Appendix A. FEMA Forms

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☒ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
530342	City of Spokane valley	WA	53063C	0751D	7/6/2010
530174	Spokane County	WA	53063C	0751D	7/6/2010

2. a. Flooding Source:

b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier:

4. FEMA zone designations affected: AE, X (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change
☐ Coastal Analysis
☐ Weir-Dam Changes
☐ New Topographic Data
☐ Improved Methodology/Data
☒ Hydraulic Analysis
☒ Levee Certification
☒ Other (Attach Description)
☒ Regulatory Floodway Revision
☐ Hydrologic Analysis
☐ Alluvial Fan Analysis
☐ Base Map Changes
☐ Corrections
☐ Natural Changes

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☒ Levee/Floodwall ☐ Bridge/Culvert

☐ Dam ☐ Fill ☒ Other (Attach Description)

6. ☒ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $$7,250

☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Kenneth D Puhn

Company: WEST Consultants, Inc.

Mailing Address:
2601 25th St SE, Suite 450
Salem, OR 97302

Daytime Telephone No.: 503-485-5490

Fax No.: 503-485-5491

E-Mail Address: kpuhn@westconsultants.com

Signature of Requester (required): KP

Date: 10/13/16

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:

Community Name: City of Spokane Valley

Mailing Address:

Daytime Telephone No.:

Fax No.:

E-Mail Address:

Community Official's Signature (required):

Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Kenneth D Puhn

License No.: 52823

Expiration Date: 8/29/2016

Company Name: WEST Consultants, Inc.

Telephone No.: 503-485-5490

Fax No.: 503-485-5491

Signature: KP

Date: 10/13/16

E-Mail Address: kpuhn@westconsultants.com

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	**Required if ...**
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

KENNETH D. PUHN
STATE OF WASHINGTON
52823
REGISTERED PROFESSIONAL ENGINEER

Seal (Optional)

Exp 8/29/14

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

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PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☒ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☐ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
530342	City of Spokane valley	WA	53063C	0751D	7/6/2010
530174	Spokane County	WA	53063C	0751D	7/6/2010

2. a. Flooding Source:

b. Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Painted Hills Development

4. FEMA zone designations affected: AE, X (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change
☐ Coastal Analysis
☐ Weir-Dam Changes
☐ New Topographic Data
☐ Improved Methodology/Data
☒ Hydraulic Analysis
☒ Levee Certification
☒ Other (Attach Description)
☒ Regulatory Floodway Revision
☐ Hydrologic Analysis
☐ Alluvial Fan Analysis
☐ Base Map Changes
☐ Corrections
☐ Natural Changes

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☒ Channelization ☒ Levee/Floodwall ☒ Bridge/Culvert
☐ Dam ☐ Fill ☒ Other (Attach Description)

6. ☒ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $$7,250
☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Kenneth D Puhn

Company: WEST Consultants, Inc.

Mailing Address:
2601 25th St SE, Suite 450
Salem, OR 97302

Daytime Telephone No.: 503-485-5490

Fax No.: 503-485-5491

E-Mail Address: kpuhn@westconsultants.com

Signature of Requester (required):

Date: 10/13/16

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title:

Community Name: Spokane County

Mailing Address:

Daytime Telephone No.:

Fax No.:

E-Mail Address:

Community Official's Signature (required):

Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: Kenneth D Puhn

License No.: 52823

Expiration Date: 8/29/2016

Company Name: WEST Consultants, Inc.

Telephone No.: 503-485-5490

Fax No.: 503-485-5491

Signature:

Date: 10/13/16

E-Mail Address: kpuhn@westconsultants.com

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	**Required if ...**
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

KENNETH D. PUHN
52823

Seal (Optional)

Exp 8/29/16

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Chester Creek and Unnamed Tributary to Chester Creek

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☒ Not revised (skip to section B)
☐ Alternative methodology
☐ No existing analysis
☐ Proposed Conditions (CLOMR)
☐ Improved data
☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records
☐ Regional Regression Equations
☐ Precipitation/Runoff Model → Specify Model: ____________
☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	See Attached Supplemental Information			
Upstream Limit*				

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used**:** HEC-RAS 4.1

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

Models Submitted	**Natural Run**		**Floodway Run**		**Datum**
Duplicate Effective Model*	File Name: ___See Attached	Plan Name:	File Name:	Plan Name:	
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information**:** 2003 LiDAR, 2ft contours

Source**:** TerraPoint

Date**:** March 2003

Accuracy**:** 2 foot contours from LiDAR, accuracy +/- 1ft

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☒ Yes ☐ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

   b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? ☒ Yes ☐ No

   If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☒ Yes ☐ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

O.M.B. NO. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

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PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Chester Creek and Unnamed Tributary

Note**:** Fill out one form for each flooding source studied.

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization..............complete Section B
Bridge/Culvert...............complete Section C
Dam..............................complete Section D
Levee/Floodwall............complete Section E
Sediment Transport........complete Section F (if required)

Description Of Modeled Structure

1. Name of Structure: Thorpe Road Culvert (Replacement)

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Thorpe Road

Downstream Limit/Cross Section: XS 21425 on Golf Course Overflow Reach

Upstream Limit/Cross Section: XS 21481 on Golf Course Overflow Reach

2. Name of Structure: Unnamed Tributary Channel Improvements (Channel widening)

Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Unnamed Tributary

Downstream Limit/Cross Section: 651

Upstream Limit/Cross Section: 1989

3. Name of Structure: Highway 27 culvert (Culvert extension)

Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

Location of Structure: Highway 27, (HEC-RAS Structure 2040)

Downstream Limit/Cross Section: 1989

Upstream Limit/Cross Section: 2080

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: Unnamed Tributary

Name of Structure: Unnamed Tributary Channel Improvements (Channel widening)

1. Hydraulic Considerations

The channel was designed to carry _____ (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

☐ Inlet to channel ☒ Outlet of channel ☐ At Drop Structures ☐ At Transitions

☐ Other locations (specify): _____

2. Channel Design Plans

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Accessory Structures

The channelization includes (check one):

☒ Levees [Attach Section E (Levee/Floodwall)] ☐ Drop structures ☐ Superelevated sections

☐ Transitions in cross sectional geometry ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] ☐ Energy dissipator

☐ Weir ☐ Other (Describe):

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? ☐ Yes ☒ No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: _____

Name of Structure: _____

1. This revision reflects (check one):

☐ Bridge/culvert not modeled in the FIS

☐ Modified bridge/culvert previously modeled in the FIS

☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): _____
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

☐ Dimensions (height, width, span, radius, length)

☐ Shape (culverts only)

☐ Material

☐ Beveling or Rounding

☐ Wing Wall Angle

☐ Skew Angle

☐ Distances Between Cross Sections

☐ Erosion Protection

☐ Low Chord Elevations – Upstream and Downstream

☐ Top of Road Elevations – Upstream and Downstream

☐ Structure Invert Elevations – Upstream and Downstream

☐ Stream Invert Elevations – Upstream and Downstream

☐ Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the structure affected by sediment transport? ☐ Yes ☐ No

If Yes, then fill out Section F (Sediment Transport) of Form 3. If no, then attach an explanation.

D. DAM/BASIN

Flooding Source: _____
Name of Structure: _____

1. This request is for (check one): ☐ Existing dam/basin ☐ New dam/basin ☐ Modification of existing dam/basin

2. The dam/basin was designed by (check one): ☐ Federal agency ☐ State agency ☐ Private organization ☐ Local government agency

   Name of the agency or organization: _____

3. The Dam was permitted as (check one): ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number __________________ Permitting Agency or Organization _____________________________

   a. ☐ Local Government Dam ☐ Private Dam

   Provided related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

   Was the dam/basin designed using critical duration storm? (must account for the maximum volume of runoff)

   ☐ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why debris/sediment analysis was not considered?

6. Does the Base Flood Elevation behind the dam/basin or downstream of the dam/basin change? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

	Stillwater Elevation Behind the Dam/Basin	
FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)	_____	_____
50-year (2%)	_____	_____
100-year (1%)	_____	_____
500-year (0.2%)	_____	_____
Normal Pool Elevation	_____	_____

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

Dishman-Mica Road Levee, Geotechnical analysis and information provided by IPEC

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):
Levee to be constructed

☐ upgrading of an existing levee/floodwall system ☒ a newly constructed levee/floodwall system ☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☒ earthen embankment, dike, berm, etc. Station 19430 to 20462
☐ structural floodwall Station _____ to _____
☐ Other (describe): Station _____ to _____

c. Structural Type (check one): ☐ monolithic cast-in place reinforced concrete ☐ reinforced concrete masonry block ☐ sheet piling
☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☒ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers): Plan, Profile, XS see sheets C4.0, C4.1, C4.3 in Appendix B

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers: NA
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: NA

2. Freeboard

a. The minimum freeboard provided above the BFE is: 3 ft

Riverine

3.0 feet or more at the downstream end and throughout	☒ Yes	☐ No
3.5 feet or more at the upstream end	☒ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☒ Yes	☐ No

Coastal NA

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures NA

a. Openings through the levee system (check one): ☐ exists ☒ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope land side is: 3:1

b. The maximum levee slope flood side is: 3:1

c. The range of velocities along the levee during the base flood is: _____ (min.) to _____ (max.)

d. Embankment material is protected by (describe what kind): Vegetation

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

_____

☐ Overall height: Sta.: _____, height _____ ft.

☐ Limiting foundation soil strength:

Strength ϕ = 32 degrees, c = 0 psf

Slope: SS = 3 (h) to 1 (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

_____ Bishops Method of Slices (circular arc)

c. Summary of stability analysis results:

E. LEVEE/FLOODWALL (CONTINUED)

5. Embankment And Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction	2.45	1.3
II	Sudden drawdown	1.86	1.0
III	Critical flood stage	2.15	1.4
IV	Steady seepage at flood stage	2.15	1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☒ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☒ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☒ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☒ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability NA

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability (continued)

   e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☒ Yes ☐ No

b. The computed range of settlement is 0 ft. to 0.04 ft.

c. Settlement of the levee crest is determined to be primarily from : ☒ Foundation consolidation ☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

The remaining interior area that is not intercepted by the primary infiltration facility is small (141 acres) and contains no channels or watercourses. Interior drainage within this area will be addressed with drywells and possibly gravel galleries in order to discharge interior precipitation into the ground. Final determination of number and locations of drywells will be determined as part of final stormwater design.

a. Specify size of each interior watershed:

Draining to pressure conduit: _____ acres
Draining to ponding area: 141 acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

e. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☒ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☒ is not a problem
Hydrocompaction ☐ is ☒ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☒ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☒ No Attach supporting documentation Levee separated from watercourse by Dishman-Mica Road

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☒ No
If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan And Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

O & M plans provided in CLOMR Appendix J

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: _____ Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-Mail Address: _____

Certification to be completed by IPEC at future date since levee is not yet built

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

Detailed sedimentation analysis (such as complete resurvey of FIS cross sections) was not conducted; however, comparison of available 2014 WCE survey and original FIS survey points does not indicate an aggradational trend at this location. It should be noted that BFEs along this levee are predicated on failure of non-certified trailer park levee (located between Chester Creek and project site) and then failure of Dishman-Mica Road (located between trailer park levee and project site). Additionally the Levee O&M manual includes provisions for monitoring the channel to ensure conveyance is maintained (maintaining a free flowing condition)

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acre-feet

Debris load associated with the base flood discharge: Volume _____ acre-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: _____

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

Dishman-Mica Road Levee, Geotechnical analysis and information provided by IPEC

1. System Elements

a. This Levee/Floodwall analysis is based on (check one): ☒ upgrading of an existing levee/floodwall system ☐ a newly constructed levee/floodwall system ☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☒ earthen embankment, dike, berm, etc. Station 20462 to 21425
☐ structural floodwall Station _____ to _____
☐ Other (describe): Station _____ to _____

c. Structural Type (check one): ☐ monolithic cast-in place reinforced concrete ☐ reinforced concrete masonry block ☐ sheet piling
☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☒ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

Plan, Profile, XS see sheets C4.2, C4.4 in Appendix B

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers: NA
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: NA

2. Freeboard

a. The minimum freeboard provided above the BFE is: 3 ft

Riverine

3.0 feet or more at the downstream end and throughout ☒ Yes ☐ No

3.5 feet or more at the upstream end ☒ Yes ☐ No

4.0 feet within 100 feet upstream of all structures and/or constrictions ☒ Yes ☐ No

Coastal NA

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater). ☐ Yes ☐ No

2.0 feet above the 1%-annual-chance stillwater surge elevation ☐ Yes ☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☒ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope land side is: 3:1

b. The maximum levee slope flood side is: 2.3:1

c. The range of velocities along the levee during the base flood is: 1.4 (min.) to 6.9 (max.)

d. Embankment material is protected by (describe what kind): vegetation

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☒ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:
STA 3+00 had most critical combination of slopes and soil conditions

☐ Overall height: Sta.: 3+00, height 8 ft.

☐ Limiting foundation soil strength:

Strength ϕ = 30 degrees, c = 0 psf

Slope: SS = 2.3 (h) to 1 (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):
Bishops Method Of Slices (circular arc)

c. Summary of stability analysis results:
Case I: 1.58
Case II: 1.50
Case III: 1.55

E. LEVEE/FLOODWALL (CONTINUED)

5. Embankment And Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction	1.58	1.3
II	Sudden drawdown	1.50	1.0
III	Critical flood stage	1.55	1.4
IV	Steady seepage at flood stage	1.55	1.4
VI	Earthquake (Case I)	1.00	1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☒ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☒ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☒ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☒ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability No Floodwall Present

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability (continued)

   e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☒ Yes ☐ No

b. The computed range of settlement is 0 ft. to 0.03 ft.

c. Settlement of the levee crest is determined to be primarily from : ☒ Foundation consolidation ☐ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction. NA

Attach engineering analysis to support construction plans.

8. Interior Drainage

The remaining interior area that is not intercepted by the primary infiltration facility is small (141 acres) and contains no channels or watercourses. Interior drainage within this area will be addressed with drywells and possibly gravel galleries in order to discharge interior precipitation into the ground. Final determination of number and locations of drywells will be determined as part of final stormwater design.

a. Specify size of each interior watershed:

Draining to pressure conduit: _____ acres
Draining to ponding area: 141 acres

b. Relationships Established

Ponding elevation vs. storage ☐ Yes ☐ No
Ponding elevation vs. gravity flow ☐ Yes ☐ No
Differential head vs. gravity flow ☐ Yes ☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

- Gravity flow (Interior Watershed) ☐ Yes ☐ No
- Common storm (River Watershed) ☐ Yes ☐ No
- Historical ponding probability ☐ Yes ☐ No
- Coastal wave overtopping ☐ Yes ☐ No

If No for any of the above, attach explanation.

e. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☒ is not a problem
Hydrocompaction ☐ is ☒ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☒ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No Attach supporting documentation Levee improvements being carried out above current floodplain

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No
If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan And Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No NA

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall O & M plans provided in CLOMR Appendix J

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: _____ Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-Mail Address: _____

Certification to be completed by IPEC at future date since levee is not yet improved

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

Detailed sedimentation analysis (such as complete resurvey of FIS cross sections) was not conducted; however, comparison of available 2014 WCE survey and original FIS survey points does not indicate an aggradational trend at this location. Additionally the levee O&M manual includes provisions for monitoring the channel to ensure conveyance is maintained (maintaining a free flowing condition)

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acre-feet

Debris load associated with the base flood discharge: Volume _____ acre-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: _____

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

Gustin Ditch Levee, Geotechnical analysis and information provided by IPEC

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):

Levee to be constructed

☐ upgrading of an existing levee/floodwall system ☒ a newly constructed levee/floodwall system ☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☒ earthen embankment, dike, berm, etc. Station 1952 to 3338

☐ structural floodwall Station _____ to _____

☐ Other (describe): Station _____ to _____

c. Structural Type (check one): ☐ monolithic cast-in place reinforced concrete ☐ reinforced concrete masonry block ☐ sheet piling

☐ Other (describe): _____

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☒ No

If Yes, by which agency? _____

e. Attach certified drawings containing the following information (indicate drawing sheet numbers): See Plan Sheets C0.0, C4.0, Sheet 1, Sheet 2. Appendix B

1. Plan of the levee embankment and floodwall structures. Sheet Numbers: _____
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers: _____
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers: NA
4. A layout detail for the embankment protection measures. Sheet Numbers: _____
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, Floodwall structure, closure structures, and pump stations. Sheet Numbers: NA

2. Freeboard

a. The minimum freeboard provided above the BFE is: 3 ft

Riverine

3.0 feet or more at the downstream end and throughout ☒ Yes ☐ No

3.5 feet or more at the upstream end ☒ Yes ☐ No

4.0 feet within 100 feet upstream of all structures and/or constrictions ☒ Yes ☐ No

Coastal NA

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater). ☐ Yes ☐ No

2.0 feet above the 1%-annual-chance stillwater surge elevation ☐ Yes ☐ No

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☒ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope land side is: 1.5:1

b. The maximum levee slope flood side is: 1:1

c. The range of velocities along the levee during the base flood is: 0.91 (min.) to 3.71 (max.)

d. Embankment material is protected by (describe what kind): Vegetation

e. Riprap Design Parameters (check one): NA ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☒ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:
Analyzed 1:1 slopes as they are most critical

☐ Overall height: Sta.: _____, height 5 ft.

☐ Limiting foundation soil strength:

Strength ϕ = 34 degrees, c = 0 psf

Slope: SS = 1 (h) to 1 (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):
Bishop's Method of Slices (circular arc)

c. Summary of stability analysis results:

E. LEVEE/FLOODWALL (CONTINUED)

5. Embankment And Foundation Stability (continued)

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction	1.03	1.3
II	Sudden drawdown	0.92	1.0
III	Critical flood stage	0.50	1.4
IV	Steady seepage at flood stage	0.50	1.4
VI	Earthquake (Case I)	0.35	1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☒ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☒ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☒ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☒ No

h. The duration of the base flood hydrograph against the embankment is _____ hours.

Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability NA

a. Describe analysis submittal based on Code (check one): ☐ UBC (1988) ☐ Other (specify): _____

b. Stability analysis submitted provides for: ☐ Overturning ☐ Sliding If not, explain: _____

c. Loading included in the analyses were: ☐ Lateral earth @ P_A = _____ psf; P_p = _____ psf

☐ Surcharge-Slope @ _____, ☐ surface _____ psf

☐ Wind @ P_w = _____ psf

☐ Seepage (Uplift); _____ ☐ Earthquake @ P_{eq} = _____ %g

☐ 1%-annual-chance significant wave height: _____ ft.

☐ 1%-annual-chance significant wave period: _____ sec.

d. Summary of Stability Analysis Results: Factors of Safety.
Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)
Note: (Extend table on an added sheet as needed and reference)

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability (continued)

   e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☒ Yes ☐ No

b. The computed range of settlement is 0 ft. to 0 ft.

c. Settlement of the levee crest is determined to be primarily from : ☐ Foundation consolidation ☒ Embankment compression ☐ Other (Describe): _____

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction. NA

Attach engineering analysis to support construction plans.

8. Interior Drainage Levee is perched and does not impound water. Uphill drainage will drain to channel, downhill drainage will flow to Left Overbank Flow Path which is modeled and mapped

a. Specify size of each interior watershed:

Draining to pressure conduit: _____ acres

Draining to ponding area: _____ acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: _____ cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

e. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is _____ cfs

h. The length of levee system used to drive this seepage rate in item g: _____ ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☒ No

If Yes, include the number of pumping plants: _____ For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☒ is not a problem
Hydrocompaction ☐ is ☒ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☒ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☒ No Attach supporting documentation

Channel adjacent to levee being widened as part of project and BFEs will be lower

d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No
If Yes, then fill out Section F (Sediment Transport). If No, then attach your explanation for why sediment transport was not considered.

10. Operational Plan And Criteria

a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No

c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No If the answer is No to any of the above, please attach supporting documentation.

E. LEVEE/FLOODWALL (CONTINUED)

11. Maintenance Plan

Please attach a copy of the fomal maintenance plan for the levee/floodwall

O & M plans provided in CLOMR Appendix J

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

CERTIFICATION OF THE LEVEE DOCUMENTION

This certification is to be signed and sealed by a licensed registered professional engineer authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.10(e) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: _____ License No.: _____ Expiration Date: _____

Company Name: _____ Telephone No.: _____ Fax No.: _____

Signature: _____ Date: _____ E-Mail Address: _____

Certification to be completed by IPEC
at future date since levee is not yet improved

F. SEDIMENT TRANSPORT

Flooding Source: _____

Name of Structure: _____

Detailed sedimentation analysis was not conducted and comparison of FIS and current channel elevations is not possible since the ditch is regularly maintained by backhoe. Additionally, the evee O&M manual includes provisions for monitoring the channel to ensure conveyance is maintained (maintaining a free flowing condition)

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume _____ acre-feet

Debris load associated with the base flood discharge: Volume _____ acre-feet

Sediment transport rate _____ (percent concentration by volume)

Method used to estimate sediment transport: _____

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition: _____

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport: _____

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

MT-2 Supplemental Information

Form 1 Section B, Item 5a/b

Other: Construction of storage and infiltration facilities to intercept floodwaters prior to entering development site.

Form 2 Section B

Reaches to be revised

Chester Creek – Golf Course Overflow				
	Description	Cross Section	Effective WSE	Proposed WSE
Downstream Limit	Storage Area 1 at end of Golf Course Overflow Reach	A - 0	2008.1	n/a (no 1% floodplain at this location)
Upstream Limit	Beginning of Golf Course Overflow Reach (diversion from Chester Creek)	N - 4318	2023.0	2023.0
Unnamed Tributary to Chester Creek				
	Description	Cross Section	Effective WSE	Proposed WSE
Downstream Limit	Storage Area 6	A - 0	2008.1	n/a (no 1% floodplain at this location)
Upstream Limit	Highway 20 culvert crossing	R -3485	2020.8	2020.8

Models Submitted

Chester Creek – Golf Course Overflow					
	Natural Run		Floodway Run		Datum
	File	Plan	File	Plan	
DEM	CCMain.prj	DEM	CCMain.prj	DEM FW	NAVD88
CEM	CCMain.prj	CEM	CCMain.prj	CEM FW	NAVD88
ECM	CCMain.prj	ECM	CCMain.prj	ECM FW	NAVD88
PCM	CCMain.prj	PCM	CCMain.prj	PCM FW	NAVD88
Unnamed Tributary to Chester Creek					
	Natural Run		Floodway Run		Datum
	File	Plan	File	Plan	
DEM	CCTrib.prj	DEM	CCTrib.prj	DEM FW	NAVD88
CEM	CCTrib.prj	CEM	CCTrib.prj	CEM FW	NAVD88
ECM	CCTrib.prj	ECM	CCTrib.prj	ECM FW	NAVD88
PCM	CCTrib.prj	PCM	CCTrib.prj	PCM FW	NAVD88
Unnamed Tributary to Chester Creek, without DS Levee					
	Natural Run		Floodway Run		Datum
	File	Plan	File	Plan	

DEM	CCTrib.prj	DEM w/o DS lev	CCTrib.prj	DEM w/o DS lev FW	NAVD88
CEM	CCTrib.prj	CEM w/o DS lev	CCTrib.prj	CEM w/o DS lev FW	NAVD88
ECM	CCTrib.prj	ECM w/o DS lev	CCTrib.prj	ECM w/o DS lev FW	NAVD88
PCM	CCTrib.prj	PCM w/o DS lev	n/a	n/a	NAVD88

Form 3 Section B – Channelization – Unnamed Tributary of Chester Creek

1. Current ditch/channel of Unnamed Tributary between Highway 27 (RS 1,952 to RS 3,338) being widened to uniform bottom width of 3 ft as part of levee construction/certification process. Supercritical shown in RAS model where channel exits to steep rock lined slope at entrance to Storage Area 6 Infiltration facility (large pit). Entrance will be rock lined to prevent erosion.
2. Plans are provided in Appendix B Sheets C0.0 through C9.3
3. Channel widening will accompany levee enhancement and certification
4. Channel is maintained by heavy equipment and levee O&M manual includes inspections to ensure channel remains in free flowing condition.

Form 3 Section B – Highway 27 Culvert (Culvert Extension) - Unnamed Tributary of Chester Creek

1. Proposed extension of existing culvert that passes water under Highway 27. Existing culvert is modeled in effective FIS. Culvert is at RAS station 2040 in effective FIS, between letter Q and R (labeled Pines Road in effective FEMA profile).
2. Modeled in HEC-RAS 4.1.0
3. Plans are provided in Appendix B Sheet C4.0
4. Unknown if culvert is affected by sediment transport but channel DS of culvert is maintained by heavy equipment and levee O&M manual includes inspections to ensure channel remains in free flowing condition.

Form 3 Section B – Thorpe Road Culvert (Replacement) - Golf Course Overflow Reach of Chester Creek

1. Proposed box culvert structure passes water from the Golf Course Overflow Reach under Thorpe Road and replaces two existing round culverts. Existing FIS does not have any structure at this location as two culverts were added after FIS.
    a. DS XS – RAS XS 21425 on Golf Course Overflow Reach
    b. US XS – RAS XS 21481 on Golf Course Overflow Reach
2. Modeled in HEC-RAS 4.1.0
3. Plans are provided in Appendix B Sheets C3.12, C5.2
4. The structure is not considered to be affected by sediment transport. This overflow path is located in a vegetated field and there is no physical channel along this reach. Accordingly, mobilization and transportation of significant amounts of sediment is unlikely. Further, average 'channel' velocities within the reach are very low for the 1% annual chance flood (1.2 ft/s; max of 3.8). Most XSs have channel velocities of under 1 ft/s.

FEDERAL EMERGENCY MANAGEMENT AGENCY

PAYMENT INFORMATION FORM

Community Name:

Project Identifier:

THIS FORM MUST BE MAILED, ALONG WITH THE APPROPRIATE FEE, TO THE ADDRESS BELOW OR FAXED TO THE FAX NUMBER BELOW.

Please make check or money order payable to the National Flood Insurance Program.

Type of Request:

☐ MT-1 application
☒ MT-2 application

LOMC Clearinghouse
847 South Pickett Street
Alexandria, VA 22304-4605
Attn.: LOMC Manager

☐ EDR application

FEMA Project Library
847 South Pickett Street
Alexandria, VA 22304-4605
FAX (703) 212-4090

Request No. (if known): ____________________ **Check No.:** ____________________ **Amount:** _____

☐ INITIAL FEE* ☐ FINAL FEE ☐ FEE BALANCE** ☐ MASTER CARD ☐ VISA ☐ CHECK ☐ MONEY ORDER

*Note: Check only for EDR and/or Alluvial Fan requests (as appropriate).

****Note: Check only if submitting a corrected fee for an ongoing request.**

COMPLETE THIS SECTION *ONLY* IF PAYING BY CREDIT CARD

CARD NUMBER EXP. DATE

☐☐☐☐ – ☐☐☐☐ – ☐☐☐☐ – ☐☐☐☐ ☐☐ – ☐☐

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 Month Year

____________ ____

Date Signature

NAME *(AS IT APPEARS ON CARD)*: ______________________
(please print or type)

ADDRESS: ______________________________________
(*for your credit card receipt-please print or type*) ______________________________________

DAYTIME PHONE: ____________________________

Appendix B. Survey Maps and Plans of Proposed Project

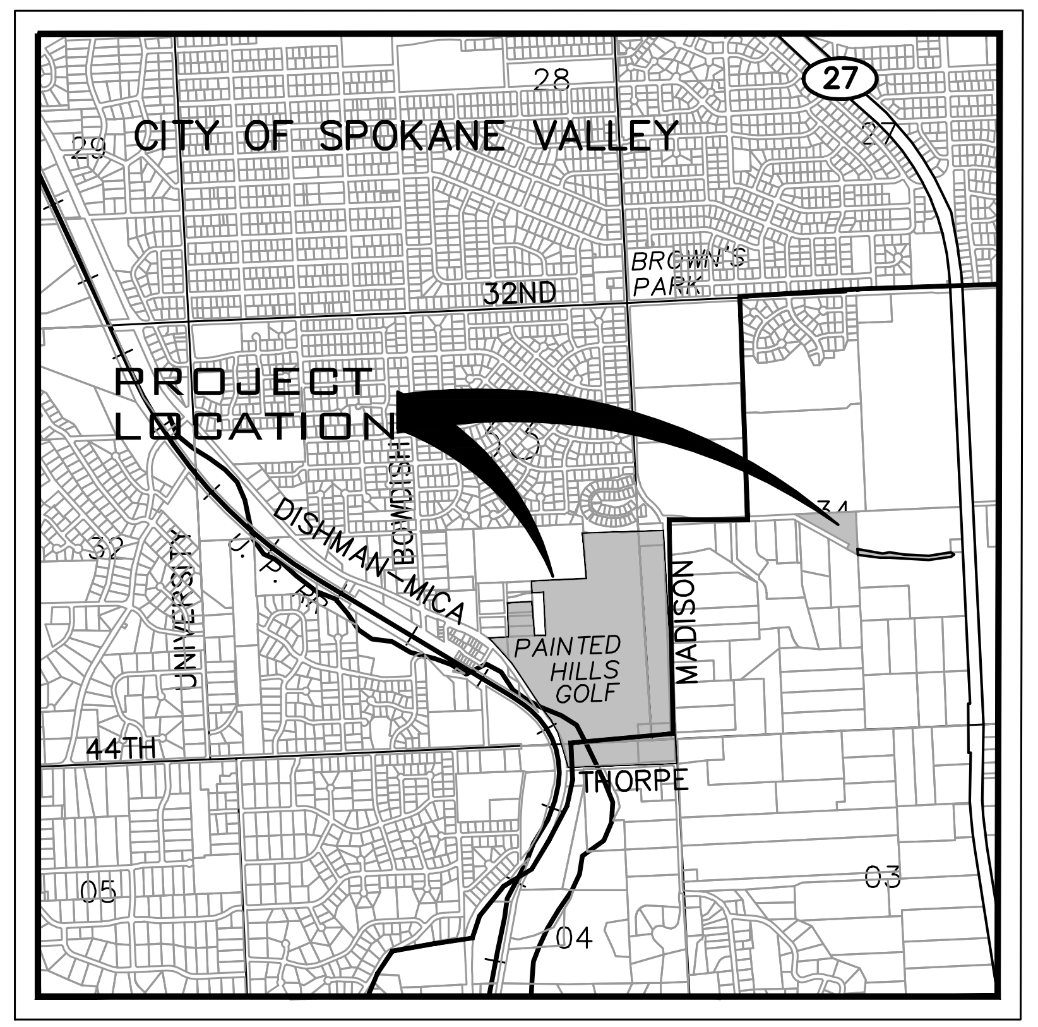
P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C0.0 COVER.dwg, 10/13/2016 2:42:59 PM

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

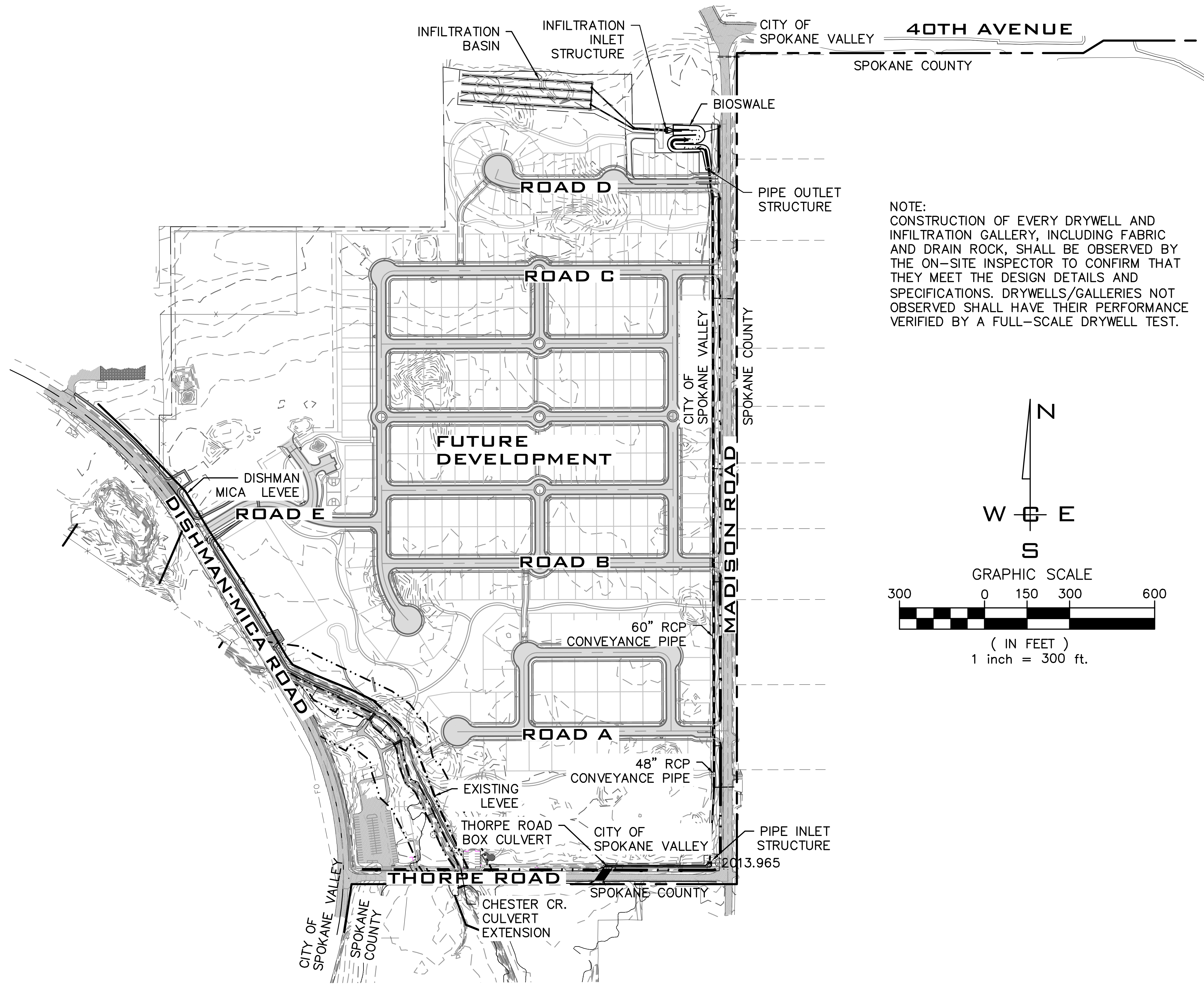
IMPROVEMENT PLANS

PAINTED HILLS FLOOD CONTROL PLANS

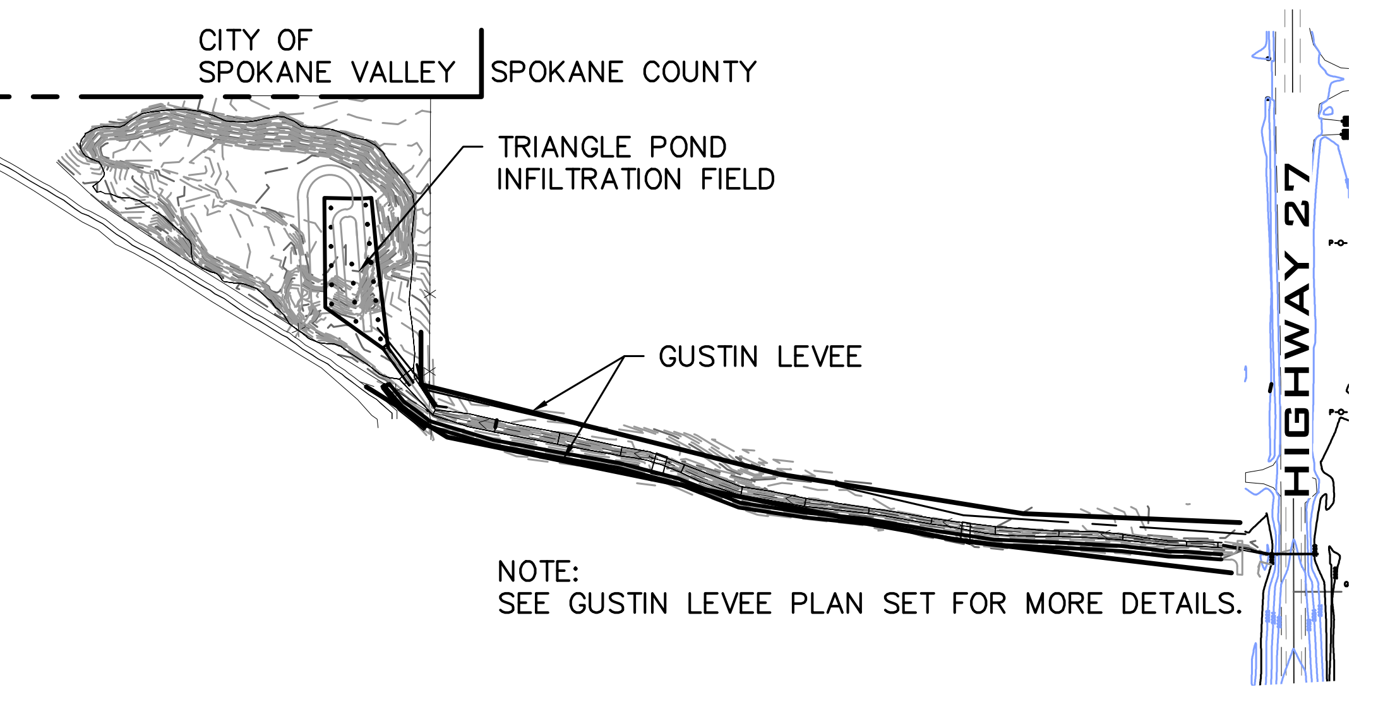
LOCATED IN A PORTION OF SE1/4, SEC. 33, T.25N., R. 44E., W.M. CITY OF SPOKANE VALLEY, WA



LOCATION MAP



NOTE:
CONSTRUCTION OF EVERY DRYWELL AND INFILTRATION GALLERY, INCLUDING FABRIC AND DRAIN ROCK, SHALL BE OBSERVED BY THE ON-SITE INSPECTOR TO CONFIRM THAT THEY MEET THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS/GALLERIES NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL-SCALE DRYWELL TEST.



NOTE:
SEE GUSTIN LEVEE PLAN SET FOR MORE DETAILS.

SITE PLAN VIEW

SCALE: 1"=300'

LEGEND

EXISTING	DESCRIPTION	PROPOSED
	ROADWAY CENTER LINE	
	RIGHT OF WAY LINE	
	PROPERTY LINE	
	EASEMENT LINE	
—x—x—	FENCE	—x—x—
	CURB	
	PAVEMENT	
	GRAVEL	
	CONCRETE	
▨	BUILDINGS & STRUCTURES	
	MONUMENT	⊕
	SEWER	
-S----S----S----S-	SANITARY SEWER	—S—S—S—S—
-S----S--Ⓢ--S----S-	MANHOLE	—S—S—○—S—
○---S----S-	CLEANOUT	○—S—S—
)---S----S-	SEWER SERVICE	)—S—S—
	WATER	
-W----W----W----W-	WATER LINE	—W—W—W—W—
-W----W--⋈--W-	VALVE	—W—⋈—W—
---W----W-	FIRE HYDRANT	—W—W—W—
○---W----W-	SERVICE	○—W—W—
---W---	WATER METER	—W—W—
---W----W-	BLOWOFF	—W—W—W
-W--W----W----W-	AIR VACUUM RELIEF STATION	—W—W—W—W
	DRAINAGE	
	DRAINAGE LINE	
MH	MANHOLE	MH
DW	DRYWELL	DW
CB	CATCH BASIN	CB
	DITCH	
	GAS	
-G----G----G----G-	GAS LINE	— G —
-G----G----G----G-	VALVE	V
GM --G----G----G-	METER	GM
	TELE-POWER	
-BT----BT----BT----	BURIED TELEPHONE	—BT— —BT—
PP	POWER OR TELEPHONE POLE	
-BP----BP----BP----	BURIED POWER	—BP— —BP—
TP	TRANSFORMER PAD	TP
TR	TELEPHONE RISER	TR
T TV	TELEPHONE VAULT	TV T
-OP----OP----OP----	OVERHEAD POWER	—OH— —OH—
GA	GUY ANCHOR	GA
PV P	POWER VAULT	P PV
LP	LIGHT POLE	LP

ABBREVIATIONS

ACT. LEN.	ACTUAL LENGTH	GB	GRADE BREAK	PRC	POINT OF REVERSE CURVE
BCR	BEGINNING OF CURVE RADIUS	FT./FT.	FEET PER FOOT	PT	POINT OF TANGENCY
BDRY.	BOUNDARY	HYD.	HYDRANT	RIM EL.	RIM ELEVATION
CO.	SEWER CLEANOUT	I.E.	INVERT ELEVATION	RD	ROAD
CSTC	CRUSHED SURFACE TOP COURSE	LN.	LANE	RT.	RIGHT
CT.	COURT	LT.	LEFT	SI	STREET INTERSECTION
DIA.	DIAMETER	MH	MANHOLE	SS	SANITARY SEWER
ECR	END OF CURVE RADIUS	MCR	MIDDLE OF CURVE RADIUS	STA.	STATION
EXIST.	EXISTING	PC	POINT OF CURVATURE	STA. LEN.	STATION LENGTH
G	GRADE	PET.	PETROLEUM	TG	TOP OF GRATE
		PI	POINT OF INTERSECTION	TC	TOP OF CURB

SHEET INDEX

PERMIT SPECIALIST
CITY OF SPOKANE VALLEY
PERMIT CENTER
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720-5240

SEWER
SPOKANE COUNTY UTILITIES
1026 W BROADWAY AVE
SPOKANE, WA 99260
PHONE: 477-7180
CONTACT: CHRIS KNUDSON

WATER
SPOKANE COUNTY WATER DISTRICT #3
1225 N YARDLEY ST
SPOKANE, WA 99212
PHONE: 536-0121
CONTACT: TY WICK

FIRE
SPOKANE VALLEY FIRE DEPT.
2120 N WILBUR RD
SPOKANE VALLEY, WA 99206
PHONE: 928-1700
CONTACT: TRACI HARVEY

ROADWAYS
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE VALLEY, WA 99206
PHONE: 688-0228
CONTACT: M. ALLEN

DEV. CONST. INSP.
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720-5324
CONTACT: JOHN JOHNSON

HEALTH
SPOKANE REGIONAL HEALTH
1101 W COLLEGE AVE
SPOKANE, WA 99260
PHONE: 324-1578
CONTACT: PAUL SAVAGE

GAS
AVISTA UTILITIES
1411 E MISSION AVE
SPOKANE, WA 99220
PHONE: 495-8610
CONTACT: MIKE TRUEX

POWER
INLAND POWER & LIGHT CO.
10100 W HALLETT RD
SPOKANE, WA 99224
PHONE: 509-789-4291
CONTACT: CONNIE NELSON

TELEPHONE
CENTURY LINK
904 N COLUMBUS ST
SPOKANE, WA 99202
PHONE: 623-0305
CONTACT: DEBORAH GEIST

DEVELOPER APPROVAL ____________________ DATE

CABLE
COMCAST BROADBAND
1717 E BUCKEYE AVE
SPOKANE, WA 99207
PHONE: 755-4717
CONTACT: BRYAN RICHARDSON

SOLID WASTE
WASTE MANAGEMENT
PHONE: 1-866-909-4558

INSPECTION
I.P.E.C.
P. O. BOX 1566
VERADALE, WA 99037
PHONE: 209-6262
CONTACT: PAUL T. NELSON, P.E.

SURVEYOR
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893-2617
CONTACT: JON GORDON, P.L.S.

ENGINEERING
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893-2617
CONTACT: TODD WHIPPLE, P.E.

OWNER
BRYAN WALKER
C/O NAI BLACK
107 S HOWARD ST
SPOKANE, WA 99201
PHONE: 623-1000
CONTACT: BRYAN WALKER

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

City of Spokane Valley Development Engineering

Reviewer: ____________________
New Street Miles – Public: __________

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted __________
Acceptance Comments

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1" = 300'
VERTICAL: N/A

PROJ #:	**13-1166**
DATE:	**08/17/16**
DRAWN:	**JPP**
REVIEWED:	**TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
COVER SHEET
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C0.0

JOB NUMBER
13-1166

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

SPOKANE VALLEY GENERAL CONSTRUCTION NOTES

(APPENDIX 4A OF CITY OF SPOKANE VALLEY STREET STANDARDS)

1. ALL WORK AND MATERIALS SHALL BE IN CONFORMANCE WITH LATEST EDITION OF THE **CITY OF SPOKANE VALLEY** STREET STANDARDS, SPOKANE REGIONAL STORMWATER MANUAL AND ALL OTHER GOVERNING AGENCY'S STANDARDS.

2. PRIOR TO SITE CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY SERVICE AT **1–800–424–5555 OR 811** BEFORE YOU DIG..

3. LOCATIONS OF EXISTING UTILITIES SHOWN IN THE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION OF ROAD AND DRAINAGE FACILITIES.

4. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF ACCEPTED STREET AND DRAINAGE PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.

5. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE APPLICANT'S ENGINEER AND ONSITE INSPECTOR.

6. THE CONTRACTOR SHOULD TAKE PRECAUTIONS TO PROTECT THE INFILTRATION CAPACITY OF STORMWATER FACILITIES (E.G., LINE THE FACILITY WITH FILTER FABRIC, OVER–EXCAVATE UPON COMPLETION OF THE INFRASTRUCTURE, ETC.)

7. WHERE DIRECTED BY **THE CITY OF SPOKANE VALLEY,** THE CONTRACTOR SHALL PLACE TRAFFIC CONTROL DEVICES, THE PLACEMENT AND TYPE OF WHICH SHALL CONFORM TO THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.).

8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH AND CONTACT ALL APPROPRIATE UTILITIES INVOLVED PRIOR TO CONSTRUCTION.

9. ALL PAVEMENT CUTS TO CONNECT UTILITIES SHALL BE REPAIRED IN CONFORMANCE WITH THE REGIONAL PAVEMENT CUT POLICY.

10. ALL SURVEY MONUMENTS SHALL BE PROTECTED DURING CONSTRUCTION BY OR UNDER THE DIRECTION OF A LICENSED SURVEYOR AS REQUIRED BY STATE LAW. ANY DISTURBED OR DAMAGED MONUMENTS SHALL BE REPLACED BY OR UNDER THE DIRECTION OF A LICENSED SURVEYOR PRIOR TO CERTIFICATION/FINAL PLAT AND/OR RELEASE OF SURETY. THE CONTRACTOR IS RESPONSIBLE FOR FILING OF PERMITS FOR MONUMENT REMOVAL AND REPLACEMENT WITH THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, AS REQUIRED BY WAC–120–070.

11. CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING AND ACQUIRING ELECTRICAL INSPECTIONS REQUIRED BY THE STATE.

12. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THAT ALL REQUIRED PERMITS HAVE BEEN OBTAINED PRIOR TO INITIATING CONSTRUCTION.

13. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL HAVE A CURRENT **CITY OF SPOKANE VALLEY** BUSINESS LICENSE.

14. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL BE LICENSED BY THE STATE OF WASHINGTON AND BONDED TO DO WORK IN THE PUBLIC RIGHT OF WAY.

15. NO WORK ON THIS PROJECT SHALL COMMENCE UNTIL A **CITY OF SPOKANE VALLEY** RIGHT OF WAY PERMIT HAS BEEN ISSUED.

16. THE CONTRACTOR SHALL PROTECT ADJACENT PROPERTIES, PUBLIC AND PRIVATE, AT ALL TIMES DURING CONSTRUCTION.

17. CONTRACTORS SHALL CONTROL DUST IN ACCORDANCE WITH REGULATIONS OF LOCAL AIR POLLUTION CONTROL AUTHORITY.

18. CONTRACTOR SHALL REMOVE ALL CONSTRUCTION RELATED DEBRIS TO AN APPROVED WASTE DISPOSAL SITE.

19. FIRE HYDRANTS SHALL BE INSTALLED AND FUNCTIONING PRIOR TO CONSTRUCTION OF ANY STRUCTURES.

20. CONTRACTOR SHALL MAINTAIN FIRE APPARATUS ACCESS STREETS DURING CONSTRUCTION.

21. THE CONTRACTOR IS REQUIRED TO NOTIFY THE ON–SITE INSPECTOR ONE BUSINESS DAY BEFORE ANY CONSTRUCTION OR PRODUCT PLACEMENT TAKES PLACE THAT REQUIRES TESTING OR OBSERVATION (REFER TO APPENDIX 9A– MINIMUM MATERIAL TESTING FREQUENCIES). THE ON–SITE INSPECTOR WILL DETERMINE THE TIME REQUIRED TO SATISFACTORILY ACHIEVE THE NECESSARY TESTING, OBSERVATION, AND DOCUMENTATION. THE ON–SITE INSPECTOR WILL BE REQUIRED TO BE ON SITE 100% OF THE TIME DURING HMA PLACEMENT, TRENCH WORK AND DRYWELL CONSTRUCTION OF EVERY DRYWELL, INCLUDING FABRIC AND DRAINROCK, THE ON–SITE INSPECTOR SHALL CONFIRM THAT THE DRYWELL MEETS THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL–SCALE DRYWELL TEST.

22. **SUPPLEMENTAL NOTES USED WHEN APPLICABLE**;

A. FOR ANY CURBS GRADES LESS THAN 1.0% (0.01 FT./FT., A PROFESSIONAL LAND SURVEYOR CURRENTLY LICENSED IN THE STATE OF WASHINGTON SHALL VERIFY THAT THE CURB FORMS ARE AT THE GRADES NOTED ON THE ACCEPTED PLANS, PRIOR TO PLACEMENT OF CONCRETE. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING AND COORDINATING WORK WITH THE SURVEYOR.

B. THE CONTRACTOR SHALL EMPLOY A PROFESSIONAL LAND SURVEYOR CURRENTLY LICENSED IN THE STATE OF WASHINGTON TO VERIFY THAT THE CROSS–GUTTER FORMS ARE AT THE CORRECT PLANE GRADE PRIOR TO CONCRETE PLACEMENT.

C. CONCRETE APRONS ARE REQUIRED AT THE INLET INTO ANY SWALE OR POND. THE FINISH GRADE OF THE SWALE/POND SIDE SLOPE, WHERE THE CONCRETE INLET APRON ENDS, SHALL BE A MINIMUM OF 2 INCHES BELOW THE FINISH ELEVATION OF THE CONCRETE CURB APRON EXTENSION. THE INTENTION IS TO ALLOW STORMWATER RUNOFF TO ENTER THE SWALE/POND UNOBSTRUCTED, WITHOUT BACKING UP INTO THE STREET AND GUTTER DUE TO SOD OVERGROWTH AT THE INLET.

D. UNLINED POND AND BIO–INFILTRATION SWALE BOTTOMS ARE EXPECTED TO INFILTRATE VIA THE POND FLOOR, AND THEREFORE, SHALL NOT BE HEAVILY COMPACTED: EQUIPMENT TRAFFIC SHALL BE MINIMIZED ON THE POND BOTTOMS. THE FACILITY SUB–GRADE SHALL BE A MEDIUM– TO WELL–DRAINING MATERIAL, WITH A MINIMUM THICKNESS OF 48 INCHES AND A MINIMUM INFILTRATION RATE OF 0.15 IN./HR., THE FACILITY SHALL DRAIN WITHIN 72 HOURS OF A STORM EVENT. IF THE POND ALSO SERVES AS A WATER QUALITY TREATMENT FACILITY, THE TREATMENT ZONE (SOD AND 6 INCHES OF TREATMENT SOIL) SHALL BE A MEDIUM–TO WELL–DRAINING MATERIAL, WITH A MINIMUM INFILTRATION OF 0.25–0.50 IN./HR. SCARIFY THE FINISH GRADE OF THE POND BOTTOM PRIOR TO HYDROSEEDING/SODDING. TESTING THAT VERIFIES SUBGRADE MINIMUM INFILTRATION RATE MAY BE REQUIRED BY THE LOCAL JURISDICTION PRIOR TO CONSTRUCTION CERTIFICATION TO ENSURE ADEQUATE DRAINAGE, INFILTRATIVE TESTING OF THE TREATMENT ZONE IS ONLY REQUIRED IF SOILS OTHER THAN SILTY LOAM OR LOAMY SOILS ARE PROPOSED.

E. IF DURING FINAL INSPECTION, IT IS FOUND THAT THE CONSTRUCTED POND OR SWALE DOES NOT CONFORM TO THE ACCEPTED DESIGN, THE SYSTEM SHALL BE RECONSTRUCTED SO THAT IT DOES COMPLY. REFER TO APPENDIX 9A OF THE SPOKANE REGIONAL STORMWATER MANUAL FOR EROSION AND SEDIMENT CONTROL STANDARD NOTES.

GENERAL GRADING NOTES

1. CONTOURS AND / OR ELEVATIONS SHOWN ARE FOR FINISHED PAVING, SIDEWALK, SLAB, OR GROUND. ADJUSTMENT TO SUBGRADE IS THE CONTRACTOR'S RESPONSIBILITY.

2. ALL DISTURBED AREAS THAT ARE UNSURFACED OR ARE NOT DESIGNATED AS LANDSCAPE AREAS ARE TO BE SEEDED, FERTILIZED, AND WATERED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.

3. IF DURING THE OVERLOT GRADING PROCESS, CONDITIONS ARE ENCOUNTERED WHICH COULD INDICATE AN UNIDENTIFIED SITUATION IS PRESENT, THE SOILS ENGINEER SHALL BE CONTACTED FOR RECOMMENDATIONS.

4. UNLESS OTHERWISE SHOWN, NO PROPOSED SLOPE SHALL EXCEED THREE (3) HORIZONTAL TO ONE (1) VERTICAL. ALL SLOPED AREAS MUST BE PROTECTED FROM EROSION.

5. IF STRIPPED MATERIALS CONSISTING OF VEGETATION AND ORGANIC MATERIALS ARE STOCKPILED ON THE SITE, TOPSOIL MAY BE PLACED TO A HEIGHT OF FIVE FEET. SILT FENCE SHALL BE PLACED AROUND THE BASE OF THE STOCKPILE AND THE STOCKPILE SHALL BE SEEDED WITH NATIVE SEED MIX IMMEDIATELY AFTER STRIPPING OPERATIONS ARE COMPLETE.

6. SPOT ELEVATIONS SHALL TAKE PRECEDENCE OVER CONTOURS AND SLOPES SHOWN. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF SPOT ELEVATIONS THAT DO NOT APPEAR TO BE CONSISTENT WITH THE CONTOURS AND SLOPES. SPOT ELEVATIONS AND SPECIFIC PROFILE DESIGN SHALL BE USED FOR SETTING ELEVATIONS OF CURB, GUTTER, AND UTILITIES. SPOT ELEVATIONS SHALL BE USED FOR FINISHED GRADE.

7. BENCHMARK VERIFICATION: CONTRACTOR SHALL USE BENCHMARKS AND DATUMS SHOWN HEREON TO SET PROJECT BENCH MARK'S), BY RUNNING A LEVEL LOOP BETWEEN AT LEAST TWO BENCHMARKS, AND SHALL PROVIDE SURVEY NOTES OF SUCH TO PROJECT ENGINEER PRIOR TO COMMENCING CONSTRUCTION.

8. ALL UTILITIES (MANHOLES, VALVE COVERS, CLEANOUTS, VAULTS, BOXES, ETC.) SHALL BE ADJUSTED TO FINAL GRADE PRIOR TO THE FINAL LIFT OF ASPHALT.

9. GRADES WITHIN ASPHALT PARKING AREAS SHALL BE CONSTRUCTED TO WITHIN 0.10 FEET OF THE DESIGN GRADE. HOWEVER, THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE IN ALL PAVEMENT AREAS AND ALONG ALL CURBS. ALL CURBS SHALL BE BUILT IN ACCORDANCE TO THE PLAN. CURBS OR PAVEMENT AREAS WHICH DO NOT PROVIDE PROPER DRAINAGE MUST BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

10. SPOT ELEVATIONS REPRESENT FLOW LINE OR TOP OF ASPHALT UNLESS OTHERWISE NOTED.

11. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING HIS OWN ESTIMATE OF EARTHWORK QUANTITIES.

12. WHERE NEW CURB AND GUTTER IS BEING CONSTRUCTED ADJACENT TO EXISTING ASPHALT OR CONCRETE PAVEMENT, THE FOLLOWING SHALL APPLY: PRIOR TO PLACEMENT OF ANY CONCRETE THE CONTRACTOR SHALL HAVE A LICENSED SURVEYOR VERIFY THE GRADE AND CROSS SLOPE OF THE CURB AND GUTTER FORMS. THE CONTRACTOR SHALL SUBMIT THE SLOPES AND GRADES TO THE ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF CONCRETE. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY SECTION WHICH DOES NOT CONFORM TO THE DESIGN OR TYPICAL CROSS SECTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CURB AND GUTTER POURS WITHOUT THE APPROVAL OF THE ENGINEER.

13. THE EARTHWORK FOR ALL BUILDING FOUNDATIONS AND SLABS SHALL BE IN ACCORDANCE WITH ARCHITECTURAL BUILDING PLANS AND SPECIFICATIONS.

14. PRE CAST STRUCTURES MAY BE USED AT CONTRACTORS OPTION.

15. EXISTING DRAINAGE STRUCTURES TO BE INSPECTED AND REPAIR AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.

16. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.

17. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.

18. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.

19. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.

20. TOPOGRAPHIC INFORMATION TAKEN FROM A TOPOGRAPHIC SURVEY PROVIDED BY THE OWNER . IF CONTRACTOR DOES NOT ACCEPT EXISTING TOPOGRAPHY AS SHOWN ON THE PLANS. WITHOUT EXCEPTION, HE SHALL HAVE MADE, AT HIS EXPENSE, A TOPOGRAPHIC SURVEY BY A REGISTERED LAND SURVEYOR AND SUBMIT IT TO THE OWNER FOR REVIEW.

21. ALL UNSURFACED AREA DISTURBED BY GRADING OPERATION SHALL RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3H:1V OR STEEPER. (CONTRACTOR SHALL PLACE SOD OR HYDROSEED DISTURBED AREAS IN ACCORDANCE WITH CITY/COUNTY SPECIFICATIONS AND MAINTAINED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.)

22. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND SITE SHALL BE CONSTRUCTED TO SAME.

23. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL UTILITIES AND NOTIFYING THE APPROPRIATE UTILITY COMPANY PRIOR TO BEGINNING CONSTRUCTION.

24. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.

25. ENGINEER SHALL BE NOTIFIED WHEN 'CURBING STRING LINE' HAS BEEN SET, PRIOR TO CURBING BEING INSTALLED.

City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
GENERAL NOTES
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

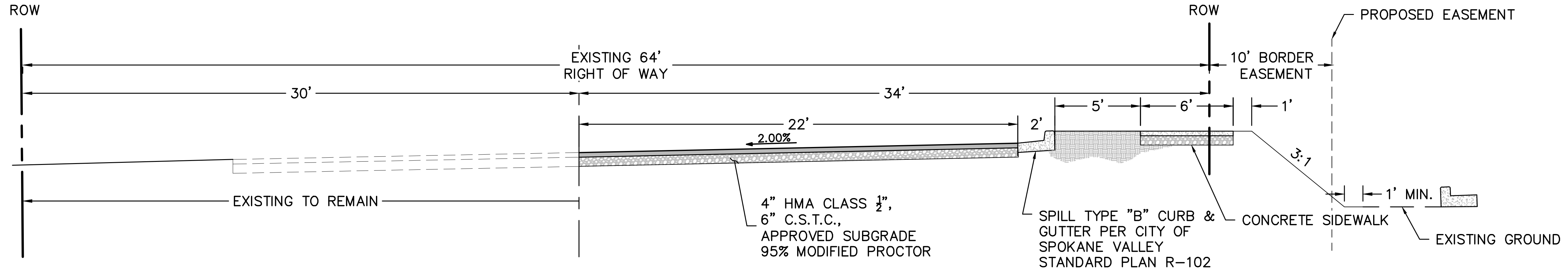
SHEET
C0.1

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C0.1 GENERAL NOTES.dwg, 10/13/2016 2:48:27 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW½, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

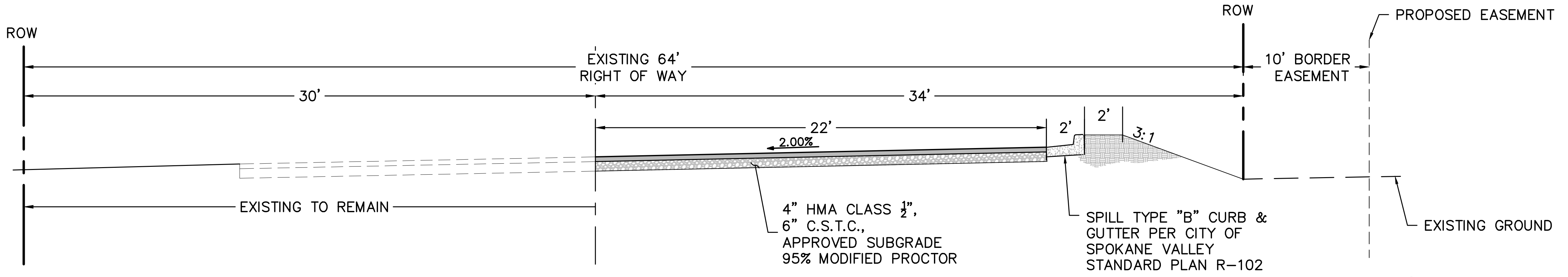


TYPICAL DISHMAN-MICA RD CROSS SECTION

①

NOT TO SCALE

STA. 20+59.67 TO STA. 24+50.31

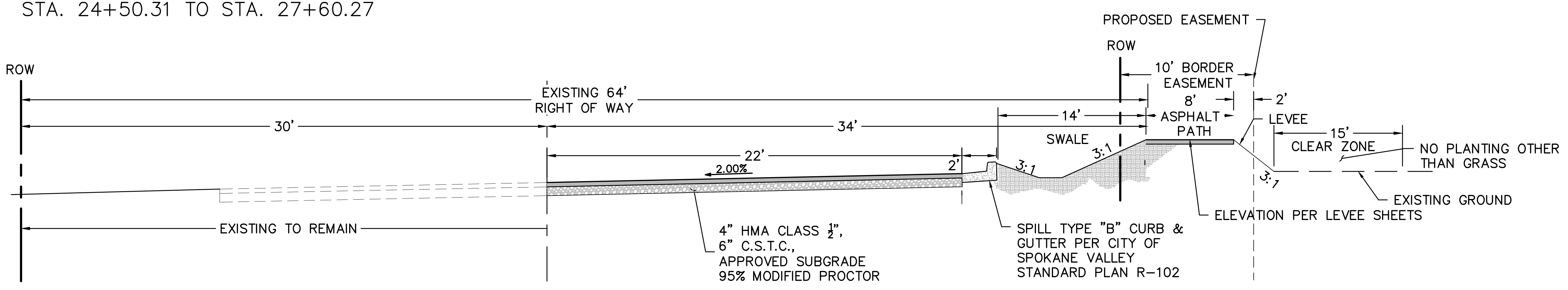


TYPICAL DISHMAN-MICA RD CROSS SECTION

②

NOT TO SCALE

STA. 24+50.31 TO STA. 27+60.27

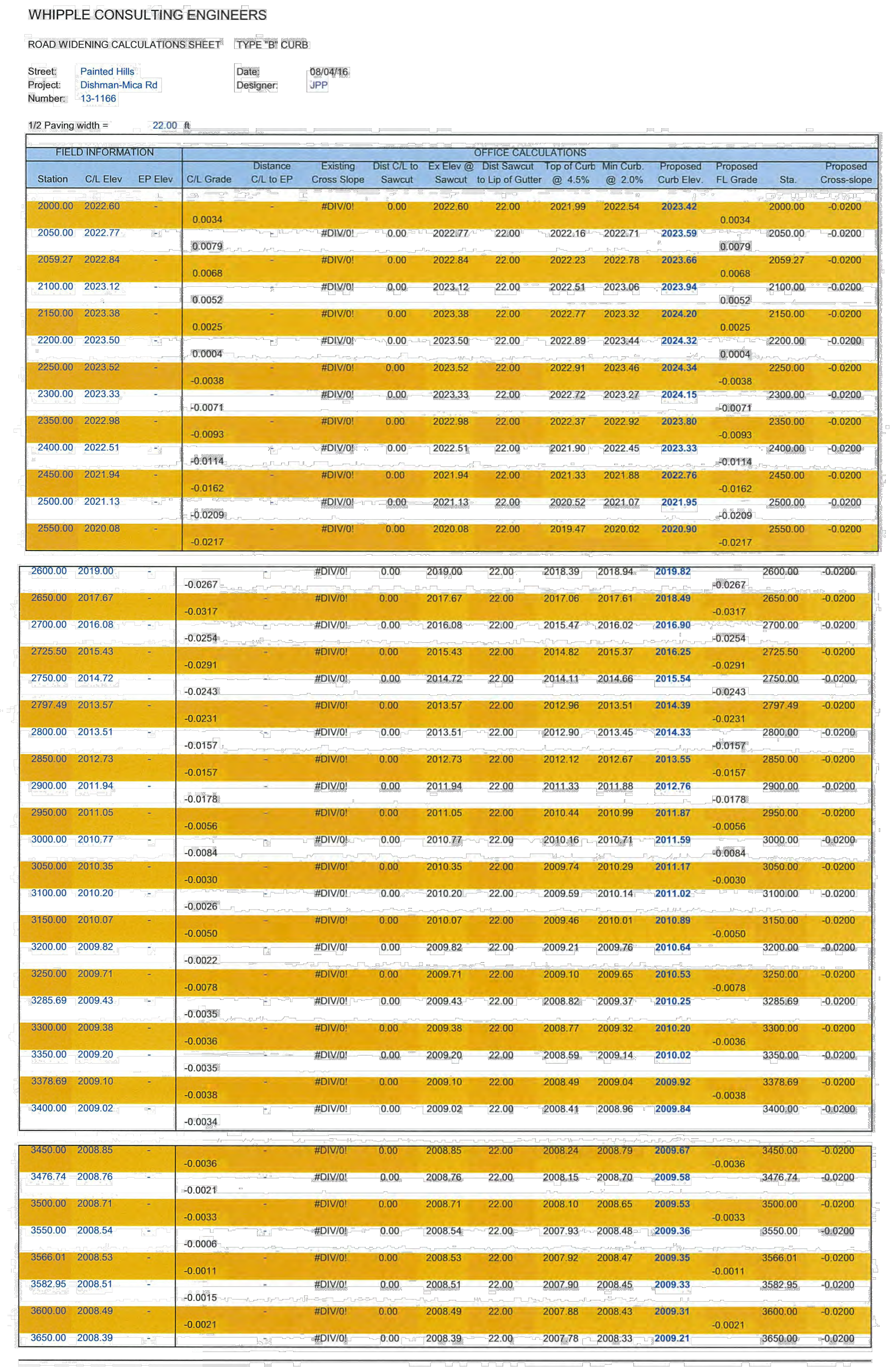


TYPICAL DISHMAN-MICA RD CROSS SECTION WITH LEVEE

③

NOT TO SCALE

STA. 27+60.27 TO STA. 35+81.87



WHIPPLE CONSULTING ENGINEERS

ROAD WIDENING CALCULATIONS SHEET   TYPE "B" CURB

Street: Painted Hills
Project: Dishman-Mica Rd
Number: 13-1166

Date: 08/04/16
Designer: JPP

1/2 Paving width = 22.00 ft

FIELD INFORMATION			OFFICE CALCULATIONS											
Station	C/L Elev	EP Elev	C/L Grade	Distance C/L to EP	Existing Cross Slope	Dist C/L to Sawcut	Ex Elev @ Sawcut	Dist Sawcut to Lip of Gutter	Top of Curb @ 4.5%	Min Curb. @ 2.0%	Proposed Curb Elev.	Proposed FL Grade	Sta.	Proposed Cross-slope
2000.00	2022.60	-	0.0034	-	#DIV/0!	0.00	2022.60	22.00	2021.99	2022.54	**2023.42**	0.0034	2000.00	-0.0200
2050.00	2022.77	-	0.0079	-	#DIV/0!	0.00	2022.77	22.00	2022.16	2022.71	**2023.59**	0.0079	2050.00	-0.0200
2059.27	2022.84	-	0.0068	-	#DIV/0!	0.00	2022.84	22.00	2022.23	2022.78	**2023.66**	0.0068	2059.27	-0.0200
2100.00	2023.12	-	0.0052	-	#DIV/0!	0.00	2023.12	22.00	2022.51	2023.06	**2023.94**	0.0052	2100.00	-0.0200
2150.00	2023.38	-	0.0025	-	#DIV/0!	0.00	2023.38	22.00	2022.77	2023.32	**2024.20**	0.0025	2150.00	-0.0200
2200.00	2023.50	-	0.0004	-	#DIV/0!	0.00	2023.50	22.00	2022.89	2023.44	**2024.32**	0.0004	2200.00	-0.0200
2250.00	2023.52	-	-0.0038	-	#DIV/0!	0.00	2023.52	22.00	2022.91	2023.46	**2024.34**	-0.0038	2250.00	-0.0200
2300.00	2023.33	-	-0.0071	-	#DIV/0!	0.00	2023.33	22.00	2022.72	2023.27	**2024.15**	-0.0071	2300.00	-0.0200
2350.00	2022.98	-	-0.0093	-	#DIV/0!	0.00	2022.98	22.00	2022.37	2022.92	**2023.80**	-0.0093	2350.00	-0.0200
2400.00	2022.51	-	-0.0114	-	#DIV/0!	0.00	2022.51	22.00	2021.90	2022.45	**2023.33**	-0.0114	2400.00	-0.0200
2450.00	2021.94	-	-0.0162	-	#DIV/0!	0.00	2021.94	22.00	2021.33	2021.88	**2022.76**	-0.0162	2450.00	-0.0200
2500.00	2021.13	-	-0.0209	-	#DIV/0!	0.00	2021.13	22.00	2020.52	2021.07	**2021.95**	-0.0209	2500.00	-0.0200
2550.00	2020.08	-	-0.0217	-	#DIV/0!	0.00	2020.08	22.00	2019.47	2020.02	**2020.90**	-0.0217	2550.00	-0.0200
2600.00	2019.00	-	-0.0267	-	#DIV/0!	0.00	2019.00	22.00	2018.39	2018.94	**2019.82**	-0.0267	2600.00	-0.0200
2650.00	2017.67	-	-0.0317	-	#DIV/0!	0.00	2017.67	22.00	2017.06	2017.61	**2018.49**	-0.0317	2650.00	-0.0200
2700.00	2016.08	-	-0.0254	-	#DIV/0!	0.00	2016.08	22.00	2015.47	2016.02	**2016.90**	-0.0254	2700.00	-0.0200
2725.50	2015.43	-	-0.0291	-	#DIV/0!	0.00	2015.43	22.00	2014.82	2015.37	**2016.25**	-0.0291	2725.50	-0.0200
2750.00	2014.72	-	-0.0243	-	#DIV/0!	0.00	2014.72	22.00	2014.11	2014.66	**2015.54**	-0.0243	2750.00	-0.0200
2797.49	2013.57	-	-0.0231	-	#DIV/0!	0.00	2013.57	22.00	2012.96	2013.51	**2014.39**	-0.0231	2797.49	-0.0200
2800.00	2013.51	-	-0.0157	-	#DIV/0!	0.00	2013.51	22.00	2012.90	2013.45	**2014.33**	-0.0157	2800.00	-0.0200
2850.00	2012.73	-	-0.0157	-	#DIV/0!	0.00	2012.73	22.00	2012.12	2012.67	**2013.55**	-0.0157	2850.00	-0.0200
2900.00	2011.94	-	-0.0178	-	#DIV/0!	0.00	2011.94	22.00	2011.33	2011.88	**2012.76**	-0.0178	2900.00	-0.0200
2950.00	2011.05	-	-0.0056	-	#DIV/0!	0.00	2011.05	22.00	2010.44	2010.99	**2011.87**	-0.0056	2950.00	-0.0200
3000.00	2010.77	-	-0.0084	-	#DIV/0!	0.00	2010.77	22.00	2010.16	2010.71	**2011.59**	-0.0084	3000.00	-0.0200
3050.00	2010.35	-	-0.0030	-	#DIV/0!	0.00	2010.35	22.00	2009.74	2010.29	**2011.17**	-0.0030	3050.00	-0.0200
3100.00	2010.20	-	-0.0026	-	#DIV/0!	0.00	2010.20	22.00	2009.59	2010.14	**2011.02**		3100.00	-0.0200
3150.00	2010.07	-	-0.0050	-	#DIV/0!	0.00	2010.07	22.00	2009.46	2010.01	**2010.89**	-0.0050	3150.00	-0.0200
3200.00	2009.82	-	-0.0022	-	#DIV/0!	0.00	2009.82	22.00	2009.21	2009.76	**2010.64**		3200.00	-0.0200
3250.00	2009.71	-	-0.0078	-	#DIV/0!	0.00	2009.71	22.00	2009.10	2009.65	**2010.53**	-0.0078	3250.00	-0.0200
3285.69	2009.43	-	-0.0035	-	#DIV/0!	0.00	2009.43	22.00	2008.82	2009.37	**2010.25**		3285.69	-0.0200
3300.00	2009.38	-	-0.0036	-	#DIV/0!	0.00	2009.38	22.00	2008.77	2009.32	**2010.20**	-0.0036	3300.00	-0.0200
3350.00	2009.20	-	-0.0035	-	#DIV/0!	0.00	2009.20	22.00	2008.59	2009.14	**2010.02**		3350.00	-0.0200
3378.69	2009.10	-	-0.0038	-	#DIV/0!	0.00	2009.10	22.00	2008.49	2009.04	**2009.92**	-0.0038	3378.69	-0.0200
3400.00	2009.02	-	-0.0034	-	#DIV/0!	0.00	2009.02	22.00	2008.41	2008.96	**2009.84**		3400.00	-0.0200
3450.00	2008.85	-	-0.0036	-	#DIV/0!	0.00	2008.85	22.00	2008.24	2008.79	**2009.67**	-0.0036	3450.00	-0.0200
3476.74	2008.76	-	-0.0021	-	#DIV/0!	0.00	2008.76	22.00	2008.15	2008.70	**2009.58**		3476.74	-0.0200
3500.00	2008.71	-	-0.0033	-	#DIV/0!	0.00	2008.71	22.00	2008.10	2008.65	**2009.53**	-0.0033	3500.00	-0.0200
3550.00	2008.54	-	-0.0006	-	#DIV/0!	0.00	2008.54	22.00	2007.93	2008.48	**2009.36**		3550.00	-0.0200
3566.01	2008.53	-	-0.0011	-	#DIV/0!	0.00	2008.53	22.00	2007.92	2008.47	**2009.35**	-0.0011	3566.01	-0.0200
3582.95	2008.51	-	-0.0015	-	#DIV/0!	0.00	2008.51	22.00	2007.90	2008.45	**2009.33**		3582.95	-0.0200
3600.00	2008.49	-	-0.0021	-	#DIV/0!	0.00	2008.49	22.00	2007.88	2008.43	**2009.31**	-0.0021	3600.00	-0.0200
3650.00	2008.39	-		-	#DIV/0!	0.00	2008.39	22.00	2007.78	2008.33	**2009.21**		3650.00	-0.0200

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ____________
Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
ROAD CROSS SECTIONS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

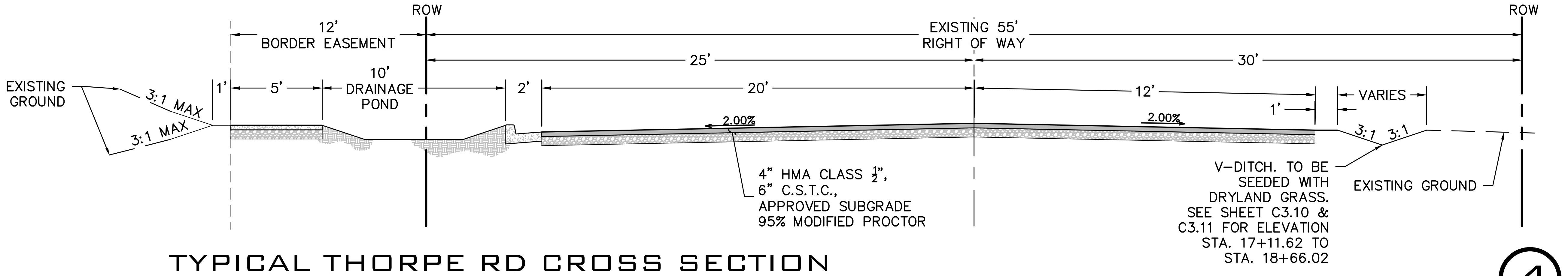
SHEET
C0.2

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C0.2 CROSS SECTIONS.dwg, 10/13/2016 2:49:05 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

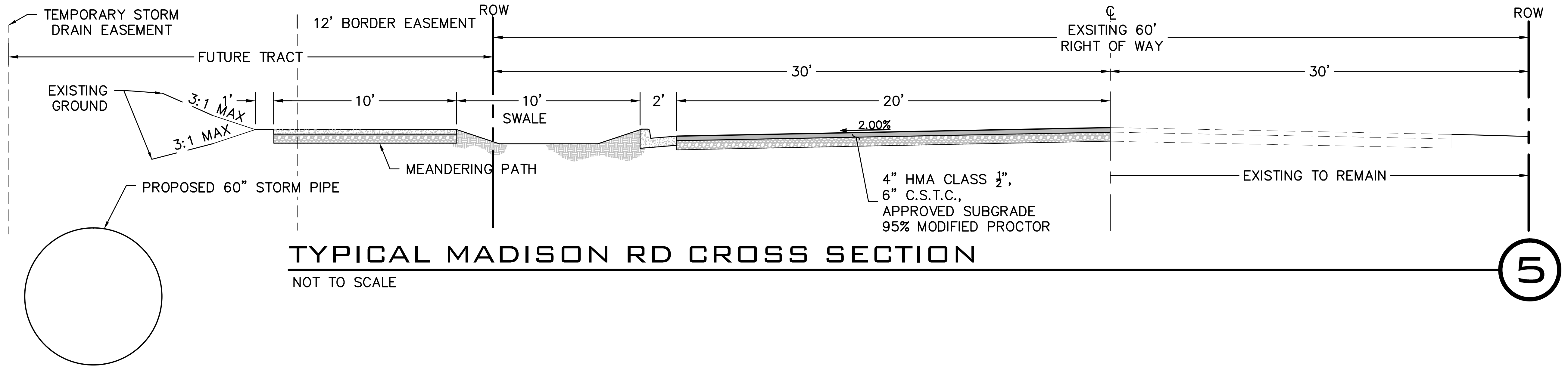
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



TYPICAL THORPE RD CROSS SECTION

NOT TO SCALE

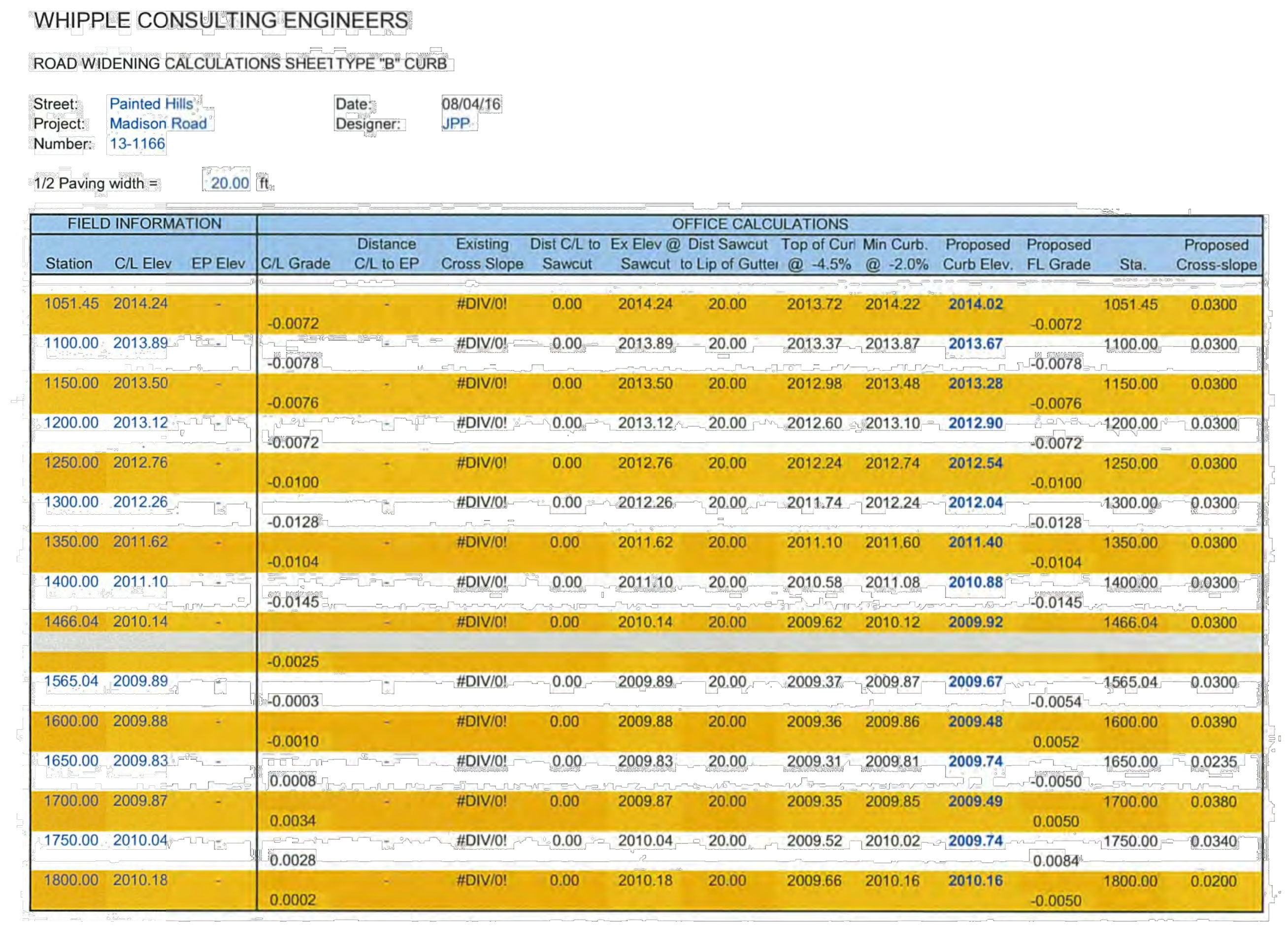
④



TYPICAL MADISON RD CROSS SECTION

NOT TO SCALE

⑤



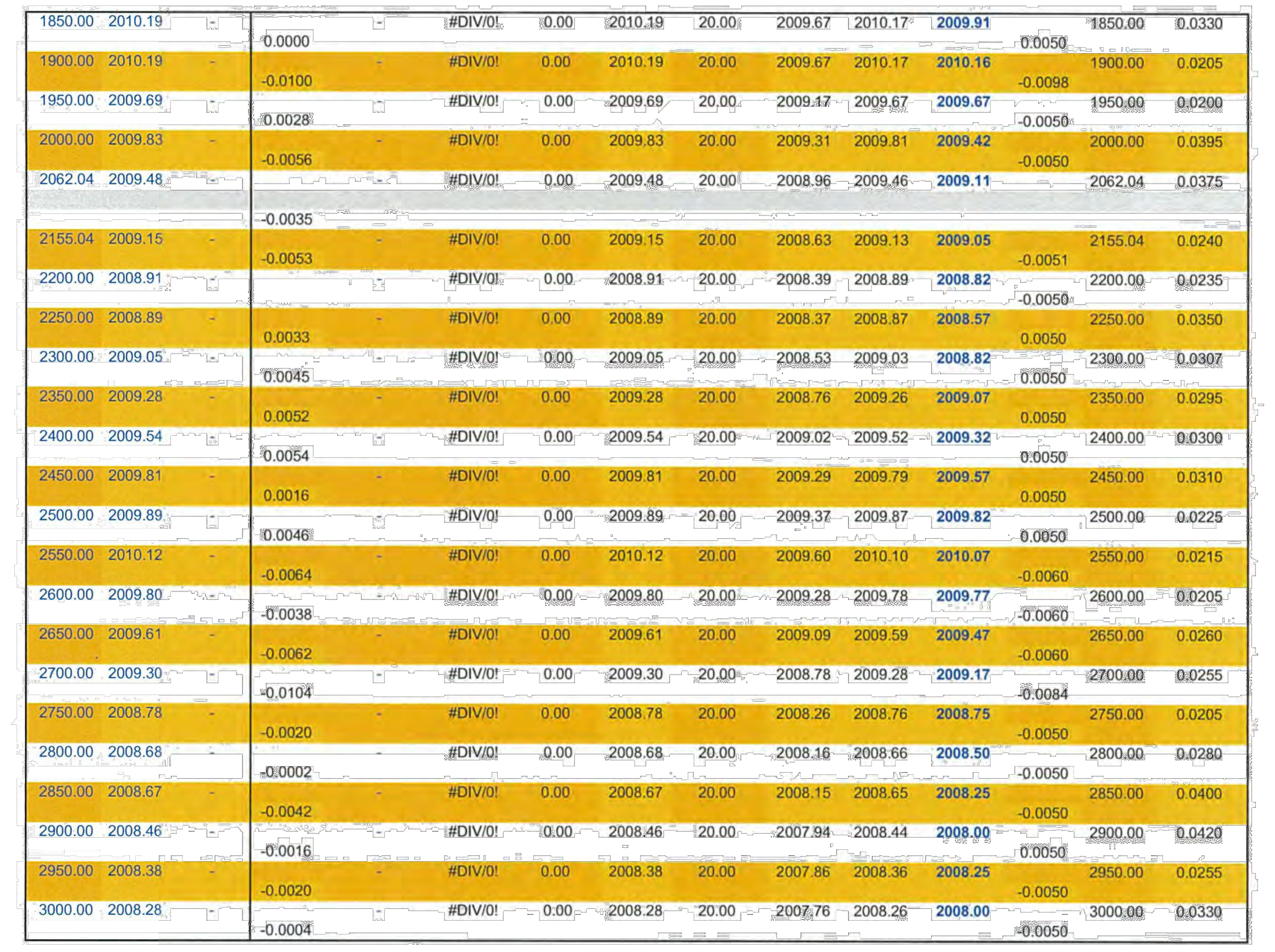
WHIPPLE CONSULTING ENGINEERS

ROAD WIDENING CALCULATIONS SHEET TYPE "B" CURB

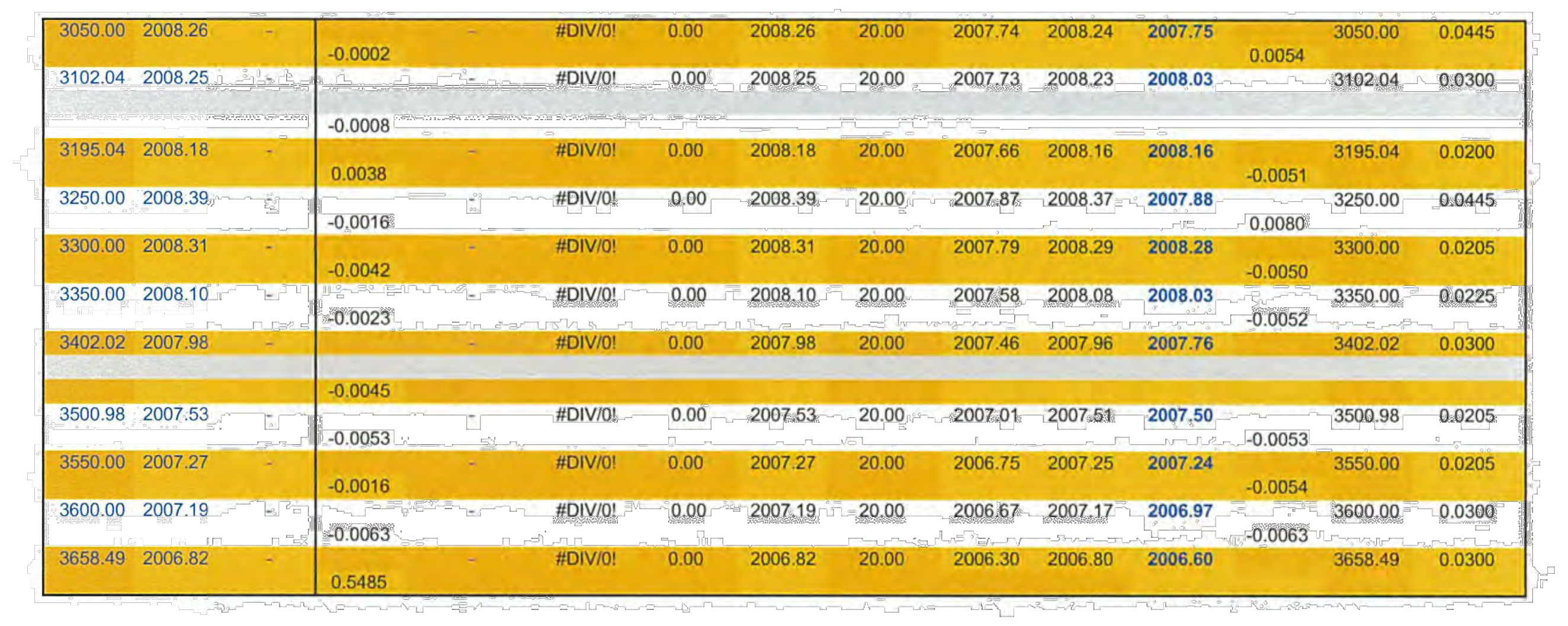
Street: Painted Hills
Project: Madison Road
Number: 13-1166
Date: 08/04/16
Designer: JPP

1/2 Paving width = 20.00 ft.

FIELD INFORMATION			OFFICE CALCULATIONS											
Station	C/L Elev	EP Elev	C/L Grade	Distance C/L to EP	Existing Cross Slope	Dist C/L to Sawcut	Ex Elev @ Sawcut	Dist Sawcut to Lip of Gutter	Top of Curb @ -4.5%	Min Curb. @ -2.0%	Proposed Curb Elev.	Proposed FL Grade	Sta.	Proposed Cross-slope
1051.45	2014.24	-	-0.0072	-	#DIV/0!	0.00	2014.24	20.00	2013.72	2014.22	**2014.02**	-0.0072	1051.45	0.0300
1100.00	2013.89	-	-0.0078	-	#DIV/0!	0.00	2013.89	20.00	2013.37	2013.87	**2013.67**	-0.0078	1100.00	0.0300
1150.00	2013.50	-	-0.0076	-	#DIV/0!	0.00	2013.50	20.00	2012.98	2013.48	**2013.28**	-0.0076	1150.00	0.0300
1200.00	2013.12	-	-0.0072	-	#DIV/0!	0.00	2013.12	20.00	2012.60	2013.10	**2012.90**	-0.0072	1200.00	0.0300
1250.00	2012.76	-	-0.0100	-	#DIV/0!	0.00	2012.76	20.00	2012.24	2012.74	**2012.54**	-0.0100	1250.00	0.0300
1300.00	2012.26	-	-0.0128	-	#DIV/0!	0.00	2012.26	20.00	2011.74	2012.24	**2012.04**	-0.0128	1300.00	0.0300
1350.00	2011.62	-	-0.0104	-	#DIV/0!	0.00	2011.62	20.00	2011.10	2011.60	**2011.40**	-0.0104	1350.00	0.0300
1400.00	2011.10	-	-0.0145	-	#DIV/0!	0.00	2011.10	20.00	2010.58	2011.08	**2010.88**	-0.0145	1400.00	0.0300
1466.04	2010.14	-		-	#DIV/0!	0.00	2010.14	20.00	2009.62	2010.12	**2009.92**		1466.04	0.0300
			-0.0025											
1565.04	2009.89	-	-0.0003	-	#DIV/0!	0.00	2009.89	20.00	2009.37	2009.87	**2009.67**	-0.0054	1565.04	0.0300
1600.00	2009.88	-	-0.0010	-	#DIV/0!	0.00	2009.88	20.00	2009.36	2009.86	**2009.48**	0.0052	1600.00	0.0390
1650.00	2009.83	-	0.0008	-	#DIV/0!	0.00	2009.83	20.00	2009.31	2009.81	**2009.74**	-0.0050	1650.00	0.0235
1700.00	2009.87	-	0.0034	-	#DIV/0!	0.00	2009.87	20.00	2009.35	2009.85	**2009.49**	0.0050	1700.00	0.0380
1750.00	2010.04	-	0.0028	-	#DIV/0!	0.00	2010.04	20.00	2009.52	2010.02	**2009.74**	0.0084	1750.00	0.0340
1800.00	2010.18	-	0.0002	-	#DIV/0!	0.00	2010.18	20.00	2009.66	2010.16	**2010.16**	-0.0050	1800.00	0.0200



1850.00	2010.19	-	0.0000	-	#DIV/0!	0.00	2010.19	20.00	2009.67	2010.17	**2009.91**	0.0050	1850.00	0.0330
1900.00	2010.19	-	-0.0100	-	#DIV/0!	0.00	2010.19	20.00	2009.67	2010.17	**2010.16**	-0.0098	1900.00	0.0205
1950.00	2009.69	-	0.0028	-	#DIV/0!	0.00	2009.69	20.00	2009.17	2009.67	**2009.67**	-0.0050	1950.00	0.0200
2000.00	2009.83	-	-0.0056	-	#DIV/0!	0.00	2009.83	20.00	2009.31	2009.81	**2009.42**	-0.0050	2000.00	0.0395
2062.04	2009.48	-		-	#DIV/0!	0.00	2009.48	20.00	2008.96	2009.46	**2009.11**		2062.04	0.0375
			-0.0035											
2155.04	2009.15	-	-0.0053	-	#DIV/0!	0.00	2009.15	20.00	2008.63	2009.13	**2009.05**	-0.0051	2155.04	0.0240
2200.00	2008.91	-		-	#DIV/0!	0.00	2008.91	20.00	2008.39	2008.89	**2008.82**	-0.0050	2200.00	0.0235
2250.00	2008.89	-	0.0033	-	#DIV/0!	0.00	2008.89	20.00	2008.37	2008.87	**2008.57**	0.0050	2250.00	0.0350
2300.00	2009.05	-	0.0045	-	#DIV/0!	0.00	2009.05	20.00	2008.53	2009.03	**2008.82**	0.0050	2300.00	0.0307
2350.00	2009.28	-	0.0052	-	#DIV/0!	0.00	2009.28	20.00	2008.76	2009.26	**2009.07**	0.0050	2350.00	0.0295
2400.00	2009.54	-	0.0054	-	#DIV/0!	0.00	2009.54	20.00	2009.02	2009.52	**2009.32**	0.0050	2400.00	0.0300
2450.00	2009.81	-	0.0016	-	#DIV/0!	0.00	2009.81	20.00	2009.29	2009.79	**2009.57**	0.0050	2450.00	0.0310
2500.00	2009.89	-	0.0046	-	#DIV/0!	0.00	2009.89	20.00	2009.37	2009.87	**2009.82**	0.0050	2500.00	0.0225
2550.00	2010.12	-	-0.0064	-	#DIV/0!	0.00	2010.12	20.00	2009.60	2010.10	**2010.07**	-0.0060	2550.00	0.0215
2600.00	2009.80	-	-0.0038	-	#DIV/0!	0.00	2009.80	20.00	2009.28	2009.78	**2009.77**	-0.0060	2600.00	0.0205
2650.00	2009.61	-	-0.0062	-	#DIV/0!	0.00	2009.61	20.00	2009.09	2009.59	**2009.47**	-0.0060	2650.00	0.0260
2700.00	2009.30	-	-0.0104	-	#DIV/0!	0.00	2009.30	20.00	2008.78	2009.28	**2009.17**	-0.0084	2700.00	0.0255
2750.00	2008.78	-	-0.0020	-	#DIV/0!	0.00	2008.78	20.00	2008.26	2008.76	**2008.75**	-0.0050	2750.00	0.0205
2800.00	2008.68	-	-0.0002	-	#DIV/0!	0.00	2008.68	20.00	2008.16	2008.66	**2008.50**	-0.0050	2800.00	0.0280
2850.00	2008.67	-	-0.0042	-	#DIV/0!	0.00	2008.67	20.00	2008.15	2008.65	**2008.25**	-0.0050	2850.00	0.0400
2900.00	2008.46	-	-0.0016	-	#DIV/0!	0.00	2008.46	20.00	2007.94	2008.44	**2008.00**	0.0050	2900.00	0.0420
2950.00	2008.38	-	-0.0020	-	#DIV/0!	0.00	2008.38	20.00	2007.86	2008.36	**2008.25**	-0.0050	2950.00	0.0255
3000.00	2008.28	-	-0.0004	-	#DIV/0!	0.00	2008.28	20.00	2007.76	2008.26	**2008.00**	-0.0050	3000.00	0.0330



3050.00	2008.26	-	-0.0002	-	#DIV/0!	0.00	2008.26	20.00	2007.74	2008.24	**2007.75**	0.0054	3050.00	0.0445
3102.04	2008.25	-		-	#DIV/0!	0.00	2008.25	20.00	2007.73	2008.23	**2008.03**		3102.04	0.0300
			-0.0008											
3195.04	2008.18	-	0.0038	-	#DIV/0!	0.00	2008.18	20.00	2007.66	2008.16	**2008.16**	-0.0051	3195.04	0.0200
3250.00	2008.39	-	-0.0016	-	#DIV/0!	0.00	2008.39	20.00	2007.87	2008.37	**2007.88**	0.0080	3250.00	0.0445
3300.00	2008.31	-	-0.0042	-	#DIV/0!	0.00	2008.31	20.00	2007.79	2008.29	**2008.28**	-0.0050	3300.00	0.0205
3350.00	2008.10	-	-0.0023	-	#DIV/0!	0.00	2008.10	20.00	2007.58	2008.08	**2008.03**	-0.0052	3350.00	0.0225
3402.02	2007.98	-		-	#DIV/0!	0.00	2007.98	20.00	2007.46	2007.96	**2007.76**		3402.02	0.0300
			-0.0045											
3500.98	2007.53	-	-0.0053	-	#DIV/0!	0.00	2007.53	20.00	2007.01	2007.51	**2007.50**	-0.0053	3500.98	0.0205
3550.00	2007.27	-	-0.0016	-	#DIV/0!	0.00	2007.27	20.00	2006.75	2007.25	**2007.24**	-0.0054	3550.00	0.0205
3600.00	2007.19	-	-0.0063	-	#DIV/0!	0.00	2007.19	20.00	2006.67	2007.17	**2006.97**	-0.0063	3600.00	0.0300
3658.49	2006.82	-	0.5485	-	#DIV/0!	0.00	2006.82	20.00	2006.30	2006.80	**2006.60**		3658.49	0.0300

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
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☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
ROAD CROSS SECTIONS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C0.3

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C0.2 CROSS SECTIONS.dwg, 10/13/2016 2:48:43 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
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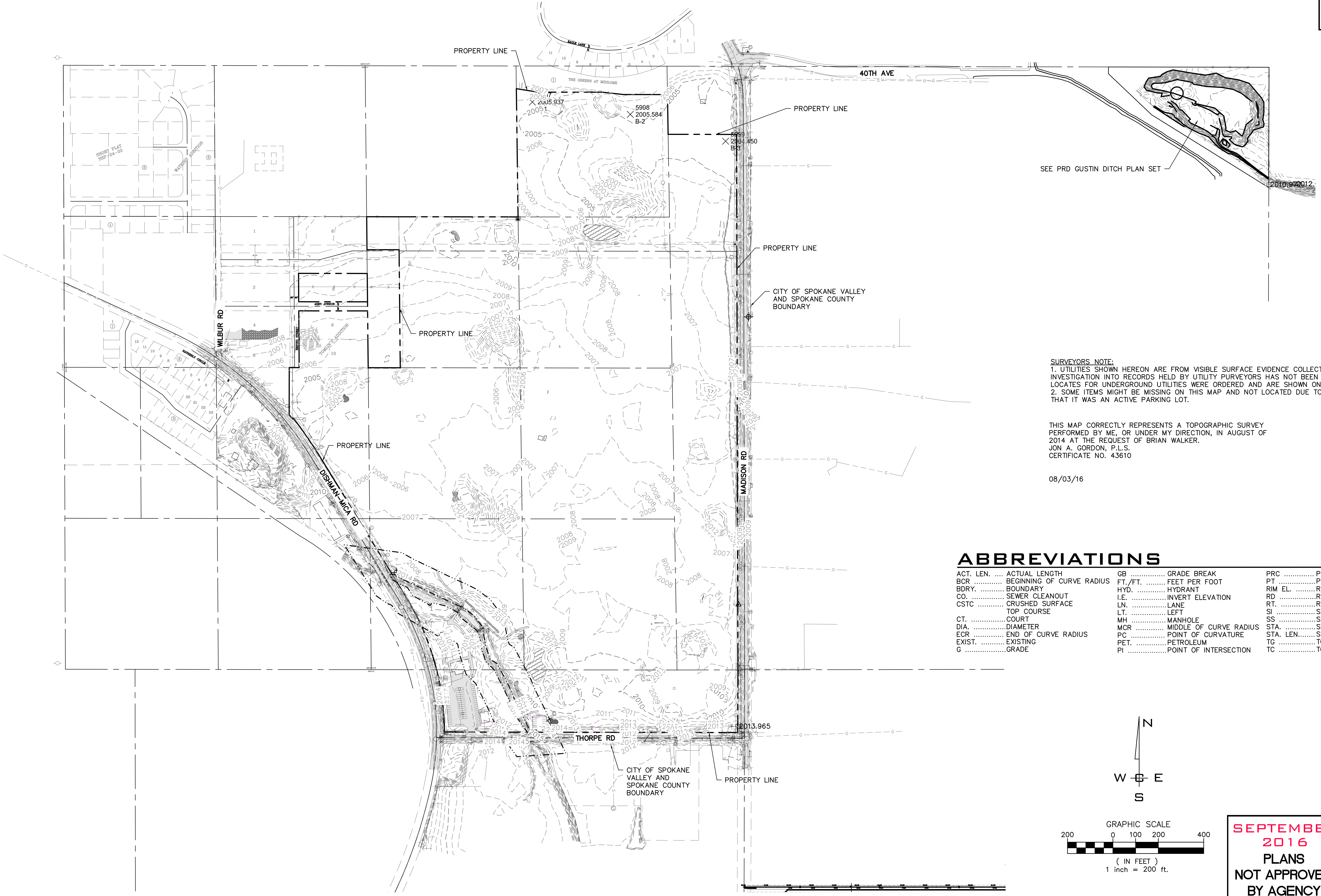
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



SURVEYORS NOTE:
1. UTILITIES SHOWN HEREON ARE FROM VISIBLE SURFACE EVIDENCE COLLECTED BY SURVEY. INVESTIGATION INTO RECORDS HELD BY UTILITY PURVEYORS HAS NOT BEEN PERFORMED. LOCATES FOR UNDERGROUND UTILITIES WERE ORDERED AND ARE SHOWN ON THIS MAP.
2. SOME ITEMS MIGHT BE MISSING ON THIS MAP AND NOT LOCATED DUE TO THE FACT THAT IT WAS AN ACTIVE PARKING LOT.

THIS MAP CORRECTLY REPRESENTS A TOPOGRAPHIC SURVEY PERFORMED BY ME, OR UNDER MY DIRECTION, IN AUGUST OF 2014 AT THE REQUEST OF BRIAN WALKER.
JON A. GORDON, P.L.S.
CERTIFICATE NO. 43610

08/03/16

ABBREVIATIONS

ACT. LEN.	ACTUAL LENGTH	GB	GRADE BREAK	PRC	POINT OF REVERSE CURVE
BCR	BEGINNING OF CURVE RADIUS	FT./FT.	FEET PER FOOT	PT	POINT OF TANGENCY
BDRY.	BOUNDARY	HYD.	HYDRANT	RIM EL.	RIM ELEVATION
CO.	SEWER CLEANOUT	I.E.	INVERT ELEVATION	RD	ROAD
CSTC	CRUSHED SURFACE TOP COURSE	LN.	LANE	RT.	RIGHT
CT.	COURT	LT.	LEFT	SI	STREET INTERSECTION
DIA.	DIAMETER	MH	MANHOLE	SS	SANITARY SEWER
ECR	END OF CURVE RADIUS	MCR	MIDDLE OF CURVE RADIUS	STA.	STATION
EXIST.	EXISTING	PC	POINT OF CURVATURE	STA. LEN.	STATION LENGTH
G	GRADE	PET.	PETROLEUM	TG	TOP OF GRATE
		PI	POINT OF INTERSECTION	TC	TOP OF CURB

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ **Not Reviewed**

☐ **Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2**
Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

JON A. GORDON
43610

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL:
1"=200'
VERTICAL:
N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

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SPOKANE VALLEY PAINTED HILLS PRD
TOPOGRAPHY (REFR. ONLY)
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C1.0

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C1.0 TOPOGRAPHY.dwg, 10/13/2016 2:49:21 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
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UNDERGROUND SERVICE ALERT
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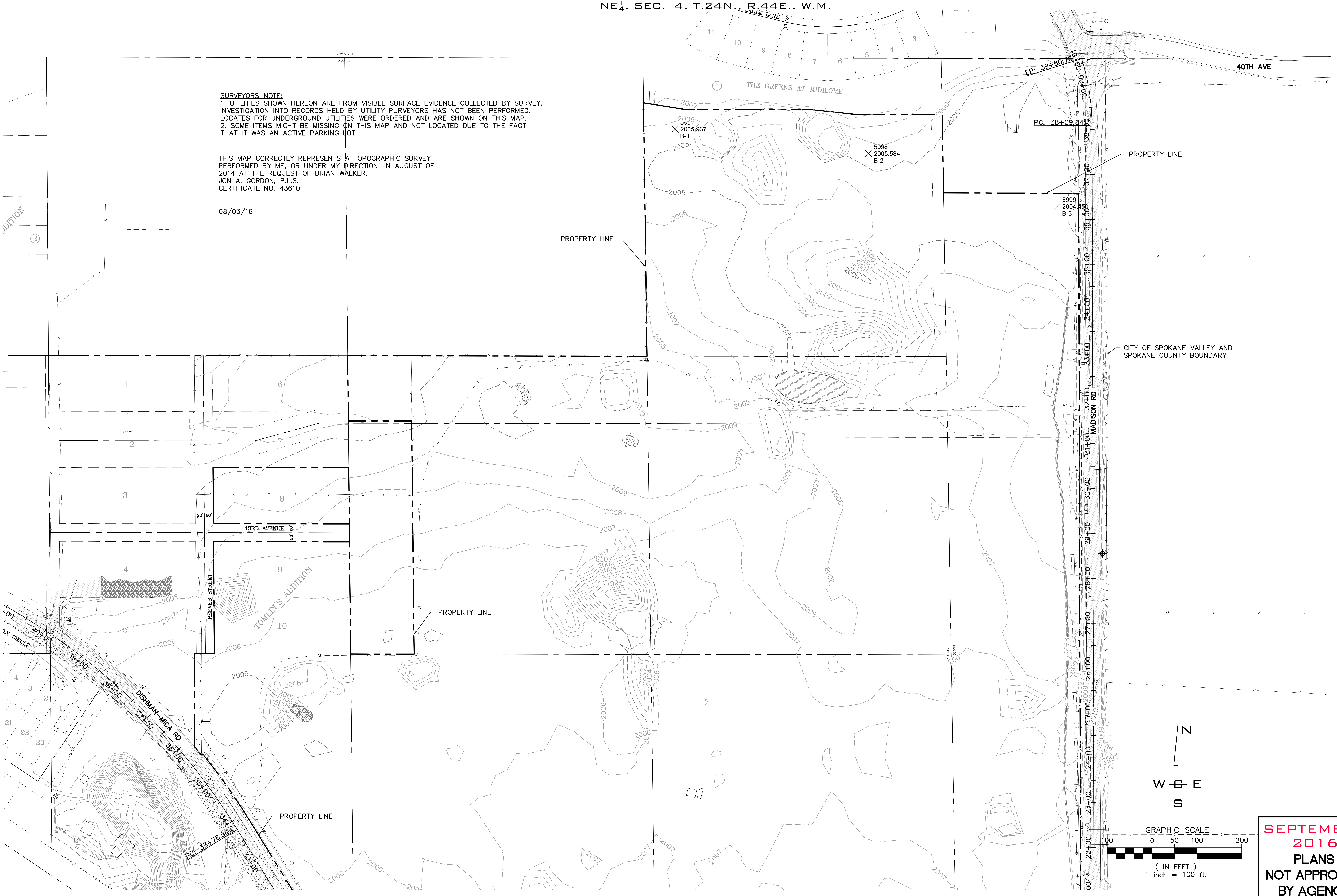

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JON A. GORDON, P.L.S.
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08/03/16

City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed

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Date Accepted ______
Acceptance Comments

SEPTEMBER
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JON A. GORDON
43610

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=100'
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
NORTH TOPOGRAPHY (REF. ONLY)
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

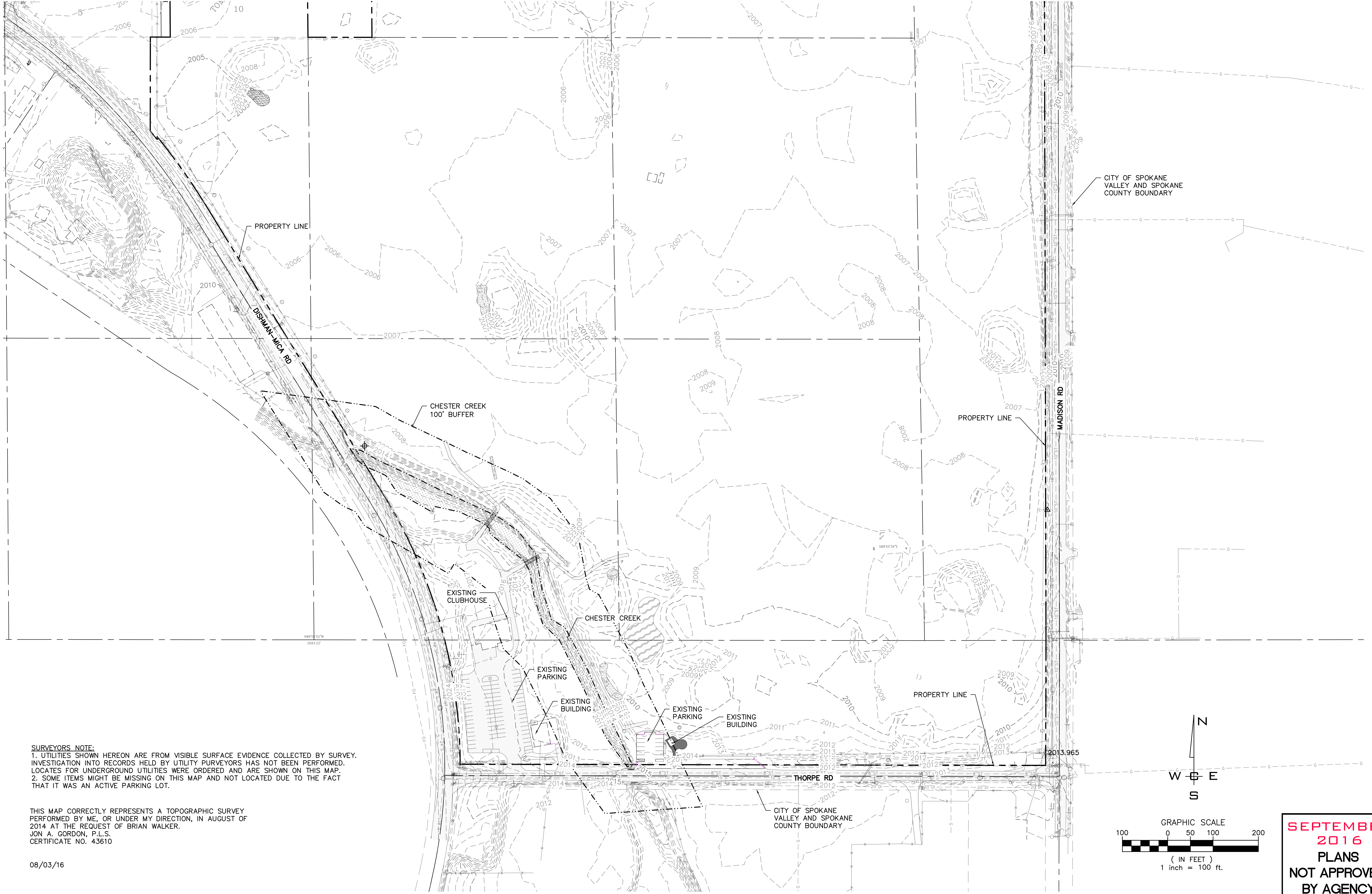
SHEET
C1.1

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C1.0 TOPOGRAPHY.dwg, 10/13/2016 2:49:42 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



SURVEYORS NOTE:
1. UTILITIES SHOWN HEREON ARE FROM VISIBLE SURFACE EVIDENCE COLLECTED BY SURVEY. INVESTIGATION INTO RECORDS HELD BY UTILITY PURVEYORS HAS NOT BEEN PERFORMED. LOCATES FOR UNDERGROUND UTILITIES WERE ORDERED AND ARE SHOWN ON THIS MAP.
2. SOME ITEMS MIGHT BE MISSING ON THIS MAP AND NOT LOCATED DUE TO THE FACT THAT IT WAS AN ACTIVE PARKING LOT.

THIS MAP CORRECTLY REPRESENTS A TOPOGRAPHIC SURVEY PERFORMED BY ME, OR UNDER MY DIRECTION, IN AUGUST OF 2014 AT THE REQUEST OF BRIAN WALKER.
JON A. GORDON, P.L.S.
CERTIFICATE NO. 43610

08/03/16

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

JON A. GORDON
43610

DATUM: NAVD - 88

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SPOKANE VALLEY,WA

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C1.2

JOB NUMBER
13-1166

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UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
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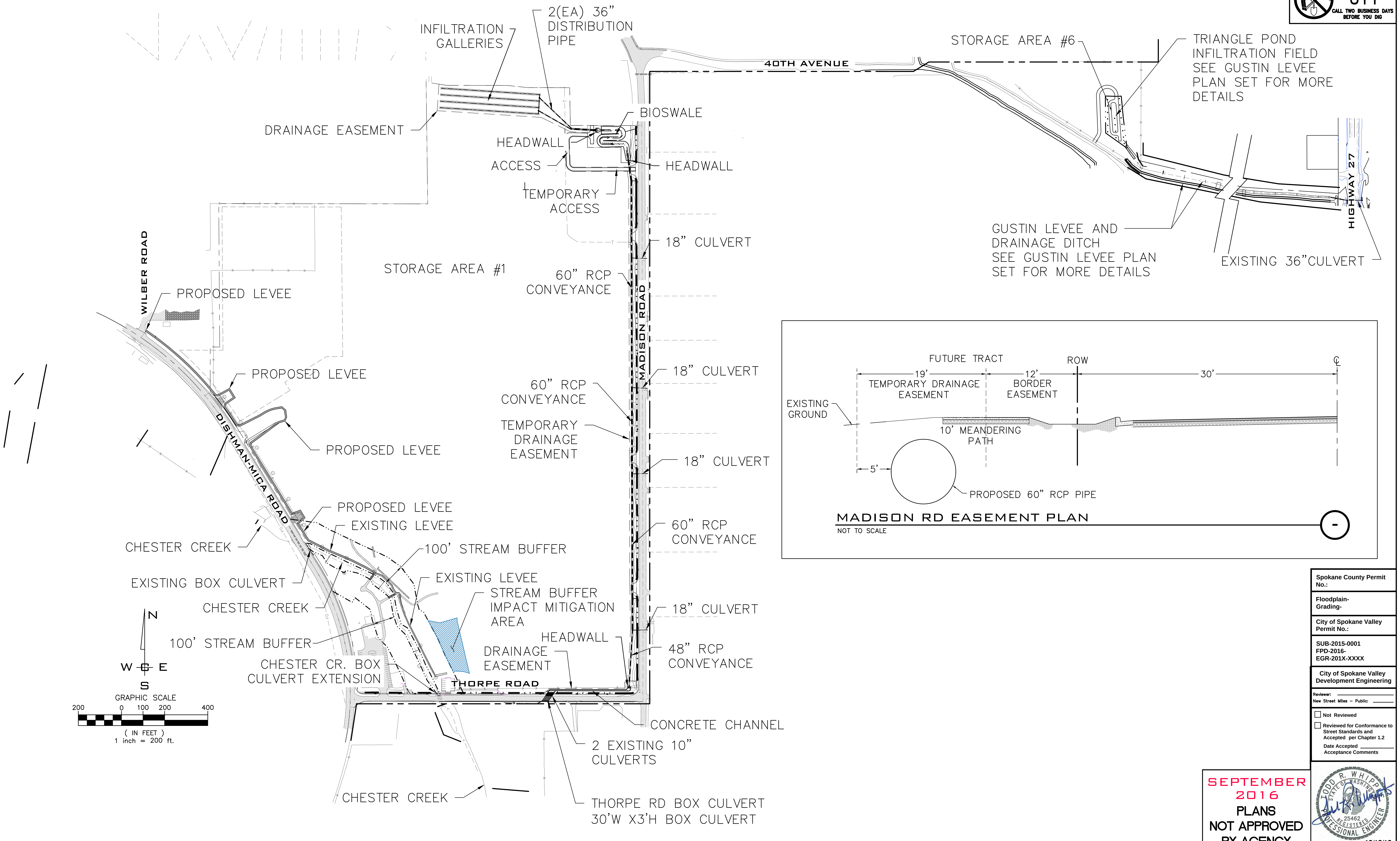

Spokane County Permit No.:
Floodplain- **Grading-**
City of Spokane Valley Permit No.:
SUB-2015-0001 **FPD-2016-** **EGR-201X-XXXX**
City of Spokane Valley Development Engineering
Reviewer: ______ **New Street Miles – Public:** ______
☐ **Not Reviewed** ☐ **Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2** **Date Accepted** ______ **Acceptance Comments**

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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☐ TRAFFIC
☐ PLANNING
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☐ OTHER

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SPOKANE VALLEY PAINTED HILLS PRD
SITE ELEMENT PLAN
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C1.3

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C1.3 ELEMENT PLAN.dwg, 10/13/2016 2:50:16 PM

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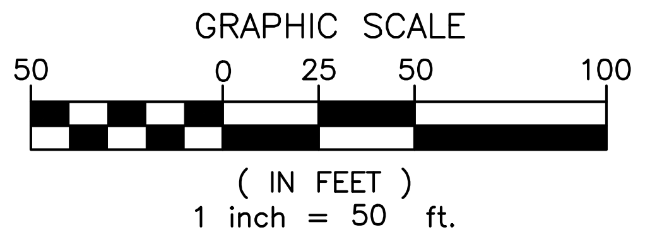
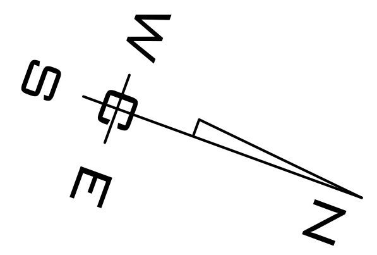
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

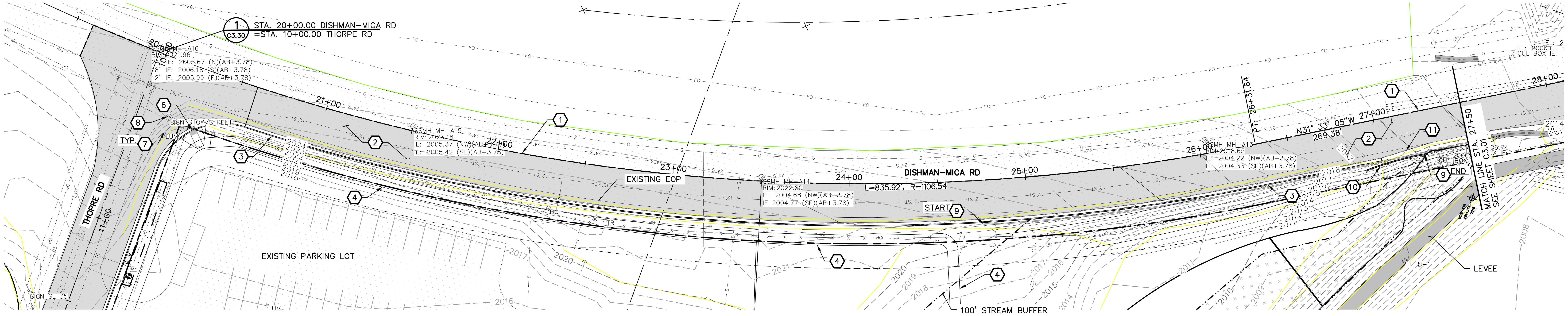
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

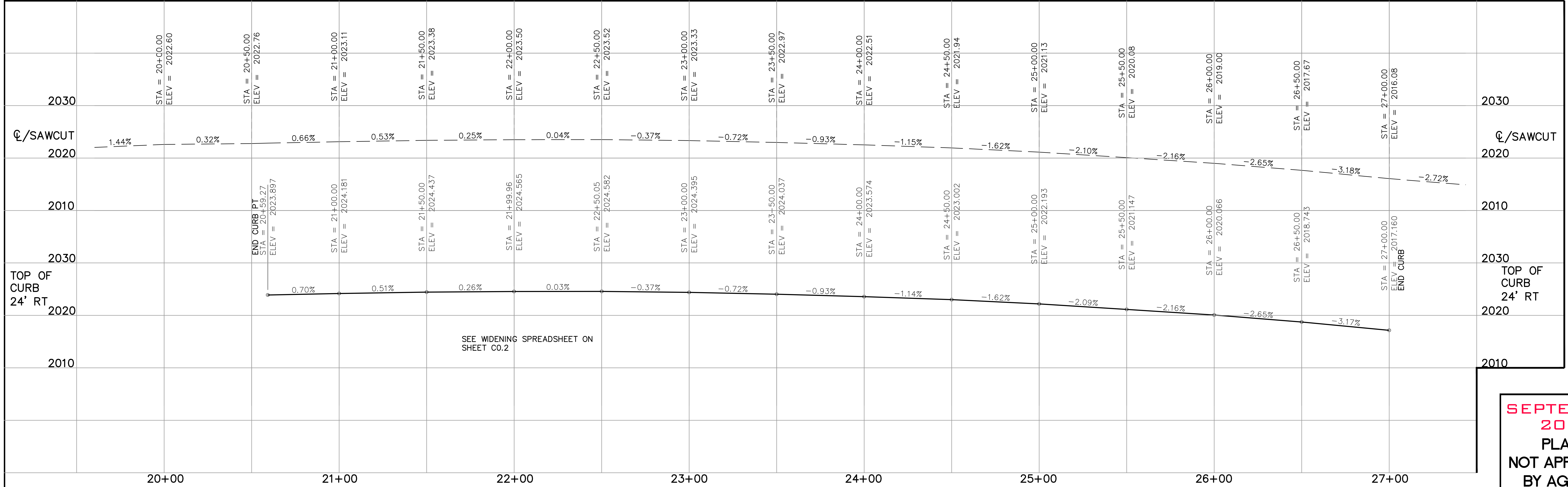
CONSTRUCTION NOTES

1. SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, SEE SHEET C0.2.
3. PROVIDE AND INSTALL TYPE "B" CURB AND GUTTER SPILL PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102 & GENERAL NOTE 8.
4. PROVIDE AND INSTALL 6' WIDE CONCRETE SIDEWALK PER CITY OF SPOKANE VALLEY STANDARD PLAN R-103.
5. RESERVED.
6. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
7. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U-101. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
8. EXISTING SIGN TO BE RELOCATED TO MAINTAIN 2' OF CLEARANCE FROM BACK OF CURB PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
9. REMOVE EXISTING GUARD RAIL.
10. REUSE 35' OF GUARDRAIL AND REPLACE POSTS PER WSDOT STANDARD PLAN C-2A. CONNECT TO GUARDRAIL AT SOUTH END OF CULVERT.
11. TAPER TO MATCH EXISTING ASPHALT.









City of Spokane Valley Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ____________
Acceptance Comments

SEPTEMBER 2016
PLANS
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BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

PROJ #: 13-1166
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REVIEWED: TRW

☒ CIVIL
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☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

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2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
DISHMAN-MICA PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.00

JOB NUMBER
13-1166

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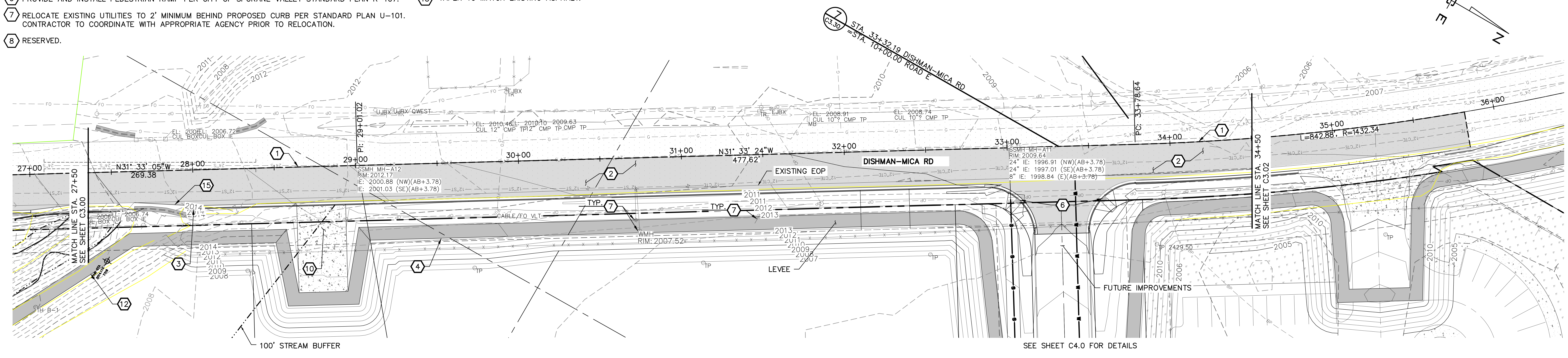
SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

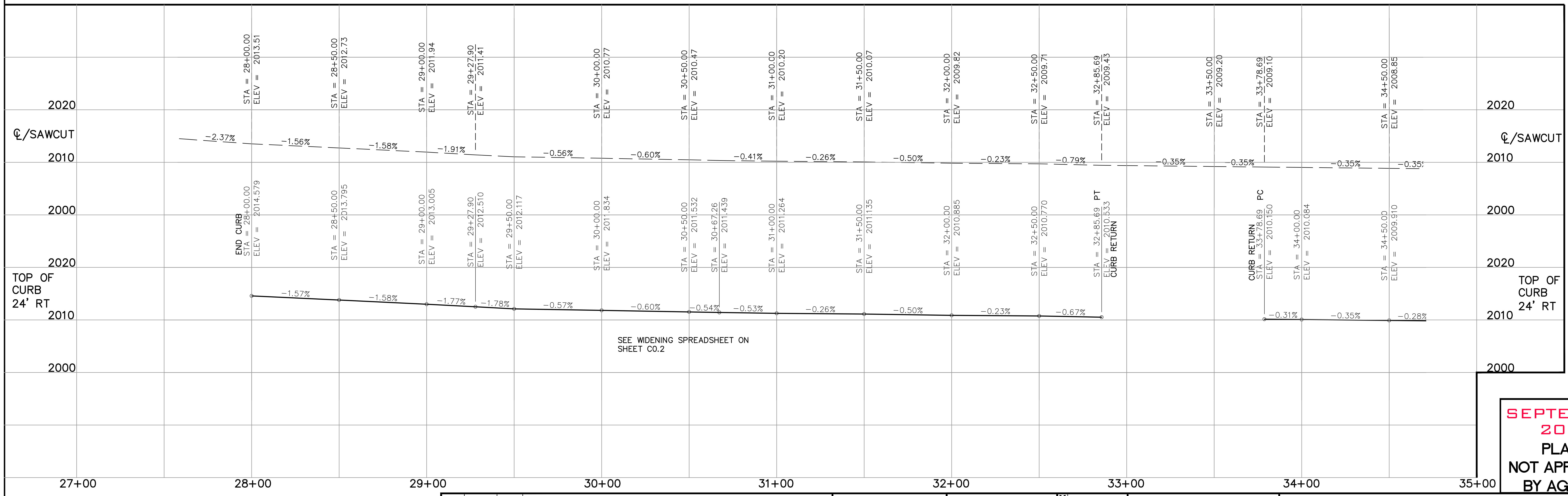
CONSTRUCTION NOTES

1. SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, DETAIL 1 SHEET C3.3.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R–102.
4. PROVIDE AND INSTALL 8' WIDE ASPHALT PATHWAY PER CITY OF SPOKANE VALLEY STANDARDS.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S–110.
6. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R–107.
7. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U–101. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
8. RESERVED.
9. RESERVED.
10. PROVIDE AND INSTALL 30' WIDE COMMERCIAL DRIVEWAY PER SPOKANE VALLEY STANDARD PLAN R–113.
11. RESERVED
12. CONSTRUCT PATH ON TOP OF EXISTING LEVEE. SEE SHEET C5.0.
13. RESERVED
14. RESERVED
15. TAPER TO MATCH EXISTING ASPHALT.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 30 ft.





City of Spokane Valley Development Engineering

Reviewer: ____

New Street Miles – Public: ____

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Date Accepted ____

Acceptance Comments

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☐ OTHER

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C3.01

JOB NUMBER
13-1166

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SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT ONE-CALL NUMBER 811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

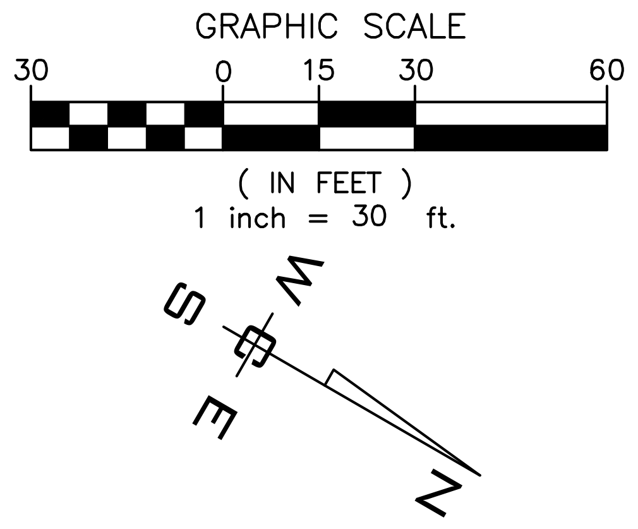
CONSTRUCTION NOTES

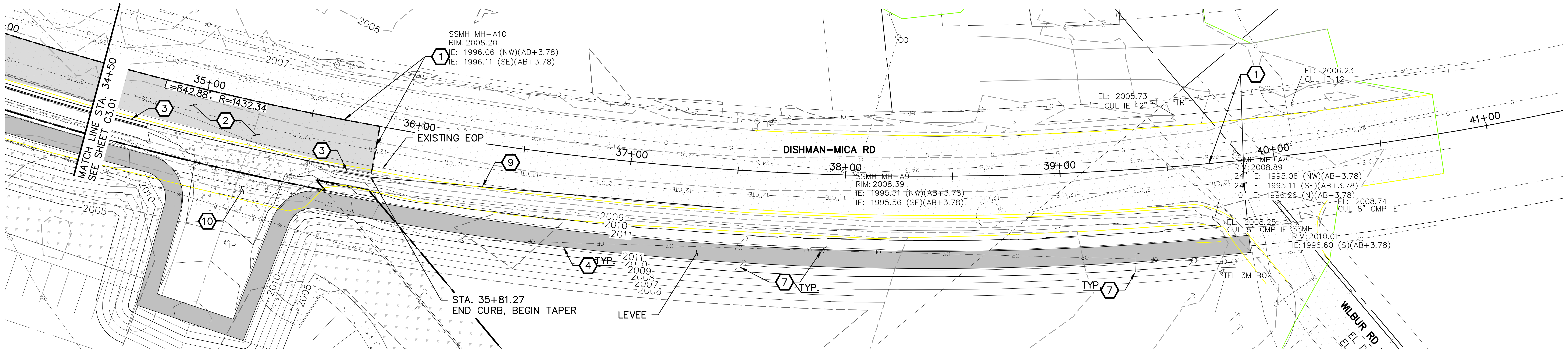
1. SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, DETAIL 1 SHEET C3.3.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102.
4. PROVIDE AND INSTALL 8' WIDE ASPHALT PATHWAY PER CITY OF SPOKANE VALLEY STANDARDS.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.
6. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
7. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U-101. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
8. EXISTING SIGN TO BE RELOCATED TO MAINTAIN 2' OF CLEARANCE FROM BACK OF CURB PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
9. PROVIDE 166' TAPER FROM FACE OF PROPOSED CURB TO EXISTING EDGE OF ASPHALT PER TAPER CALCULATIONS, THIS SHEET.
10. PROVIDE AND INSTALL 33' COMMERCIAL DRIVEWAY PER SPOKANE VALLEY STANDARD PLAN R-113.

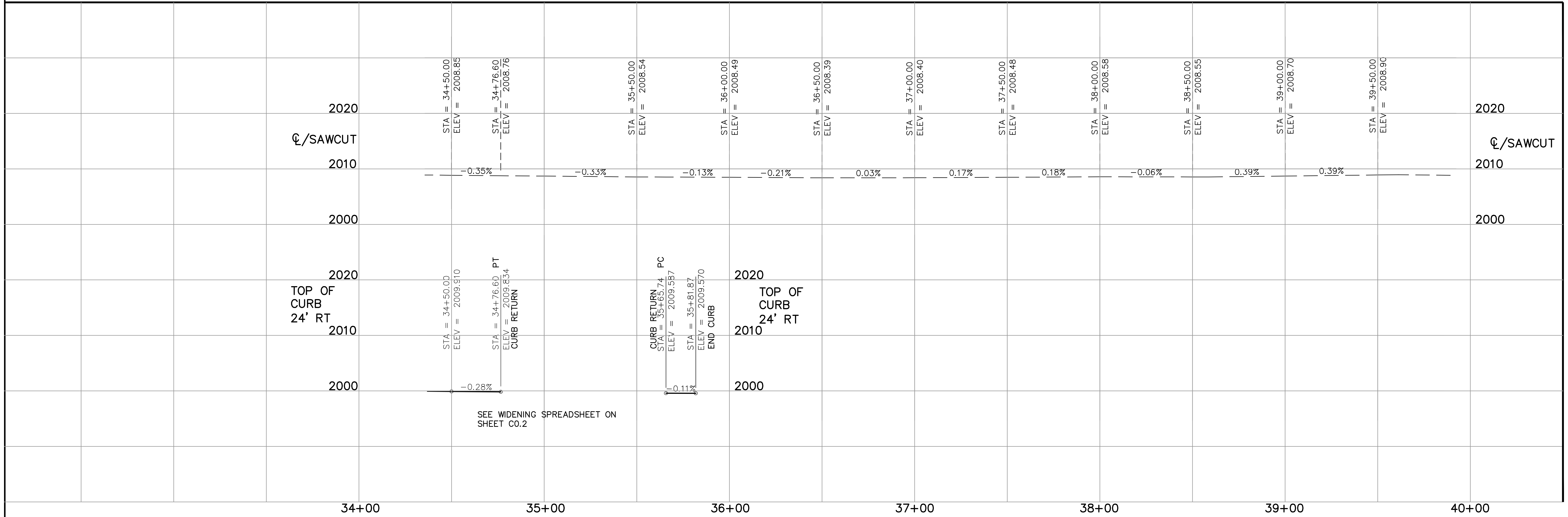
TAPER CALCULATIONS

$L=W(S)^2/60$

$4.9(45^2)/60=166'$ (DEPARTING)







City of Spokane Valley Development Engineering
Reviewer:
New Street Miles – Public:
☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted
Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
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PH: 509-893-2617 FAX: 509-926-0227

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DISHMAN-MICA RD.
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SHEET C3.02

JOB NUMBER 13-1166

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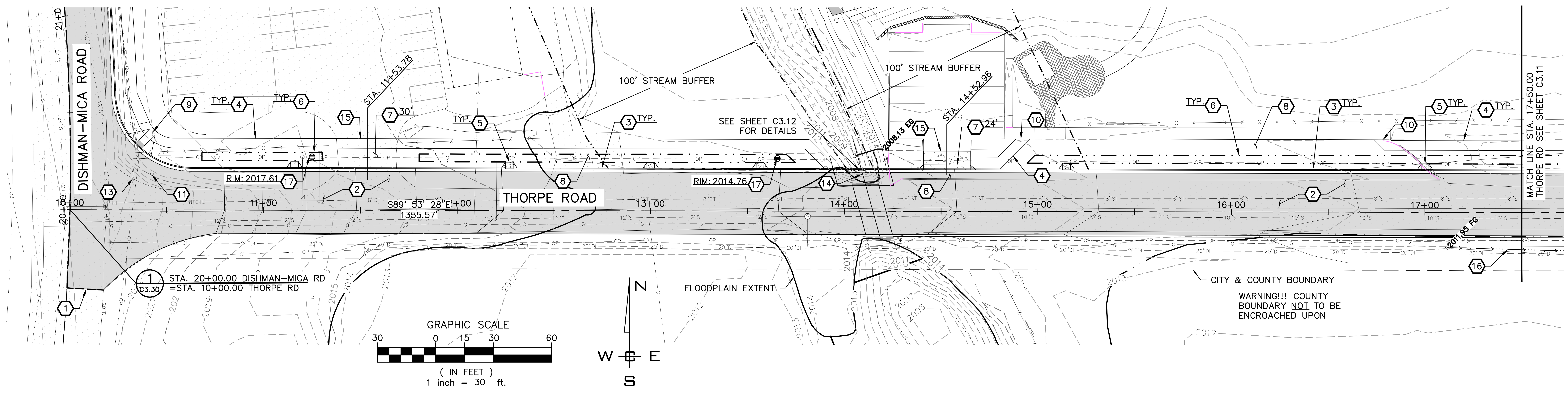
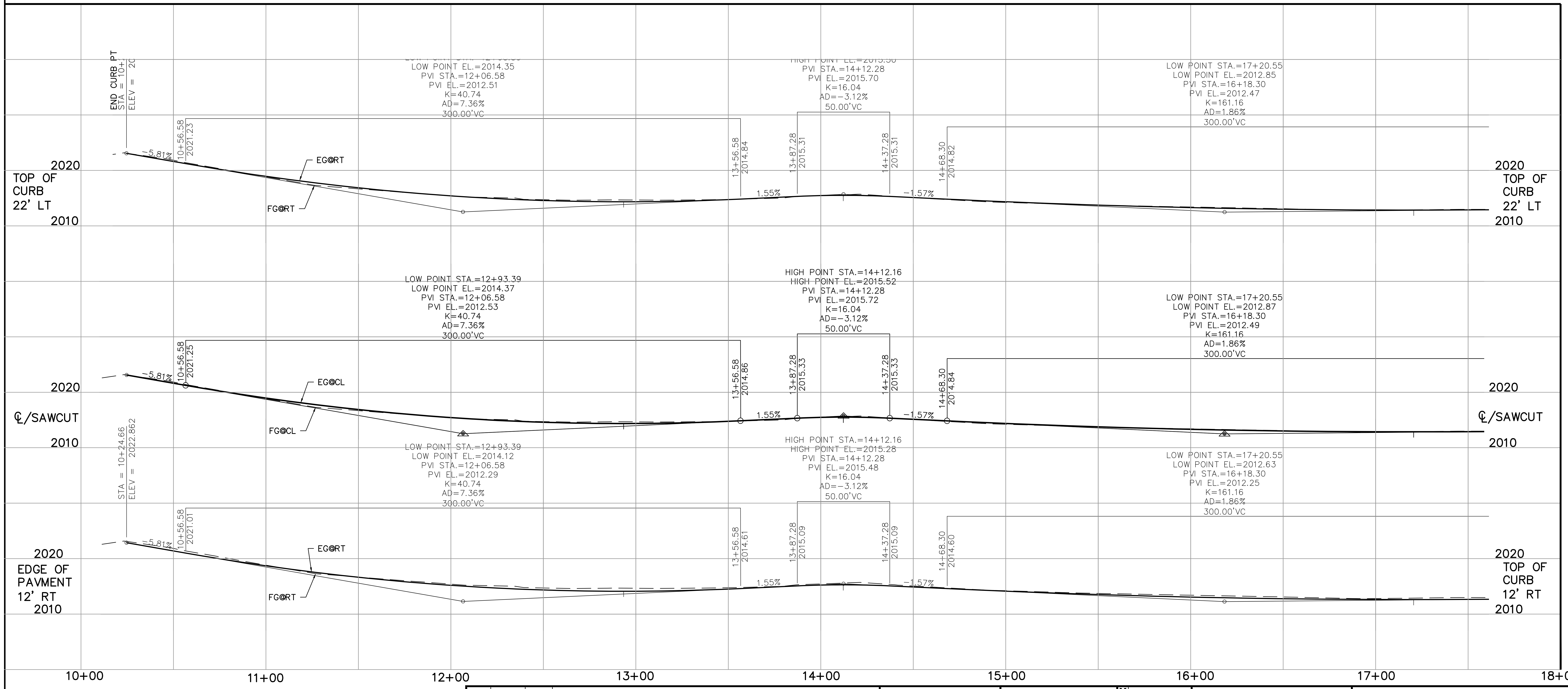
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



CONSTRUCTION NOTES

1. SAWCUT AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, SEE DETAIL 3 SHEET C0.3.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102.
4. PROVIDE AND INSTALL 5' WIDE CONCRETE SIDEWALK PER CITY OF SPOKANE VALLEY STANDARD PLAN R-103.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.
6. CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-130.
7. PROVIDE AND INSTALL COMMERCIAL DRIVEWAY PER SPOKANE VALLEY STANDARD PLAN R-114. SEE PLAN FOR WIDTH
8. REMOVE EXISTING SIDEWALK, CURB, AND ASPHALT.
9. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
10. RESERVED
11. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U-101. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
12. RESERVED
13. EXISTING SIGN TO BE RELOCATED TO MAINTAIN 2' OF CLEARANCE FROM BACK OF CURB PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
14. EXTEND BOX CULVERT. SEE DETAILS ON SHEET C3.12.
15. SAWCUT AND TACK COAT TO MATCH EXISTING ASPHALT PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
16. CONSTRUCTION V-DITCH. SEE PLAN FOR ELEVATIONS.
17. PROVIDE AND INSTALL TYPE B DRYWELL PER CITY OF SPOKANE VALLEY STANDARD PLAN S-101. SEE PLAN VIEW FOR RIM ELEVATIONS.



City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

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PH: 509-893-2617 FAX: 509-926-0227

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THORPE ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.10

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C3.1 THORPE RD.dwg, 10/13/2016 2:55:38 PM

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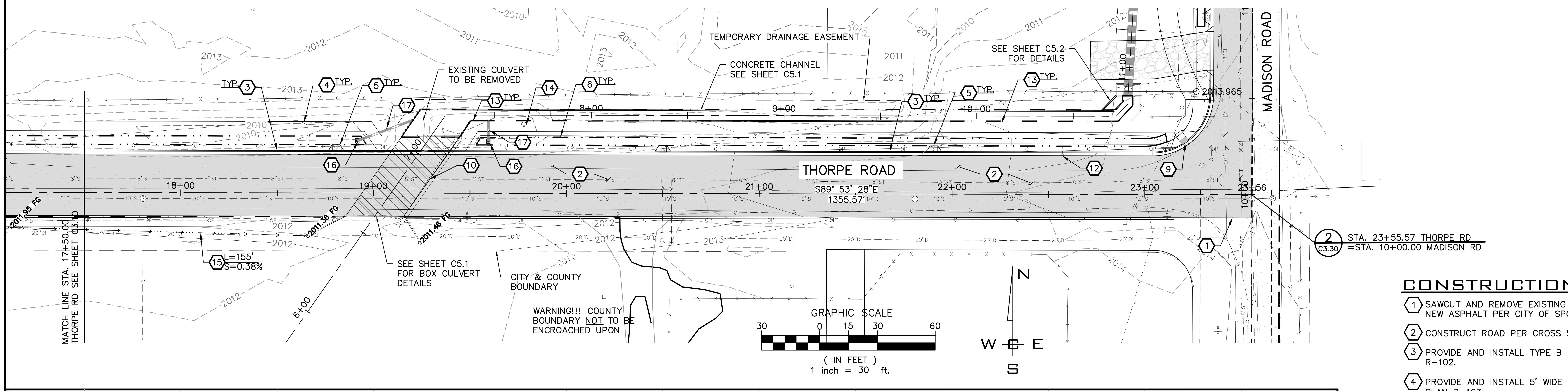
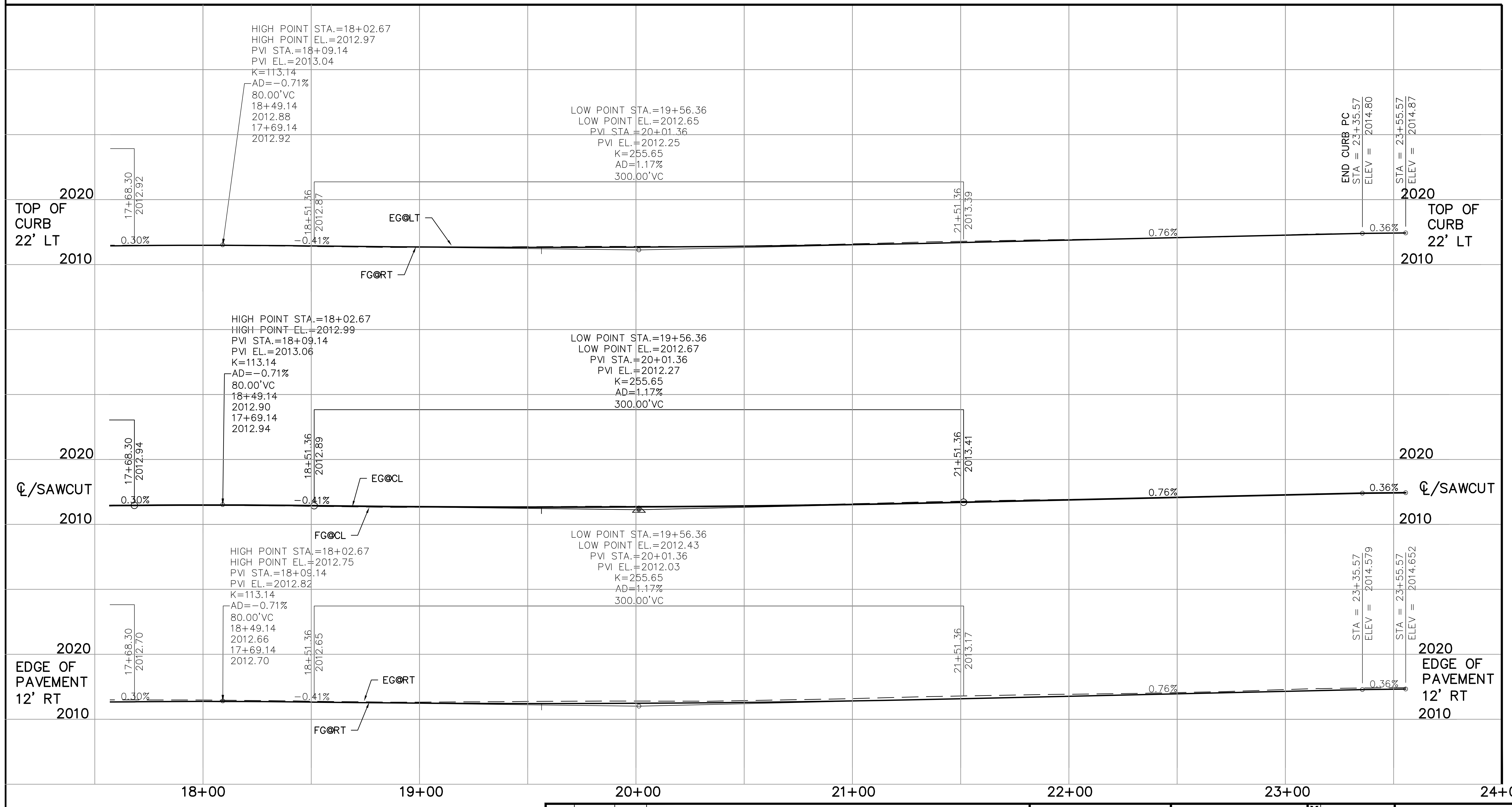


CONSTRUCTION NOTES

1. SAWCUT AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
2. CONSTRUCT ROAD PER CROSS SECTION, SEE DETAIL 4 ON SHEET C0.2.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R–102.
4. PROVIDE AND INSTALL 5' WIDE CONCRETE SIDEWALK PER CITY OF SPOKANE VALLEY STANDARD PLAN R–103.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S–110.
6. CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S–130.
7. RESERVED
8. RESERVED
9. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R–107.
10. PROVIDE AND INSTALL BOX CULVERT, SEE SHEET C5.2 FOR DETAILS.
11. RESERVED
12. EXISTING SIGN TO BE RELOCATED TO MAINTAIN 2' OF CLEARANCE FROM BACK OF CURB PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
13. PROVIDE AND INSTALL 5.5' WIDE CONCRETE SIDEWALK PER CITY OF SPOKANE VALLEY STANDARD PLAN R–103.
14. EXISTING DRYWELL TO BE REMOVED/ABANDONED PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
15. CONSTRUCT V–DITCH. SEE PLAN FOR ELEVATIONS.
16. PROVIDE AND INSTALL TYPE I CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S–112. SEE SHEET C5.1 FOR DETAILS.
17. PROVIDE AND INSTALL 12" CMP PIPE PER CITY SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE SHEET C5.1 FOR DETAILS.



City of Spokane Valley Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____________
Acceptance Comments

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
THORPE ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

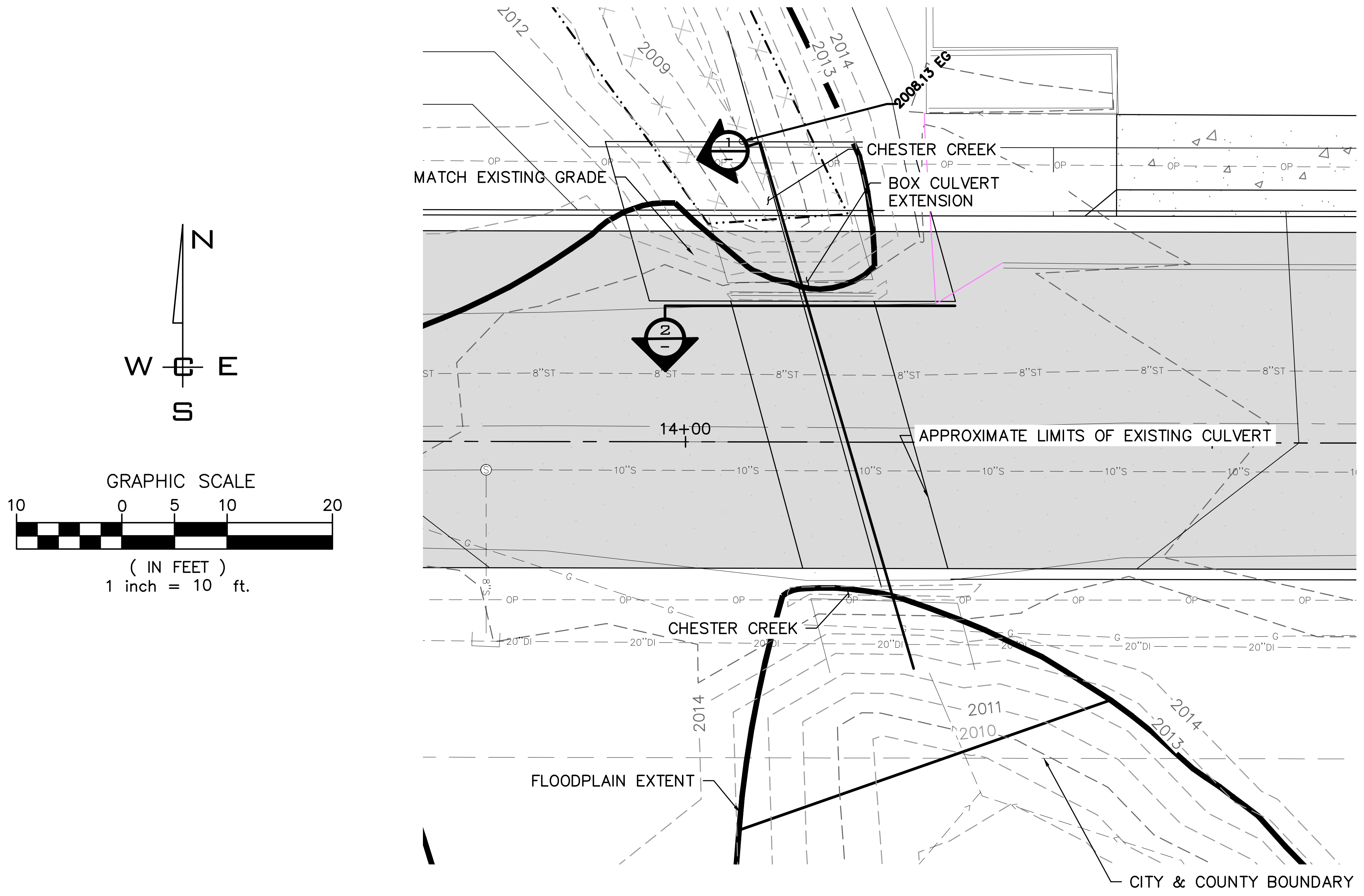
SHEET
C3.11

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C3.1 THORPE RD.dwg, 10/13/2016 2:56:14 PM

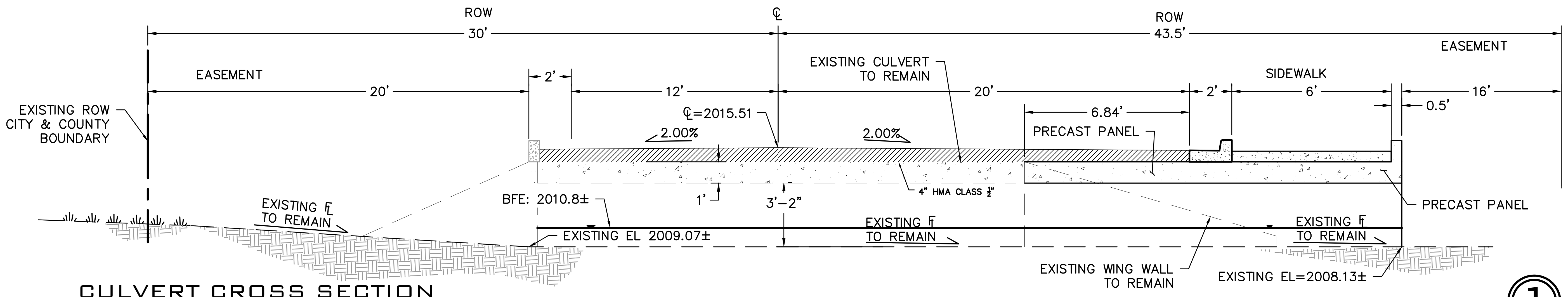
SE¼, SEC.33, T.25N., R.44E., W.M.
SW½, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



CHESTER CREEK BOX CULVERT WIDENING

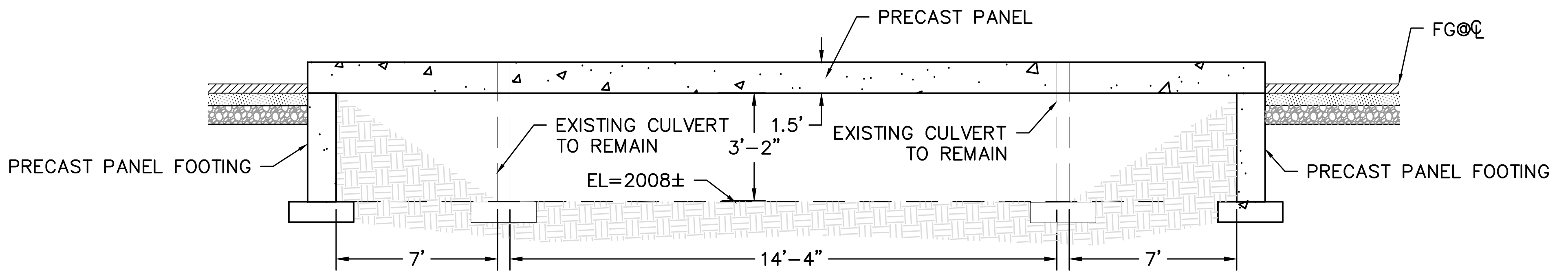
Ⓐ



CULVERT CROSS SECTION

NOT TO SCALE

①



CULVERT CROSS SECTION

NOT TO SCALE

②

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

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Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
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DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
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☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
CHESTER CREEK CULVERT WIDENING
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.12

JOB NUMBER
13-1166

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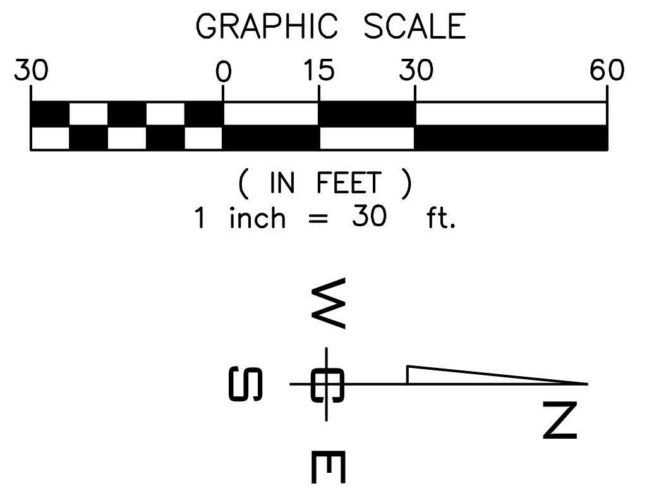
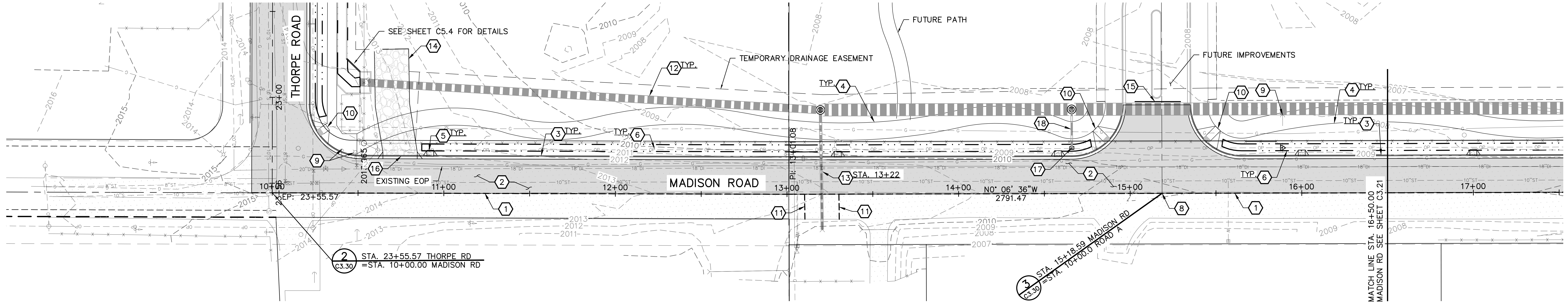
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

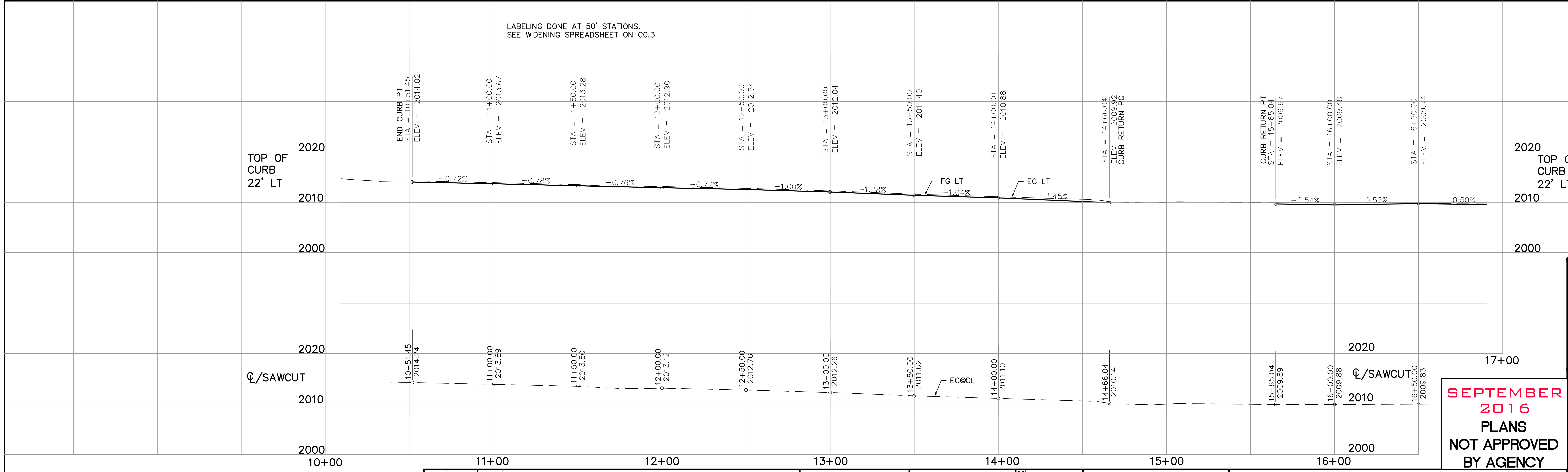
CONSTRUCTION NOTES

1. SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, DETAIL 5 SHEET C0.3.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102.
4. PROVIDE AND INSTALL 10' ASPHALT PATHWAY. PAVEMENT SECTION TO BE 2" OF 1/2" HMA ON 4" CSTC.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.
6. CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-130.
7. RESERVED
8. PROVIDE AND INSTALL STREET MONUMENT AT CENTERLINE INTERSECTIONS PER CITY OF SPOKANE VALLEY STANDARD R-145.
9. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U-101. MAINTAIN 48" CLEARANCE IF STRUCTURE IS WITHIN SIDEWALK. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
10. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
11. SAWCUT AND REMOVE EXISTING ASPHALT 10' ON EITHER SIDE OF STORM PIPE. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
12. PROVIDE AND INSTALL RCP STORM PIPE. SEE SHEET C5.
13. REPLACE EXISTING CULVERT AND EXTEND WITH 18" CMP. SEE SHEET C3.24 FOR DETAILS.
14. CONSTRUCT 20' WIDE CHANNEL ACCESS. 6" CSTC ON COMPACTED (95%) SUBGRADE.
15. INSTALL TYPE III BARRICADE PER CITY OF SPOKANE VALLEY STANDARD PLAN R-142.
16. PROVIDE AND INSTALL 20' DRIVEWAY PER SPOKANE VALLEY STANDARD PLAN R-113.
17. PROVIDE AND INSTALL TYPE I CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-112. SEE SHEET C5.3 FOR DETAILS.
18. PROVIDE AND INSTALL 12" PVC PIPE PER CITY SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE SHEET C5.3 FOR DETAILS.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG







City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

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Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
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TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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PROJ #:	13-1166
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☐ TRAFFIC
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☐ OTHER

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SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
MADISON ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.20

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C3.2 MADISON RD.dwg, 10/13/2016 2:57:08 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

CONSTRUCTION NOTES

① SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.

② CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, DETAIL 5 SHEET C0.30.

③ PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102.

④ PROVIDE AND INSTALL 10' ASPHALT PATHWAY. PAVEMENT SECTION TO BE 2" OF 1/2" HMA ON 4" CSTC.

⑤ PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.

⑥ CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-130.

⑦ RESERVED

⑧ PROVIDE AND INSTALL STREET MONUMENT AT CENTERLINE INTERSECTIONS PER CITY OF SPOKANE VALLEY STANDARD R-145.

⑨ RELOCATE EXISTING UTILITIES TO 2' BEHIND PROPOSED CURB PER STANDARD PLAN U-101. MAINTAIN 48" CLEARANCE IF STRUCTURE IS WITHIN SIDEWALK. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.

⑩ PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.

⑪ SAWCUT AND REMOVE EXISTING ASPHALT 10' ON EITHER SIDE OF STORM PIPE. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.

⑫ RESERVED.

⑬ REPLACE EXISTING CULVERT AND EXTEND WITH 18" CMP. SEE SHEET C3.24 FOR DETAILS.

⑭ RESERVED.

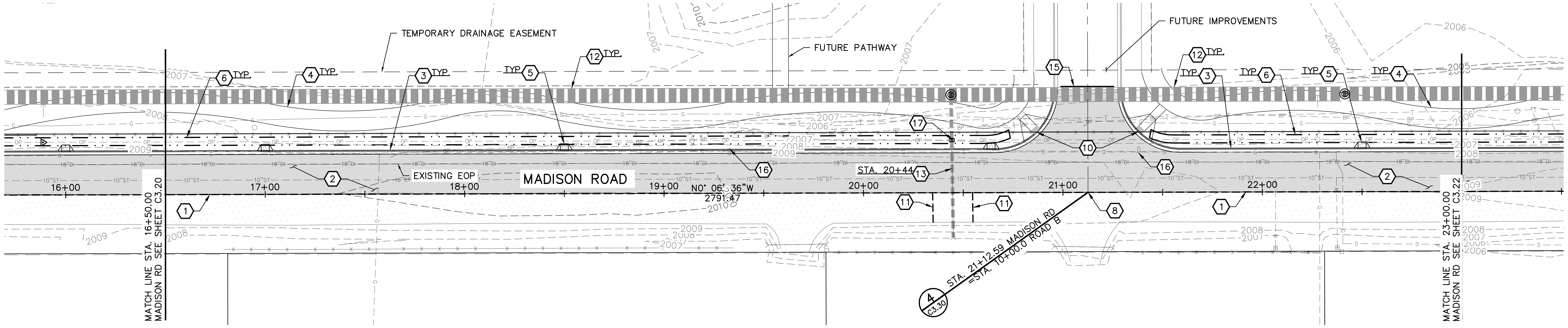
⑮ INSTALL TYPE III BARRICADE PER CITY OF SPOKANE VALLEY STANDARD PLAN R-142.

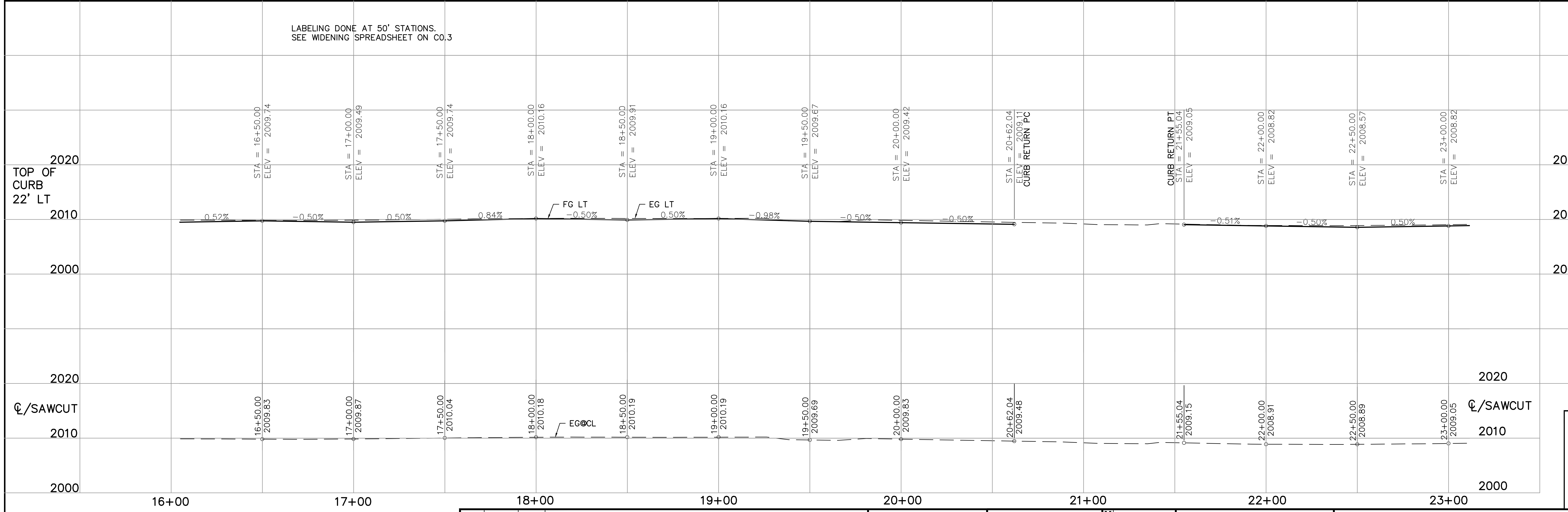
⑯ EXISTING MAILBOX TO BE RELOCATED.

⑰ PROVIDE AND INSTALL TYPE I CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-112. SEE SHEET C5.3 FOR DETAILS.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 30 ft.





City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

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Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
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TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
MADISON ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.21

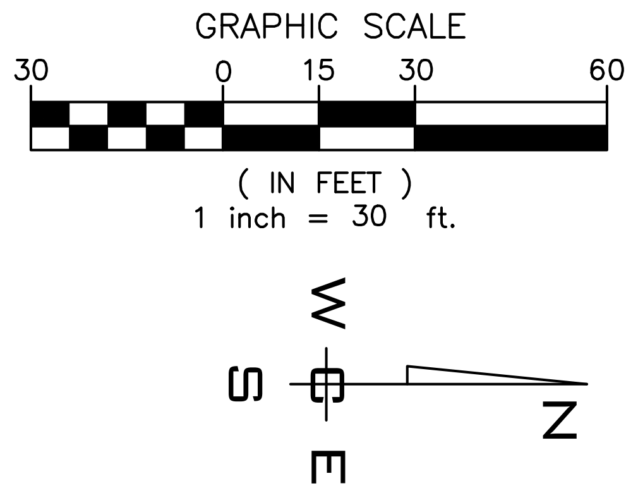
JOB NUMBER
13-1166

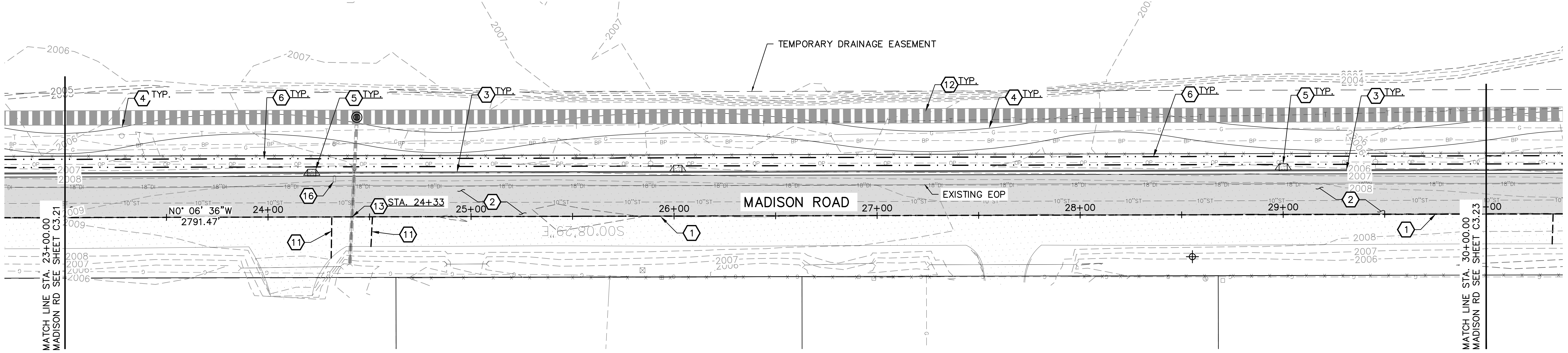
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

CONSTRUCTION NOTES

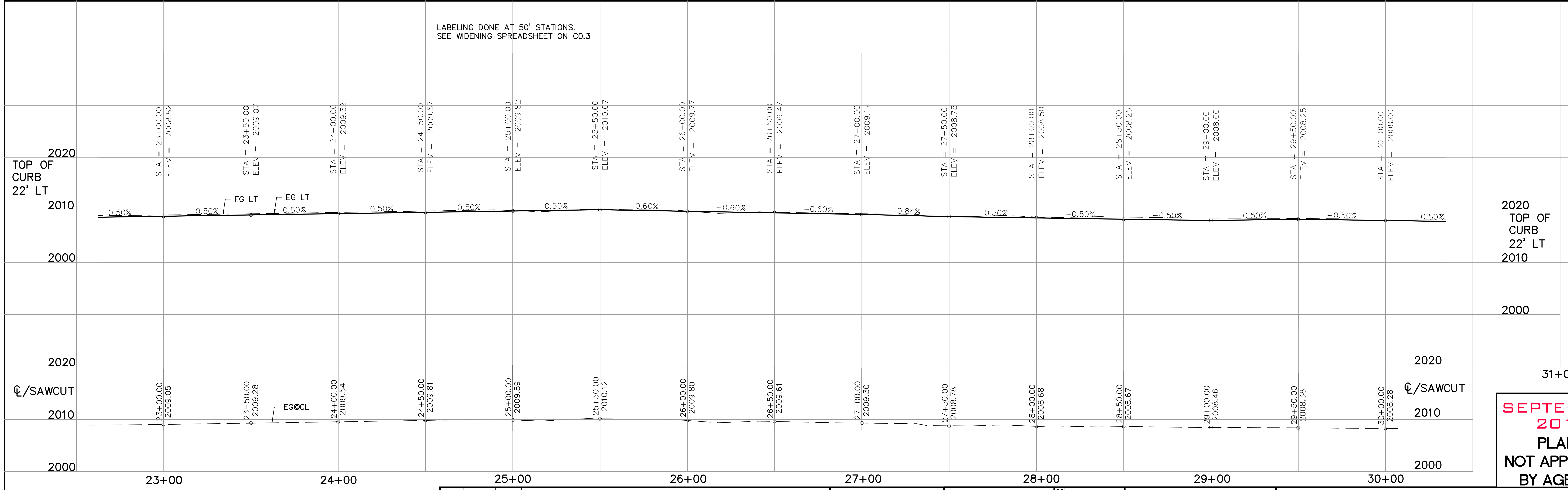
1. SAWCUT AT CENTERLINE AND REMOVE EXISTING ASPHALT. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
2. CONSTRUCT ROAD WIDENING PER TYPICAL WIDENING SECTION, DETAIL 5 SHEET C0.3.
3. PROVIDE AND INSTALL TYPE B CURB AND GUTTER PER CITY OF SPOKANE VALLEY STANDARD PLAN R-102.
4. PROVIDE AND INSTALL 10' ASPHALT PATHWAY. PAVEMENT SECTION TO BE 2" OF 1/2" HMA ON 4" CSTC.
5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.
6. CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-130.
7. RESERVED
8. PROVIDE AND INSTALL STREET MONUMENT AT CENTERLINE INTERSECTIONS PER CITY OF SPOKANE VALLEY STANDARD R-145.
9. RELOCATE EXISTING UTILITIES TO 2' MINIMUM BEHIND PROPOSED CURB PER STANDARD PLAN U-101. MAINTAIN 48" CLEARANCE IF STRUCTURE IS WITHIN SIDEWALK. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
10. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
11. SAWCUT AND REMOVE EXISTING ASPHALT 10' ON EITHER SIDE OF STORM PIPE. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
12. PROVIDE AND INSTALL RCP STORM PIPE. SEE SHEET C5.3.
13. REPLACE EXISTING CULVERT AND EXTEND WITH 18" CMP. SEE SHEET C3.24 FOR DETAILS.
14. RESERVED.
15. RESERVED.
16. EXISTING MAILBOX TO BE RELOCATED.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG





LABELING DONE AT 50' STATIONS.
SEE WIDENING SPREADSHEET ON C0.3



City of Spokane Valley Development Engineering

Reviewer: ______
New Street Miles – Public: ______

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SEPTEMBER 2016
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TODD R. WHIPPLE
25462
10/13/16

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WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
MADISON ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.22

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C3.2 MADISON RD.dwg, 10/13/2016 2:58:08 PM

SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
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CONSTRUCTION NOTES

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5. PROVIDE AND INSTALL 4' WIDE, TYPE 1 CURB DROP PER CITY OF SPOKANE VALLEY STANDARD PLAN S-110.
6. CONSTRUCT ROADSIDE SWALE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-130.
7. PROVIDE AND INSTALL 67' TAPER FROM FACE OF PROPOSED CURB TO EXISTING EDGE OF ASPHALT PER TAPER CALCUALTIONS, THIS SHEET.
8. PROVIDE AND INSTALL STREET MONUMENT AT CENTERLINE INTERSECTIONS PER CITY OF SPOKANE VALLEY STANDARD R-145.
9. RELOCATE EXISTING UTILITIES TO 2' BEHIND PROPOSED CURB PER STANDARD PLAN U-101. MAINTAIN 48" CLEARANCE IF STRUCTURE IS WITHIN SIDEWALK. CONTRACTOR TO COORDINATE WITH APPROPRIATE AGENCY PRIOR TO RELOCATION.
10. PROVIDE AND INSTALL PEDESTRIAN RAMP PER CITY OF SPOKANE VALLEY STANDARD PLAN R-107.
11. SAWCUT AND REMOVE EXISTING ASPHALT 10' ON EITHER SIDE OF STORM PIPE. TACK COAT AND MATCH TO EXISTING ASPHALT WITH NEW ASPHALT PER CITY OF SPOKANE VALLEY SPECIFICATIONS.
12. PROVIDE AND INSTALL 60" RCP PIPE. SEE SHEET C5.3 FOR DETAILS.
13. REPLACE EXISTING CULVERT AND EXTEND WITH 18" CMP. SEE SHEET C3.24 FOR DETAILS.
14. RESERVED.
15. INSTALL TYPE III BARRICADE PER CITY OF SPOKANE VALLEY STANDARD PLAN R-142.
16. EXISTING MAILBOX TO BE RELOCATED.
17. PROVIDE AND INSTALL TYPE I CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-112. SEE SHEET C5.3 FOR DETAILS.
18. PROVIDE AND INSTALL 12" PVC PIPE PER CITY SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE SHEET C5.3 FOR DETAILS.
19. PROVIDE AND INSTALL 15' WIDE TEMPORARY ACCESS ROAD. 6" CSTC ON (95%) COMPACTED SUBGRADE. SEE SHEET C5.4 FOR MORE INFORMATION.

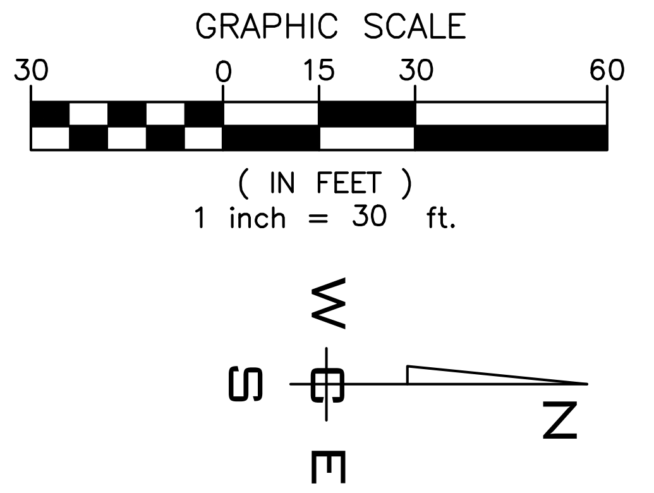
TAPER CALCULATIONS

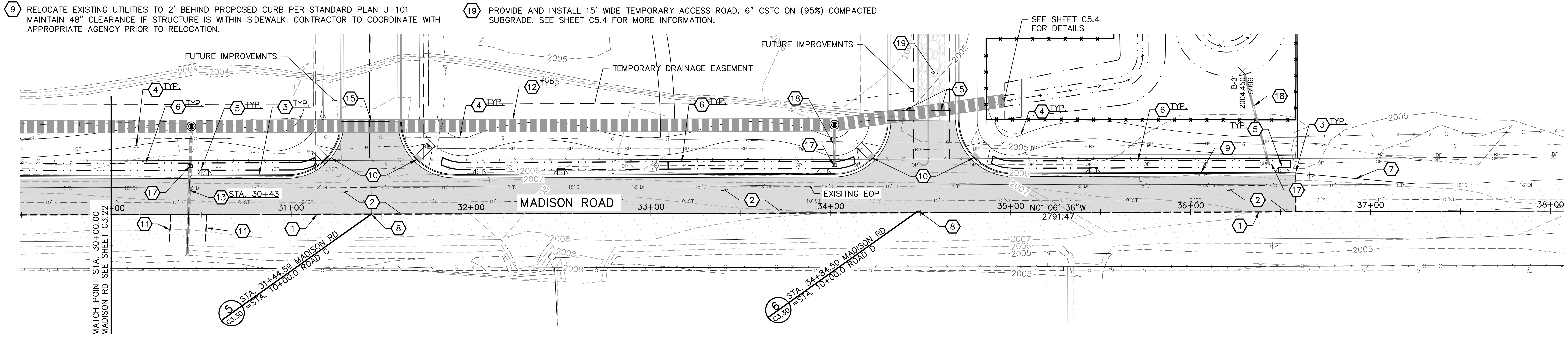
$L=W(S)^2/60$

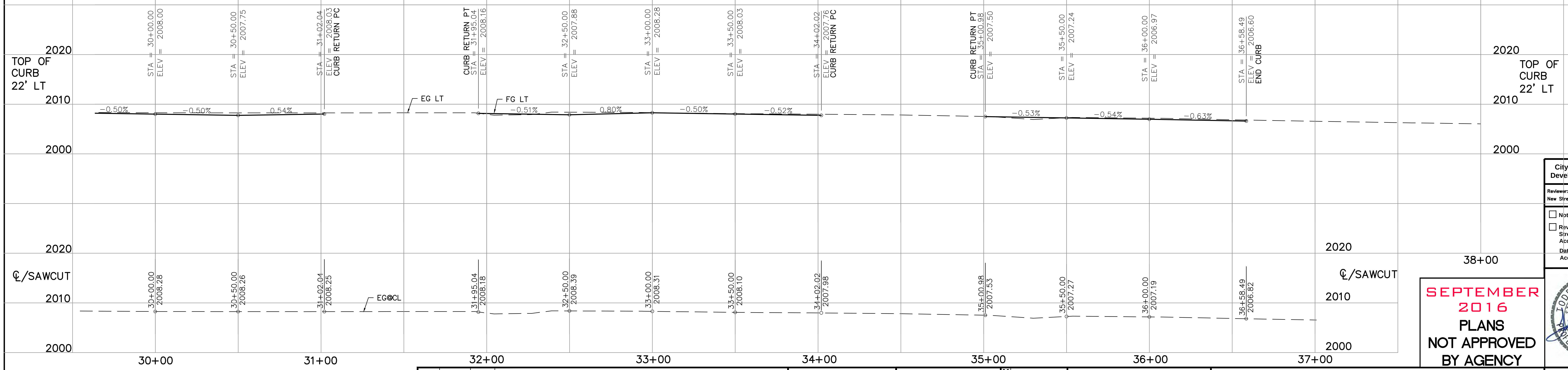
$6.5(35^2)/60=133'$ (DEPARTING)

$133'/2=67'$ (ARRIVING)

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG







City of Spokane Valley Development Engineering
Reviewer:
New Street Miles – Public:
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Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

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25462
10/13/16

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SPOKANE VALLEY PAINTED HILLS PRD
MADISON ROAD PLAN AND PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

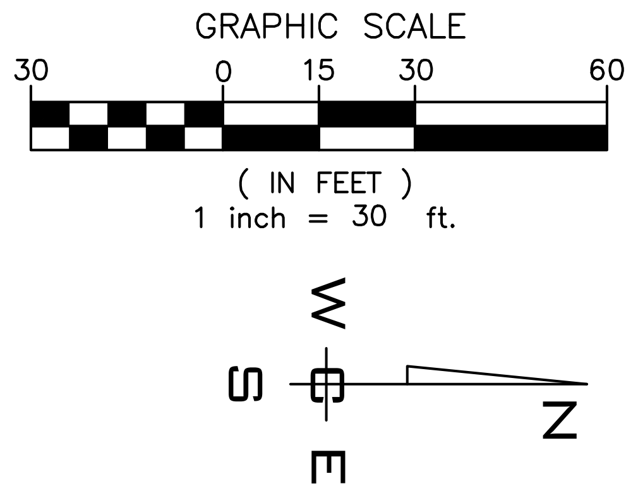
SHEET C3.23

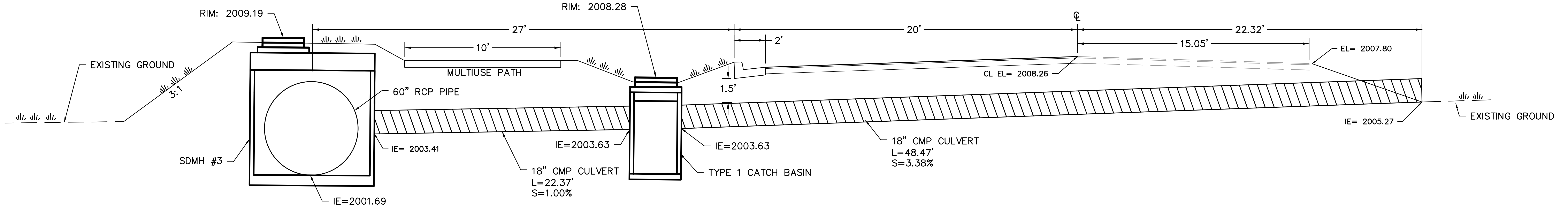
JOB NUMBER 13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C3.2 MADISON RD.dwg, 10/13/2016 2:58:41 PM

SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

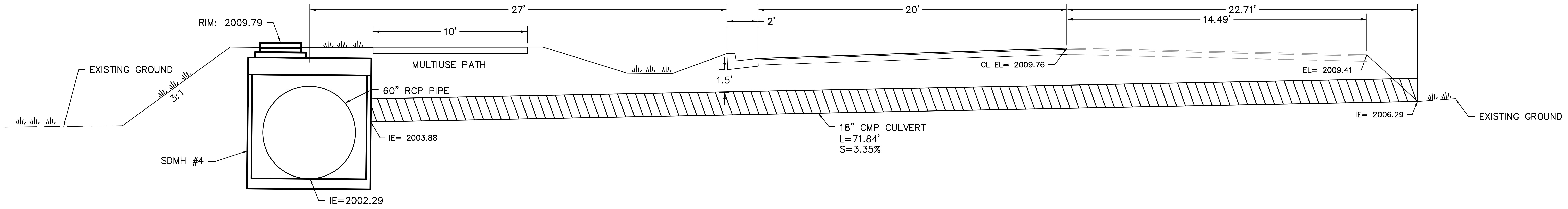




MADISON RD PIPE CROSSING

MADISON STA 30+43
NOT TO SCALE

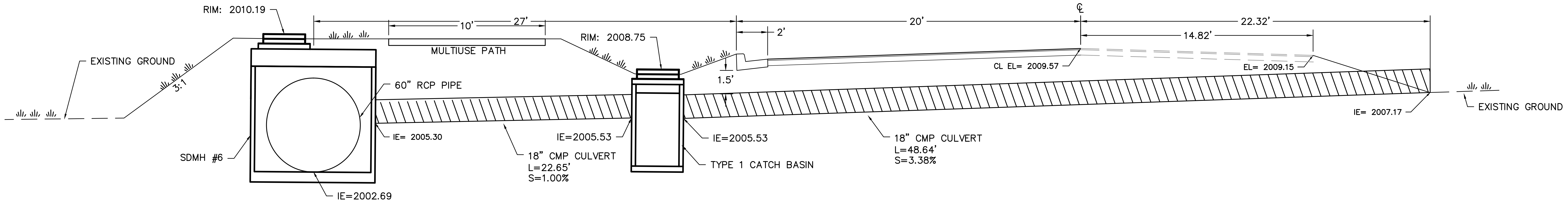
A



MADISON RD PIPE CROSSING

MADISON STA 24+43
NOT TO SCALE

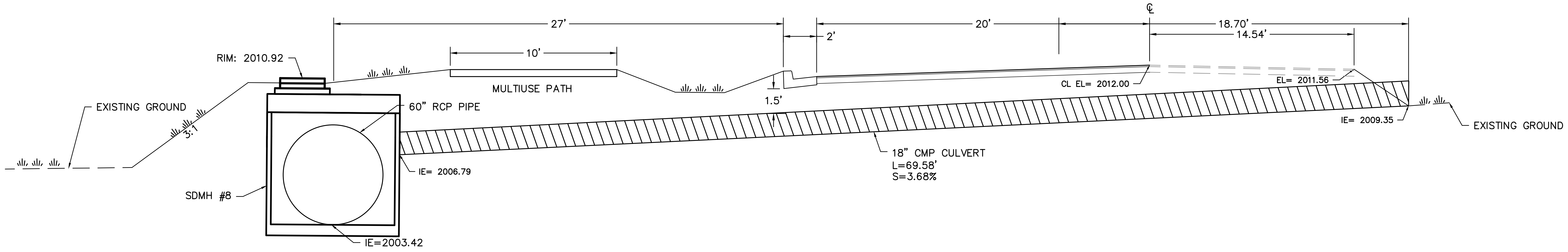
B



MADISON RD PIPE CROSSING

MADISON STA 20+44
NOT TO SCALE

C



MADISON RD PIPE CROSSING

MADISON STA 13+22
NOT TO SCALE

D

City of Spokane Valley
Development Engineering

Reviewer: ________
New Street Miles – Public: ________

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ________
Acceptance Comments

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
MADISON STORM PLAN
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.24

JOB NUMBER
13-1166

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SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
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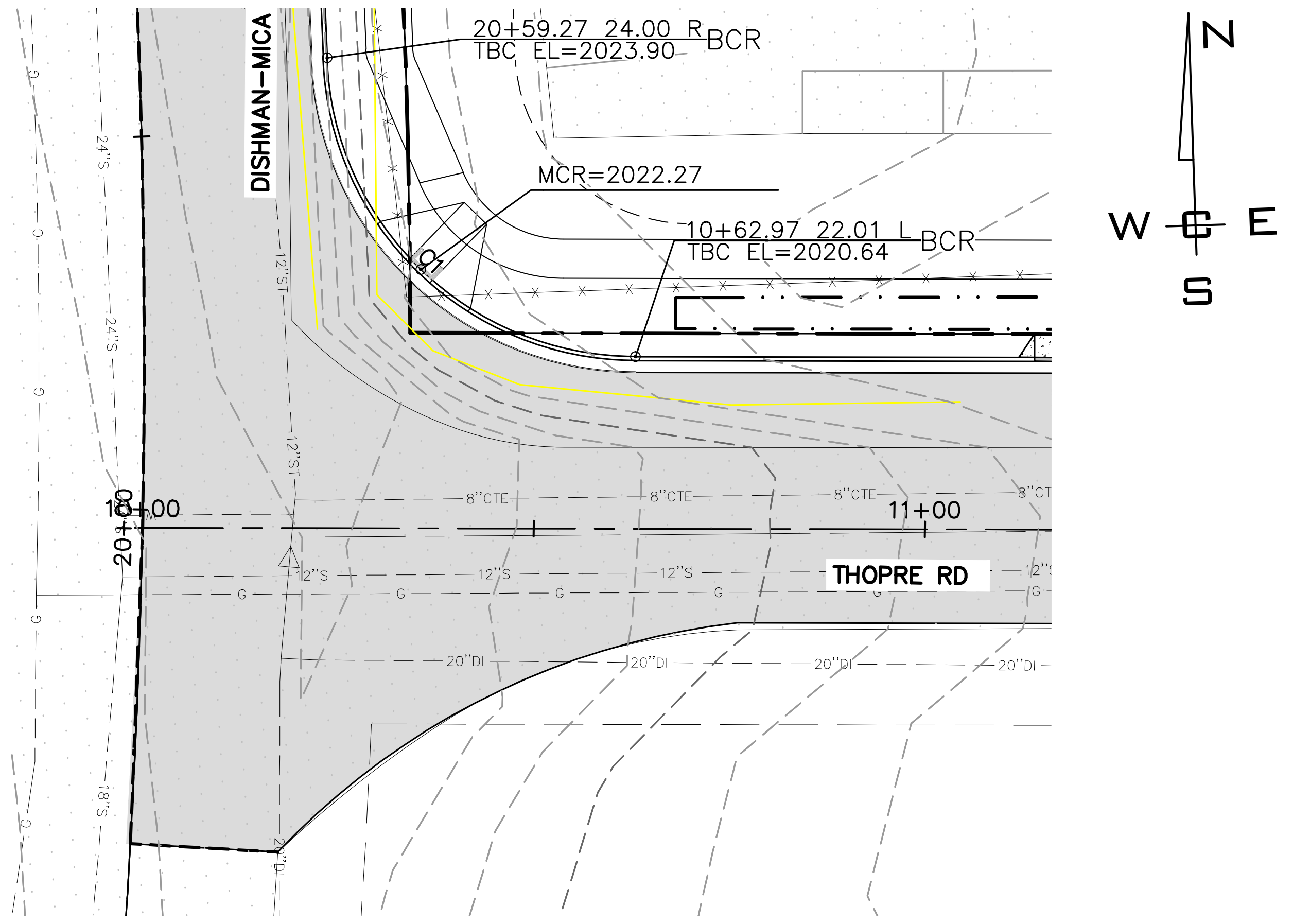
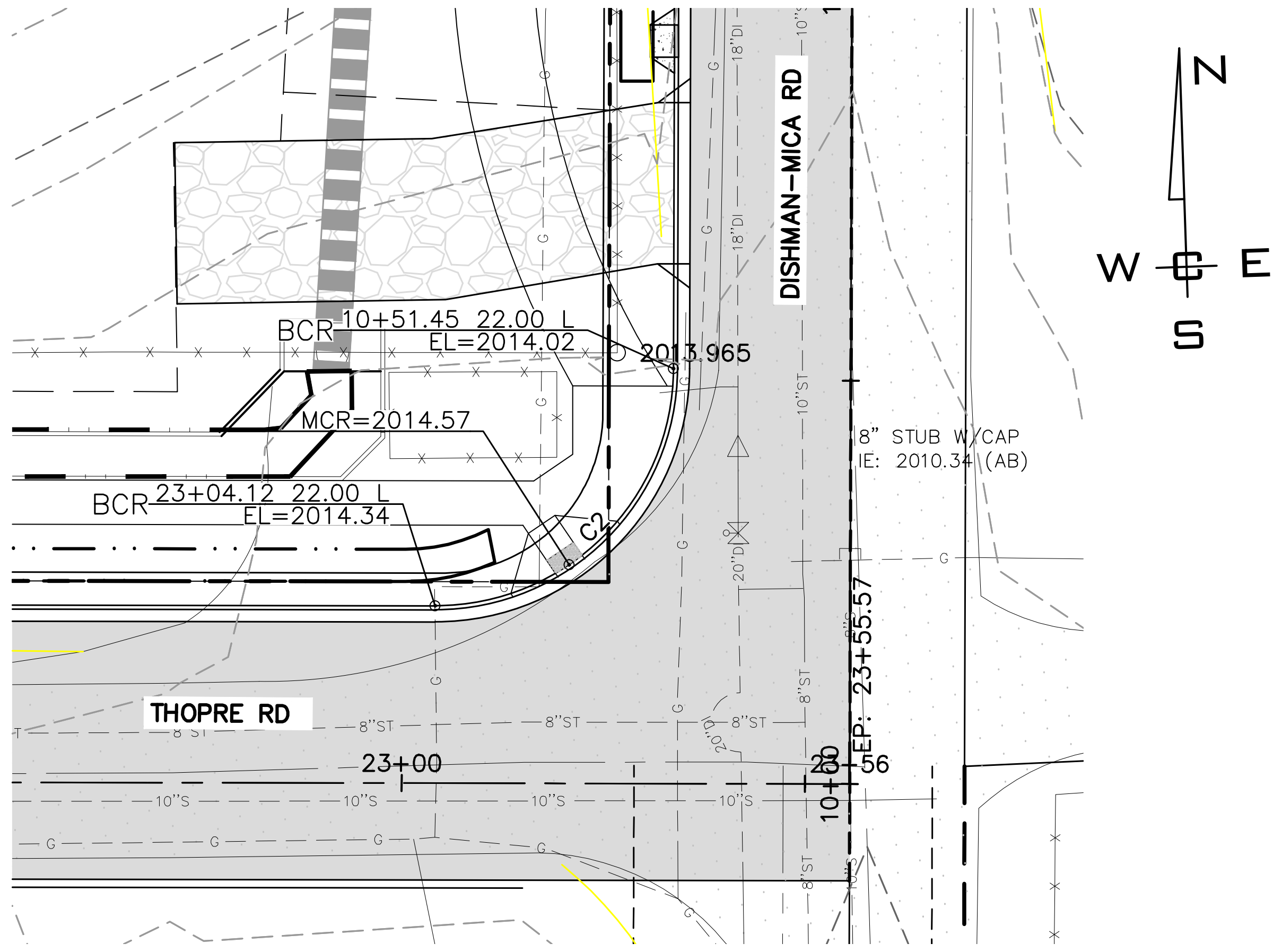


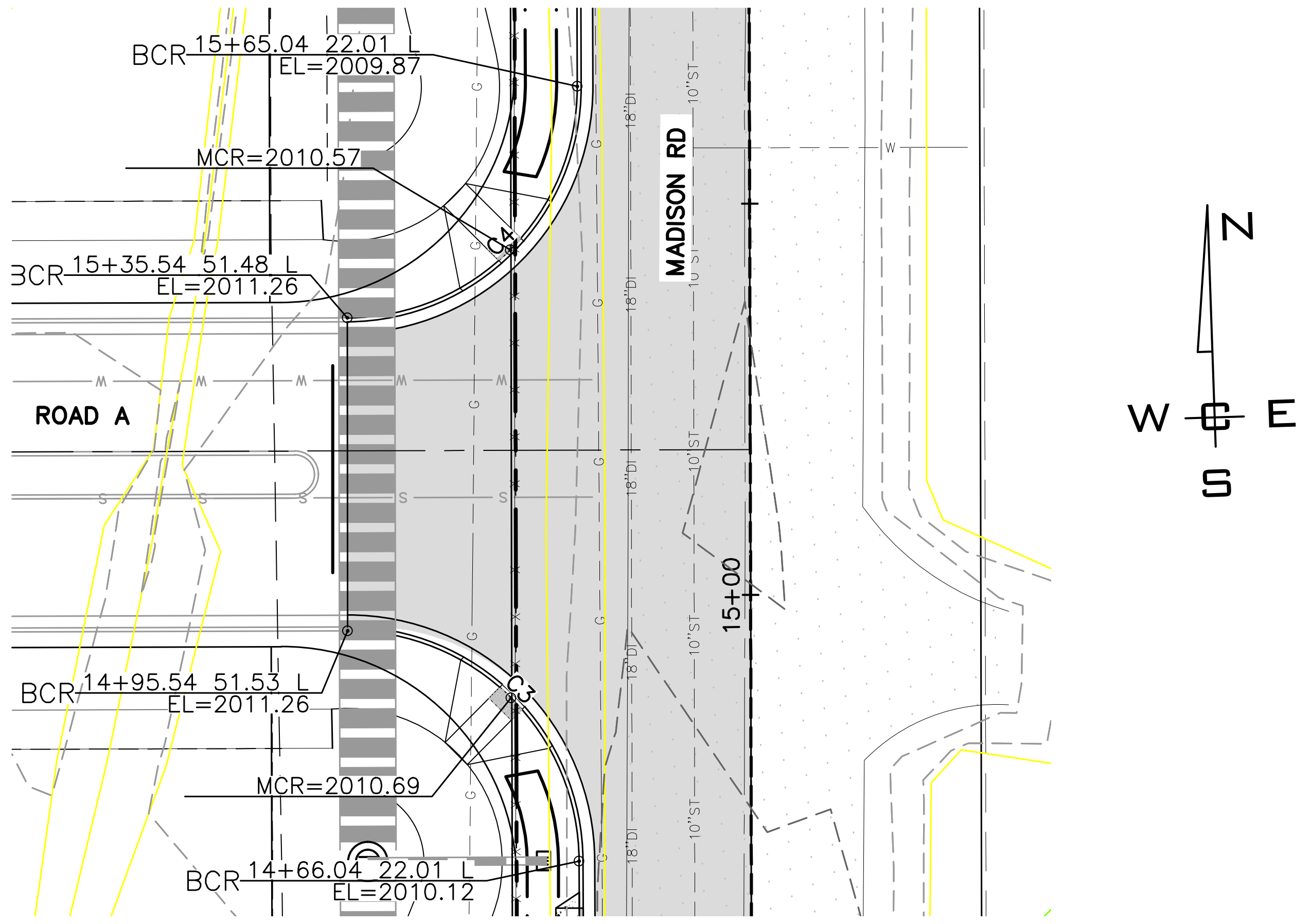
INTERSECTION DETAIL ①

DISHMAN-MICA RD AND THORPE RD
SCALE: 1" = 20'
STA 20+00 DISHMAN-MICA RD TO STA 10+00 THORPE RD



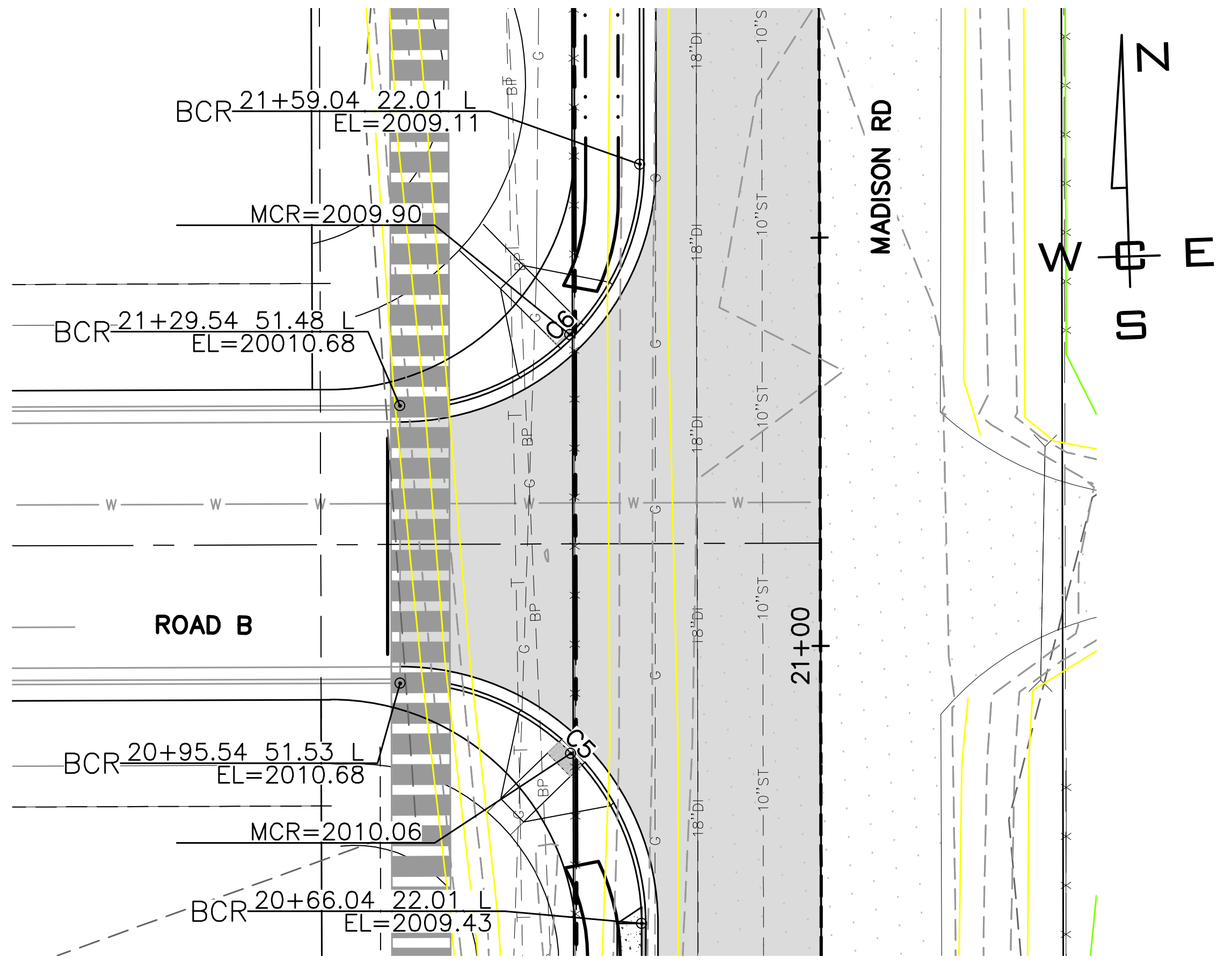
INTERSECTION DETAIL ②

MADISON RD AND THORPE RD
SCALE: 1" = 20'
STA 23+55.57 THORPE RD TO STA 10+00.00 MADISON RD



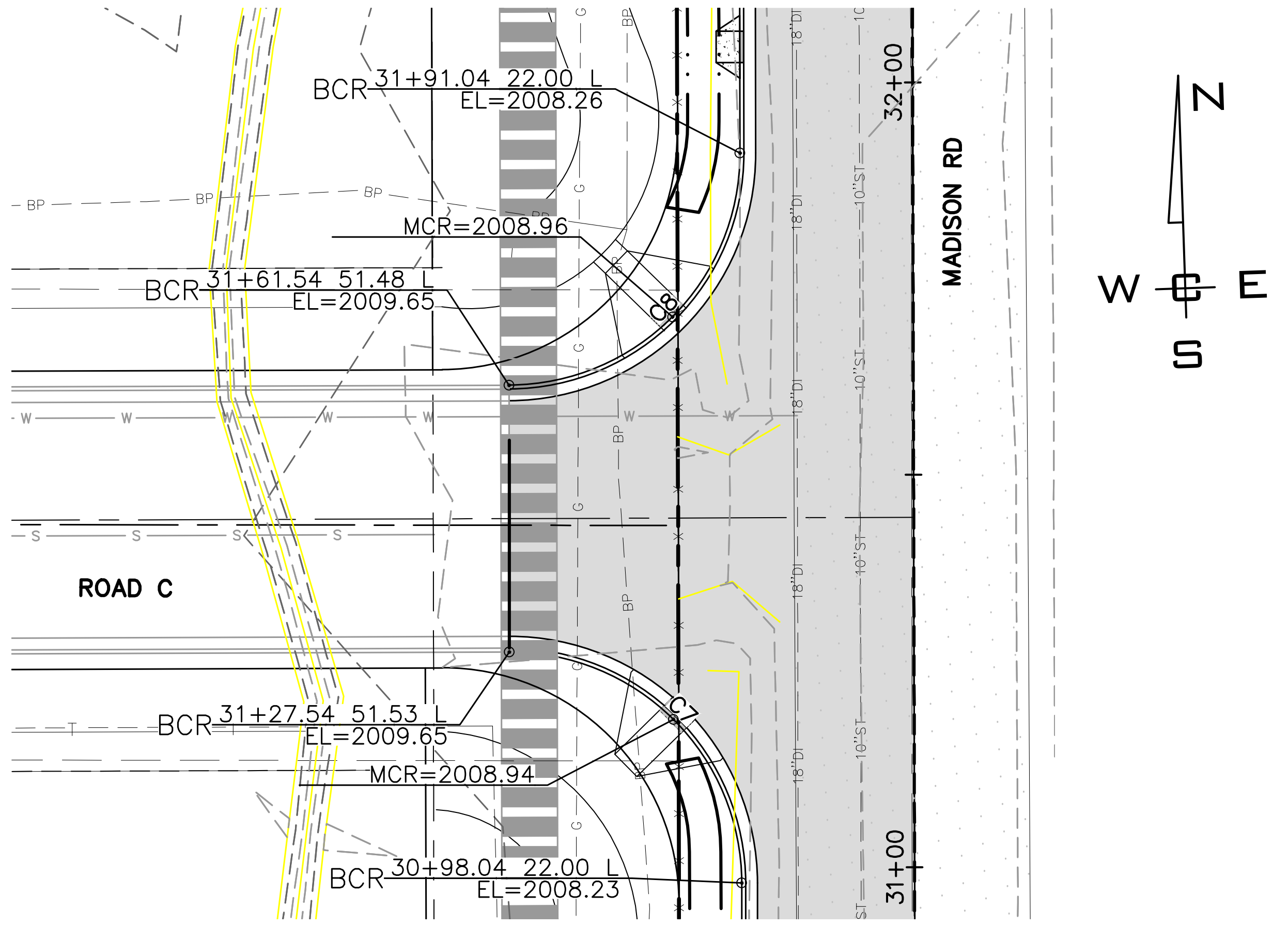
INTERSECTION DETAIL ③

MADISON RD AND ROAD A
SCALE: 1" = 20'
STA 15+18.59 MADISON RD TO STA 10+00 ROAD A



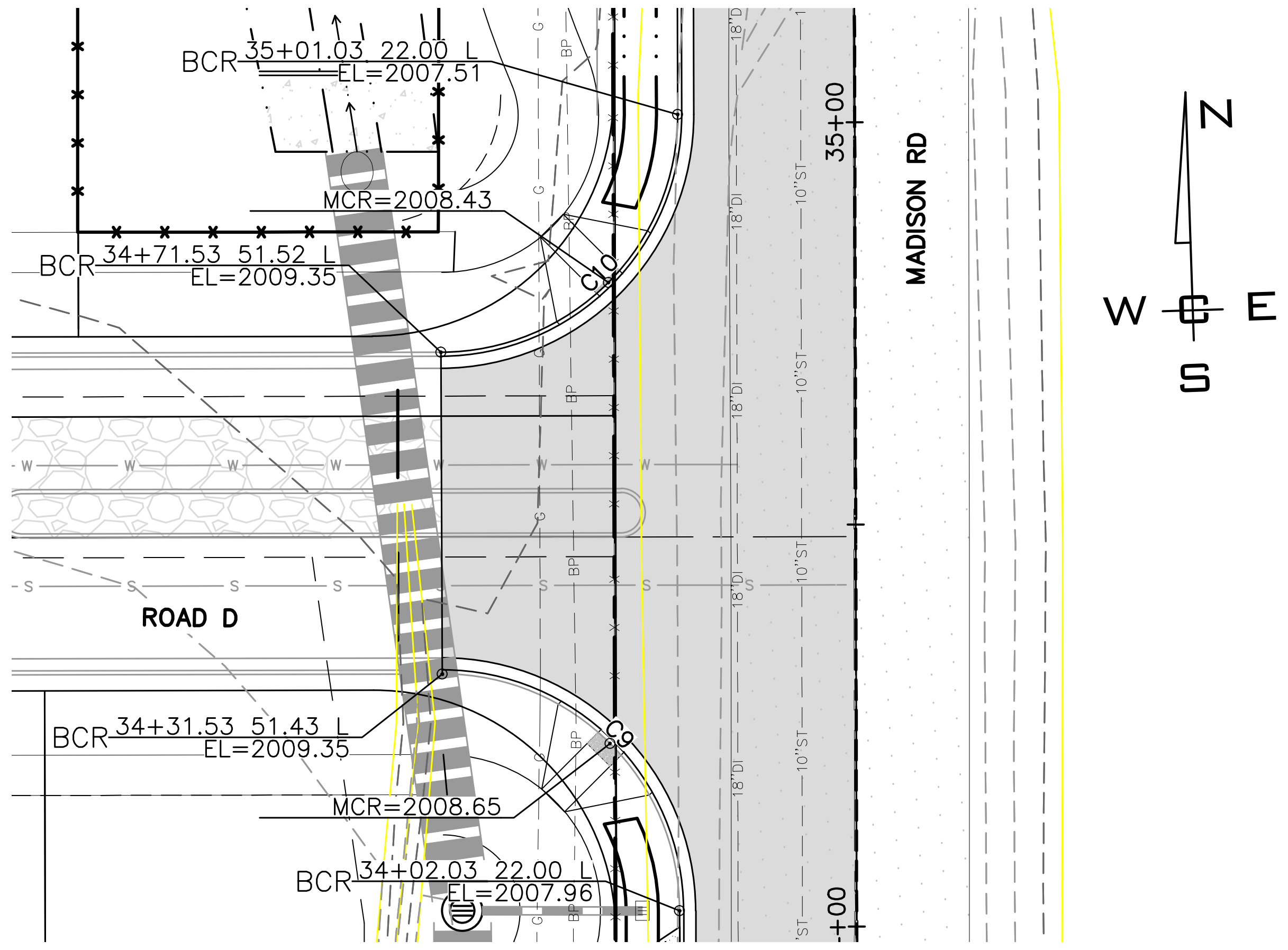
INTERSECTION DETAIL ④

MADISON RD AND ROAD B
SCALE: 1" = 20'
STA 21+12.59 MADISON RD TO STA 10+00 ROAD B



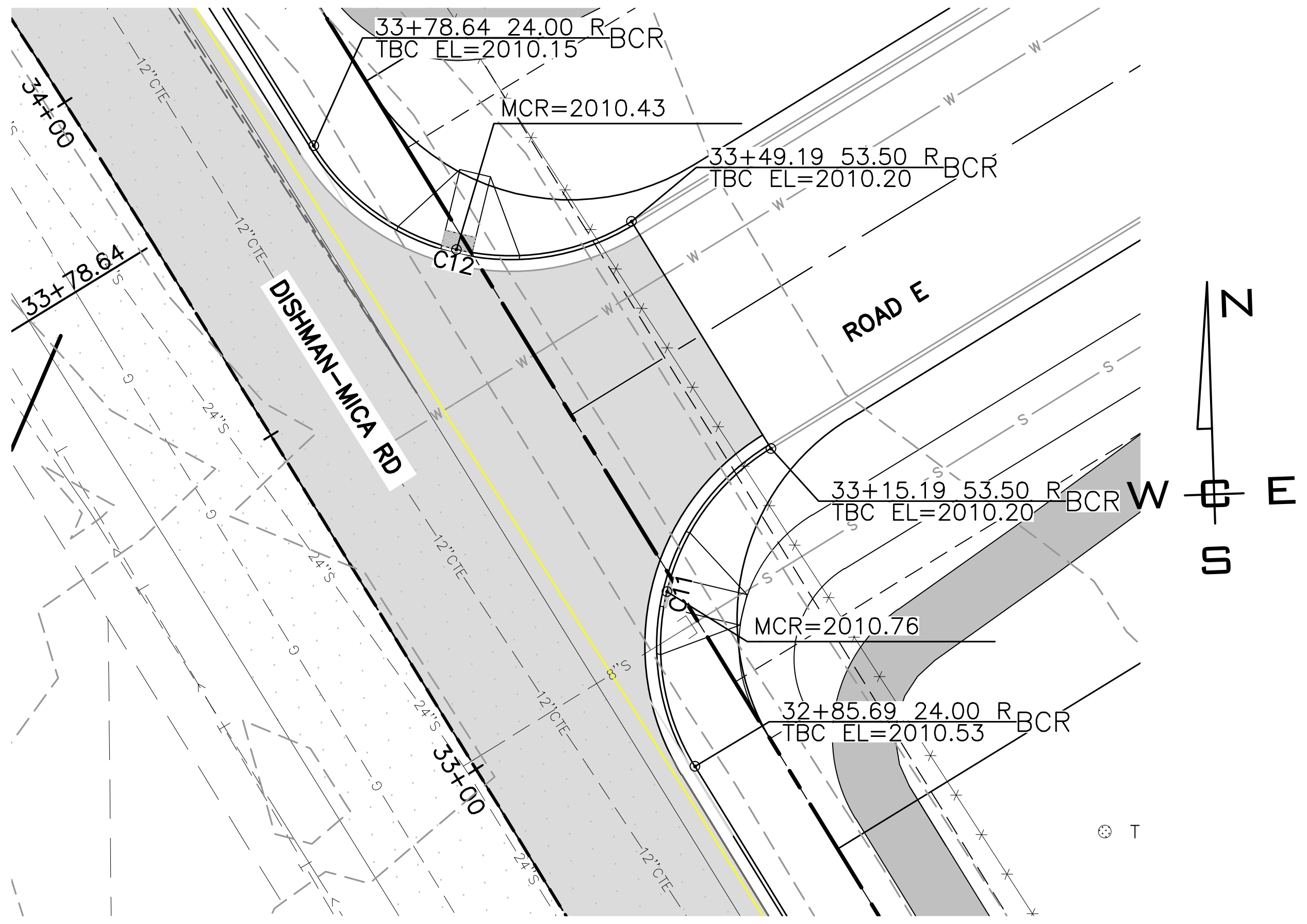
INTERSECTION DETAIL ⑤

MADISON RD AND ROAD C
SCALE: 1" = 20'
STA 31+44.59 MADISON RD TO STA 10+00.00 ROAD C



INTERSECTION DETAIL ⑥

MADISON RD AND ROAD D
SCALE: 1" = 20'
STA 34+84.50 MADISON RD TO STA 10+00 ROAD D

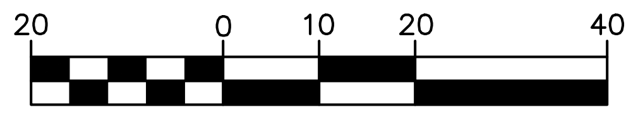


INTERSECTION DETAIL ⑦

DISHMAN-MICA RD AND ROAD E
SCALE: 1" = 20'
STA 33+32.19 DISHMAN-MICA RD TO STA 10+00 ROAD E

Curve Table			
Curve #	Length	Radius	Delta
C1	60.65	39.50	87.98
C2	46.31	29.50	89.95
C3	46.36	29.50	90.05
C4	46.31	29.50	89.95
C5	46.36	29.50	90.05
C6	46.31	29.50	89.95
C7	46.36	29.50	90.05
C8	46.31	29.50	89.95
C9	46.27	29.50	89.87
C10	46.36	29.50	90.03
C11	46.34	29.50	90.00
C12	46.34	29.50	90.00

GRAPHIC SCALE



(IN FEET)
1 inch = 20 ft.

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ________
Acceptance Comments

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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NO.	DATE	BY	REVISIONS
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SCALE:
HORIZONTAL:
1"=20'
VERTICAL:
N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
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☐ OTHER

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WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
INTERSECTION DETAILS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C3.30

JOB NUMBER
13-1166

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UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
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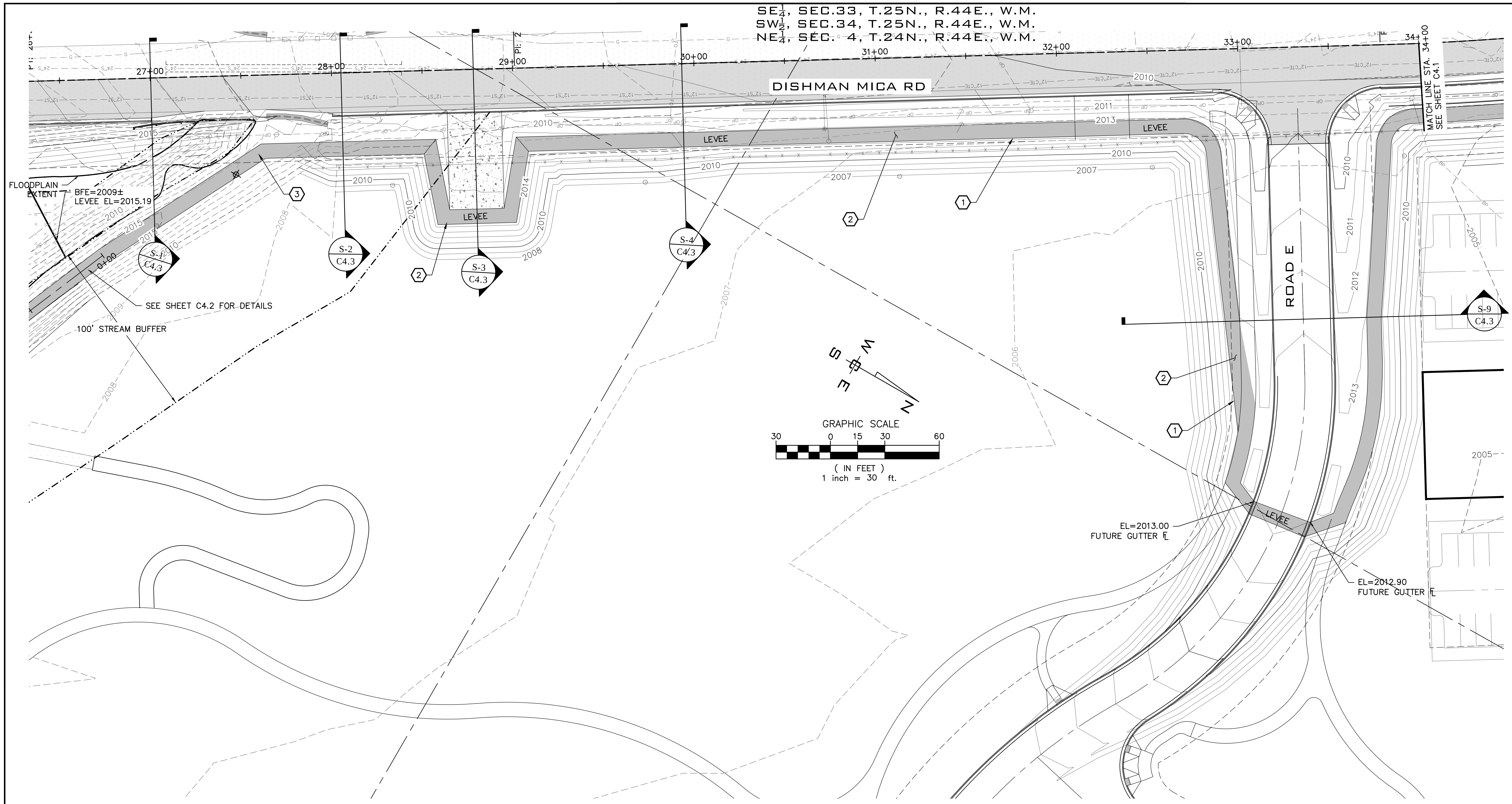
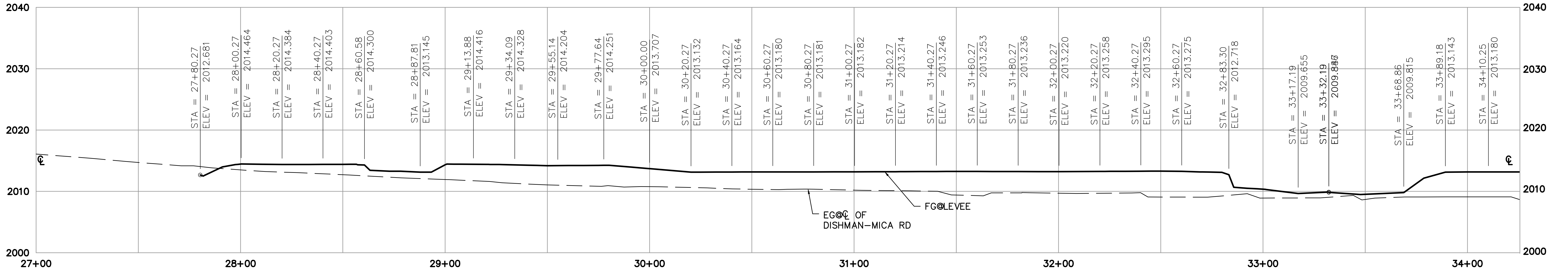


CONSTRUCTION NOTES

① PROVIDE AND INSTALL 8' WIDE ASPHALT PATHWAY PER CITY OF SPOKANE VALLEY STANDARDS.

② CONSTRUCT LEVEE PER DETAIL A, SEE SHEET C4.1.

③ CONNECT TO EXISTING LEVEE.



City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

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Date Accepted ____________
Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

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SPOKANE VALLEY PAINTED HILLS PRD
PROPOSED LEVEE PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C4.0

JOB NUMBER
13-1166

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UNDERGROUND SERVICE ALERT
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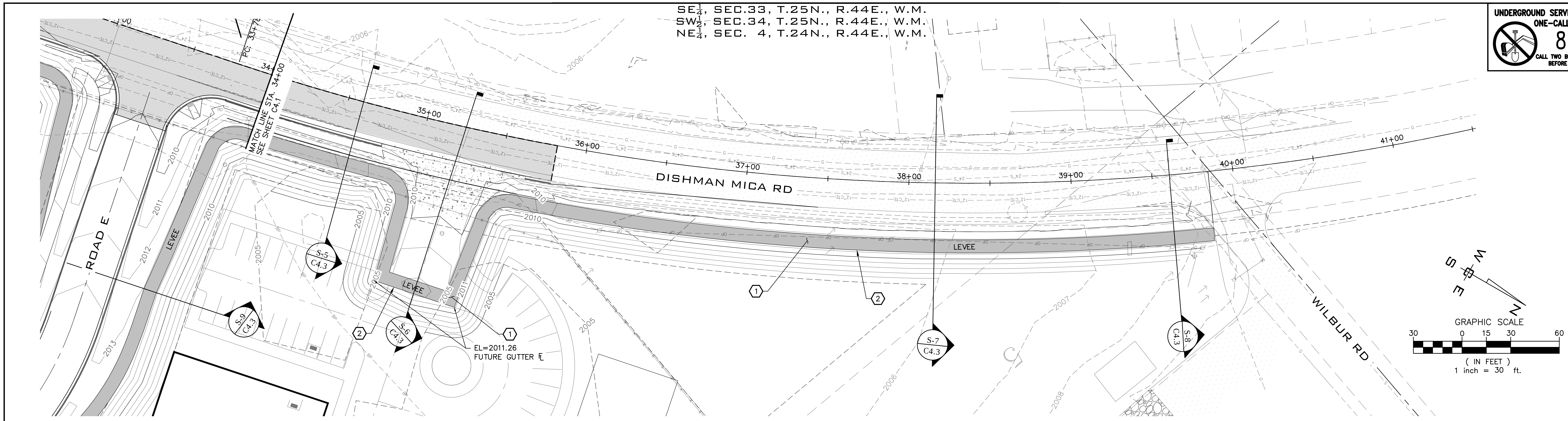
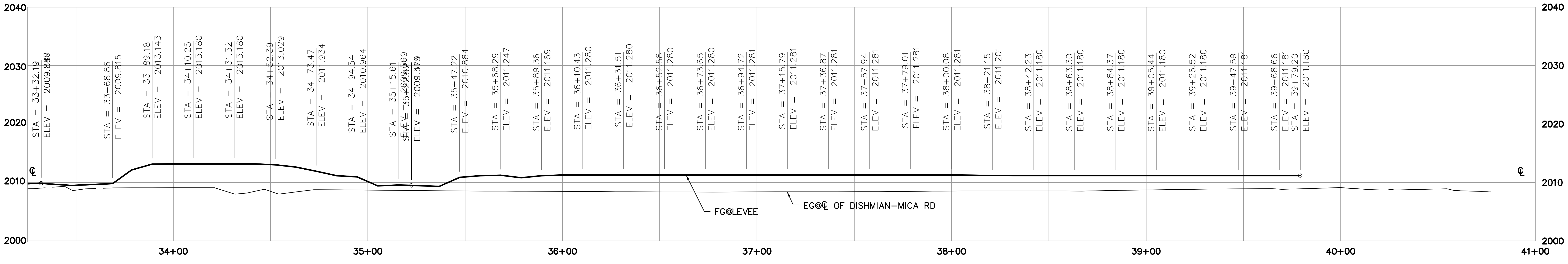




CONSTRUCTION NOTES

① PROVIDE AND INSTALL 8' WIDE ASPHALT PATHWAY PER CITY OF SPOKANE VALLEY STANDARDS.

② CONSTRUCT LEVEE PER DETAIL A, THIS SHEET.

SEEDING NOTE:

GRASS SEED: PROVIDE FRESH, CLEAN, NEW-CROP SEED COMPLYING WITH TOLERANCE OF PURITY AND GERMINATION ESTABLISHED BY THE OFFICIAL SEED ANALYSIS OF NORTH AMERICAN. PROVIDE SEED MIXTURE COMPOSED OF GRASS SPECIES AND PERCENTAGES AS FOLLOWS:

10 PER CENT	ELKA PERRENIAL RYE
20 PERCENT	DURAR HARD FESCUE
45 PERCENT	COVAR SHEEP/FESCUE
15 PERCENT	REUBENS CANADIAN BLUEGRASS

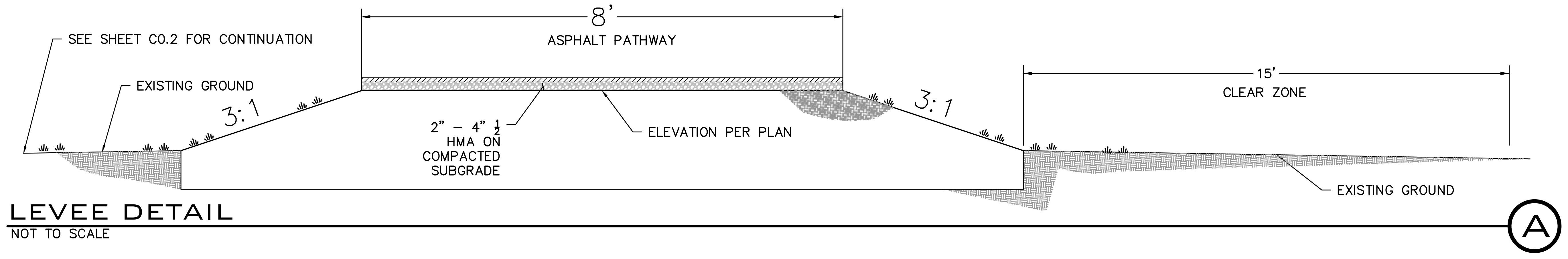
PROVIDE MIXTURE COMPOSED OF GRASS SEED AND FERTILIZER IN PERCENTAGES AS FOLLOWS:

GRASS SEED:	90 LBS. PER ACRE
FERTILIZER:	16-16-16 TIMED RELEASE COMPOSITION, 300 LBS. PER ACRE

ALL SEEDING OF SLOPES SHALL SHALL BE DONE IN ACCORDANCE WITH THE W.S.D.O.T. STANDARD SPECIFICATIONS, SECTION 8-01.

LEVEE CONSTRUCTION NOTES:

1. REMOVE EXISTING ORGANICS, TOP SOIL, AND FILL FROM LEVEE FOOTPRINT. SCARIFY AND RECOMPACT A MIMIMUM OF ONE FOOT BELOW LEVEE SUBGRADE.
2. CONSTRUCT LEVEE WITH GRANULAR SOIL WITH 10-30% PASSING SIEVE NO. 200. COMPACTED TO 92% PER ASTM D-1557. SOIL SHOULD BE PLACED IN 6 TO 8-INCH LIFTS. SEE GEOTECHNICAL REPORT TITLED GEOTECHNICAL EVALUATION PROPOSED LEVEE, JOB NO. 14-037A AND DATED JULY, 17 2015.
3. REVEGETATE LEVEE WITH DRYLAND GRASS. SEE SEED MIX, THIS SHEET
4. THERE IS A 15' CLEAR ZONE FROM THE TOE OF THE LEVEE WHERE SHRUBS AND TREES ARE NOT TO BE PLANTED OR EXISTING SHRUBS AND TREES NEED TO BE CLEARED.
5. SEE GEOTECHNICAL REPORT TITLED "GEOTECHNICAL EVALUATION PROPOSED LEVEE 4403 SOUTH DISHMAN-MICA ROAD" BY IPEC DATED JULY 17, 2017.



LEVEE DETAIL
NOT TO SCALE

City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ **Not Reviewed**

☐ **Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2**

Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
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VERTICAL: 1"=10'

PROJ #:	13-1166
DATE:	08/17/16
DRAWN:	JPP
REVIEWED:	TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
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WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
PROPOSED LEVEE PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

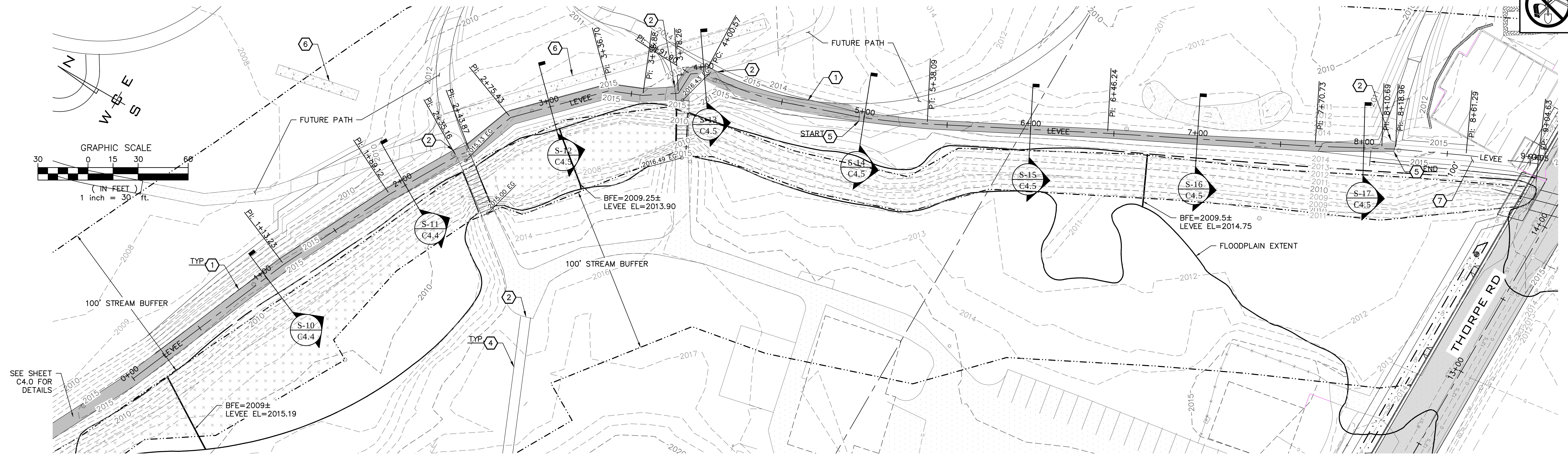
SHEET
C4.1

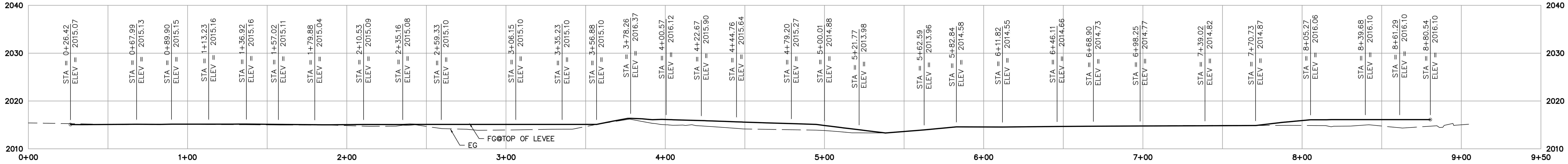
JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C4.0 LEVEE PLAN.dwg, 10/13/2016 3:07:10 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG





CONSTRUCTION NOTES

① PROVIDE AND INSTALL 8' WIDE ASPHALT PATHWAY PER CITY OF SPOKANE VALLEY STANDARDS. SEE DETAIL 1, THIS SHEET.

② CONNECT TO EXISTING SIDEWALK PER CITY OF SPOKANE STANDARDS AND SPECIFICATIONS.

③ CONSTRUCT LEVEE PER DETAIL 1 & 2, THIS SHEET.

④ PROVIDE AND INSTALL 6' CONCRETE SIDEWALK PER CITY OF SPOKANE VALLEY STANDARD PLAN R-103.

⑤ REMOVE EXISTING ASPHALT AND REPLACE WITH 5.5' WIDE ASPHALT PATH PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE DETAIL 2, THIS SHEET.

⑥ EXISTING CONCRETE TO BE REMOVED.

⑦ RAISE EXISTING LEVEE 1' TO 100 FT DOWNSTREAM OF CULVERT.

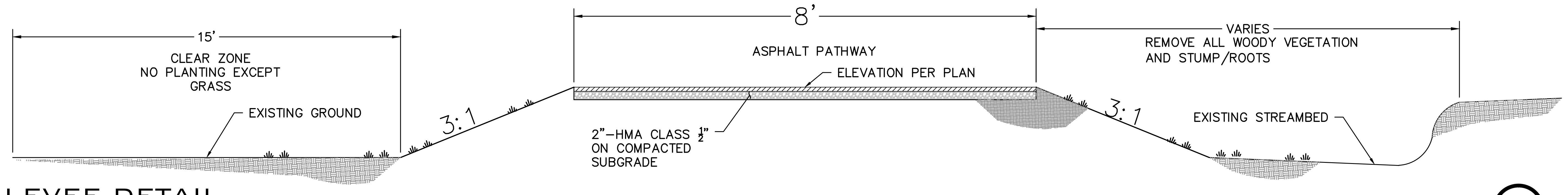
NOTE:
EXISTING LEVEE TO BE UPDATED PER GEOTECHNICAL ENGINEER.

BFE= BASE FLOOD ELEVATION

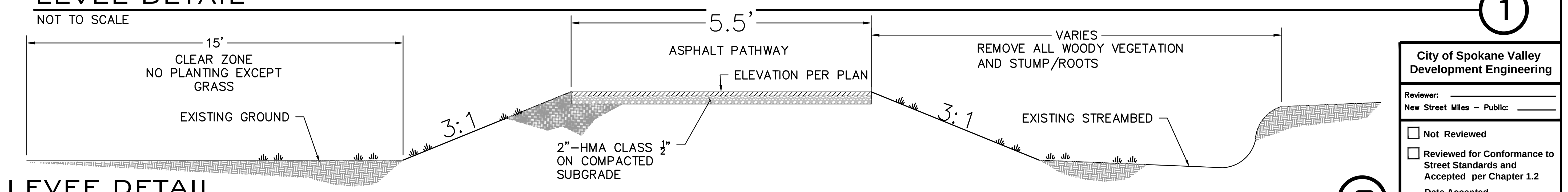
REQUIRED MINIMUM FREEBOARD = 3-FT EXCEPT STA. 1+39 TO STA. 4+82 = 4-FT.

LEVEE CONSTRUCTION NOTES:

1. REMOVE EXISTING PATHWAY AND REPLACE WITH NEW ASPHALT. SEE DETAIL 1 AND 2, THIS SHEET.
2. RAISE LEVEE HEIGHT USING GRANULAR SOIL WITH 10-30% PASSING SIEVE NO. 200. COMPACTED TO 92% PER ASTM D-1557. SOIL SHOULD BE PLACED IN 6 TO 8-INCH LIFTS. SEE GEOTECHNICAL REPORT TITLED LEVEE EVALUATION AND CERTIFICATION, JOB NO. 14-037 AND DATED FEBUARY 12, 2015.
3. REVEGETATE LEVEE WITH DRYLAND GRASS. SEE SEED MIX, SEE SHEET C4.1.
4. THERE IS A 15' CLEAR ZONE FROM THE TOE OF THE LEVEE WHERE WOODY VEGETATION ARE NOT TO BE PLANTED OR EXISTING WOODY MATERIAL NEED TO BE CLEARED.
5. SEE GEOTECHINICAL REPORT TITLED "GEOTECHINICAL EVALUATION-LEVEE EVALUATION AND CERTIFICATION 4403 SOUTH DISHMAN-MICA ROAD" BY IPEC DATED FEBRUARY 12, 2015.



LEVEE DETAIL
NOT TO SCALE



LEVEE DETAIL
NOT TO SCALE

City of Spokane Valley
Development Engineering

Reviewer: ____
New Street Miles – Public: ____

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ____
Acceptance Comments

SEPTEMBER
2016
PLANS
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TODD R. WHIPPLE
25462
10/13/16

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WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
EXISTING LEVEE PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C4.2

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C4.0 LEVEE PLAN.dwg, 10/13/2016 3:07:50 PM

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UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
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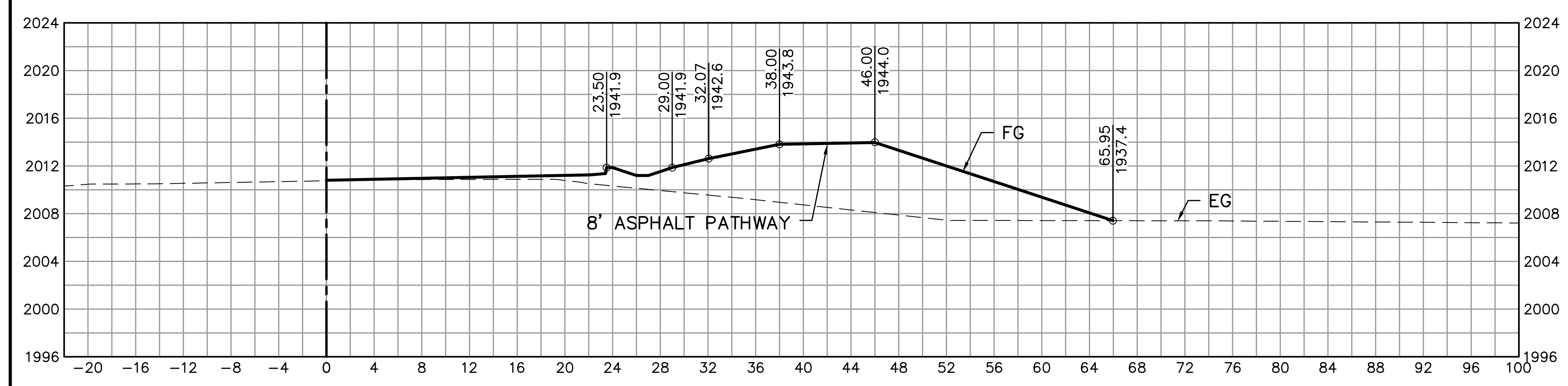
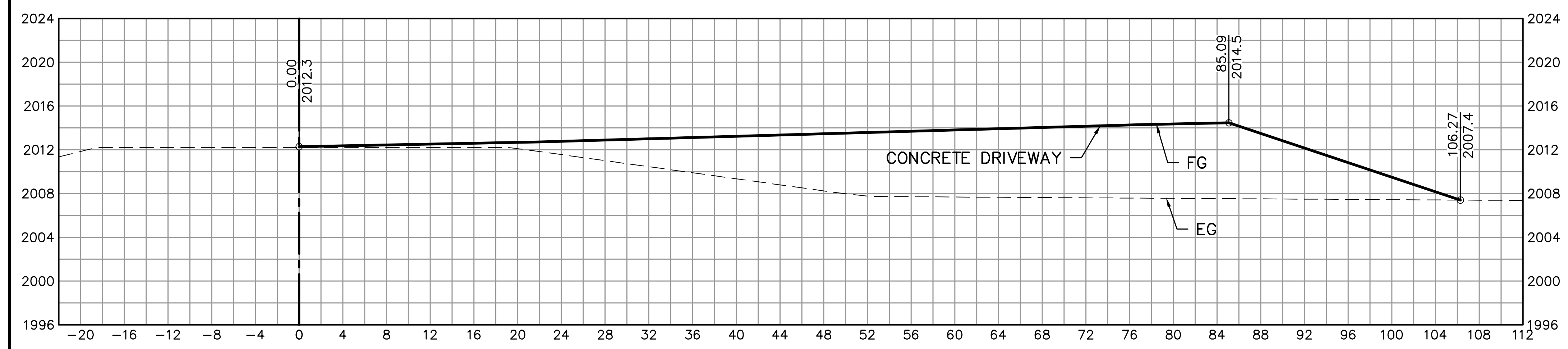
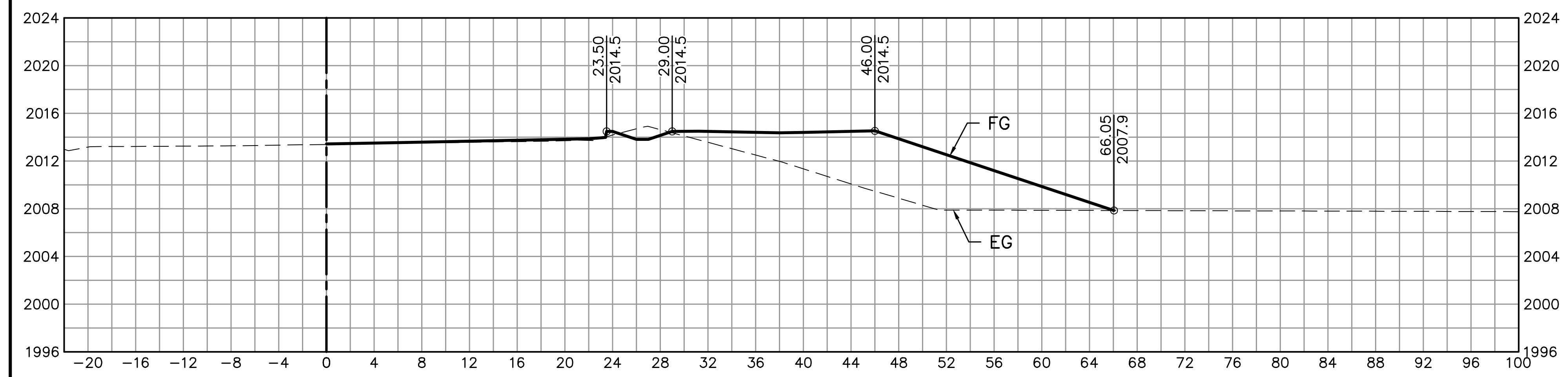
SL-4
29+93.27



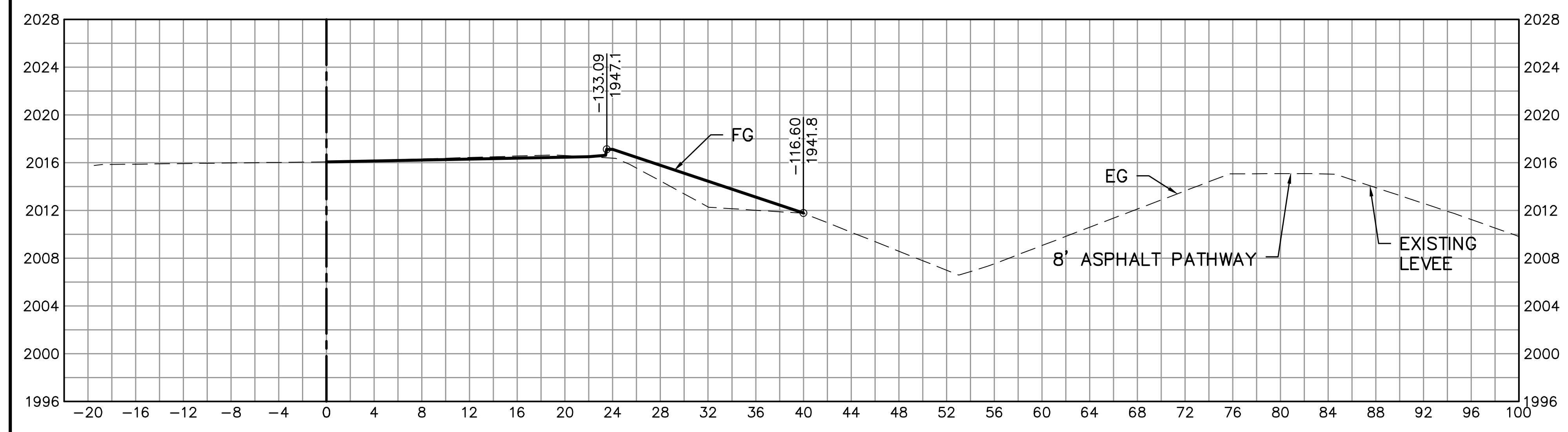
SL-3
28+78.26



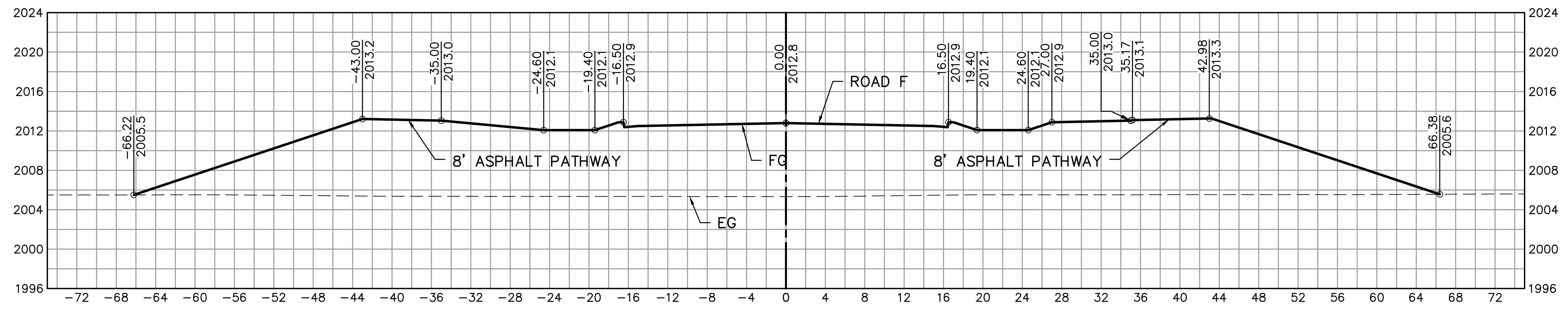
SL-2
28+05.27



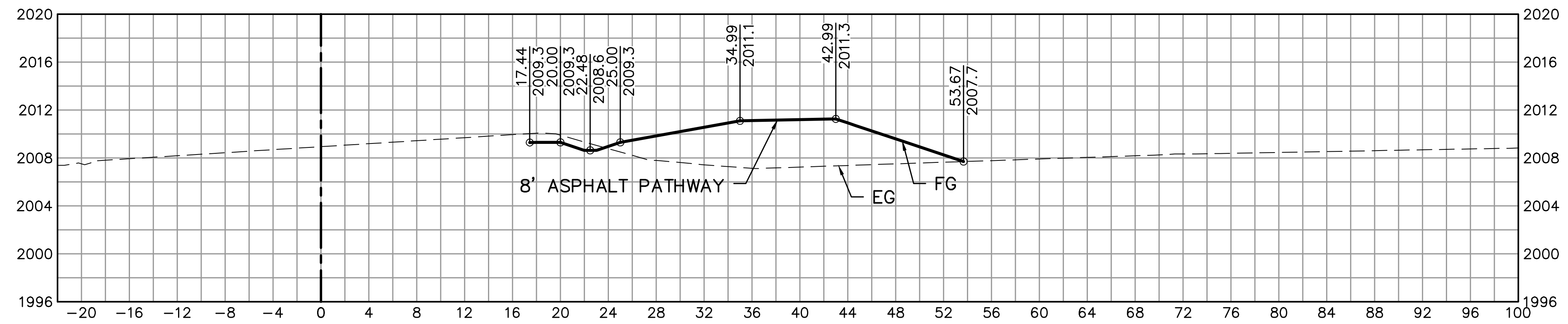
SL-1
27+00.27



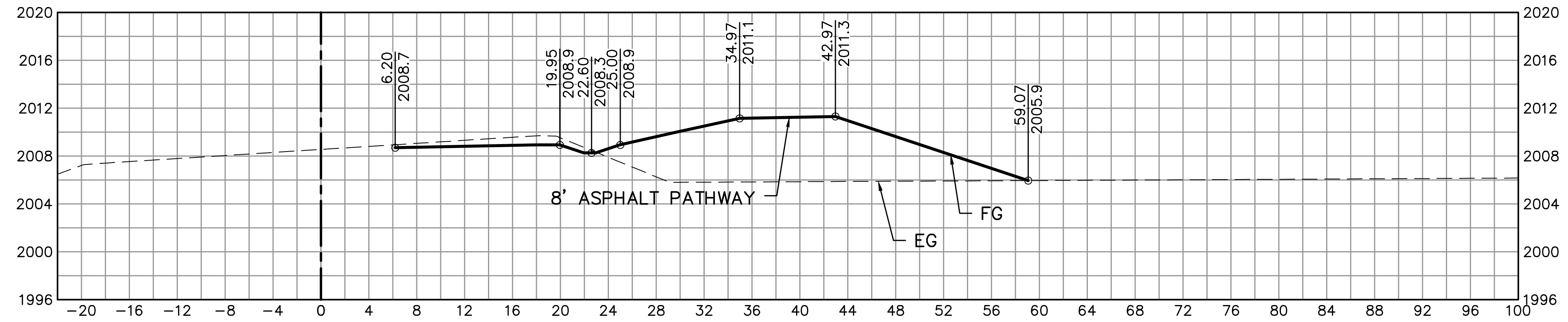
SL-9
11+50.00



SL-8
39+60.79



SL-7
38+16.27



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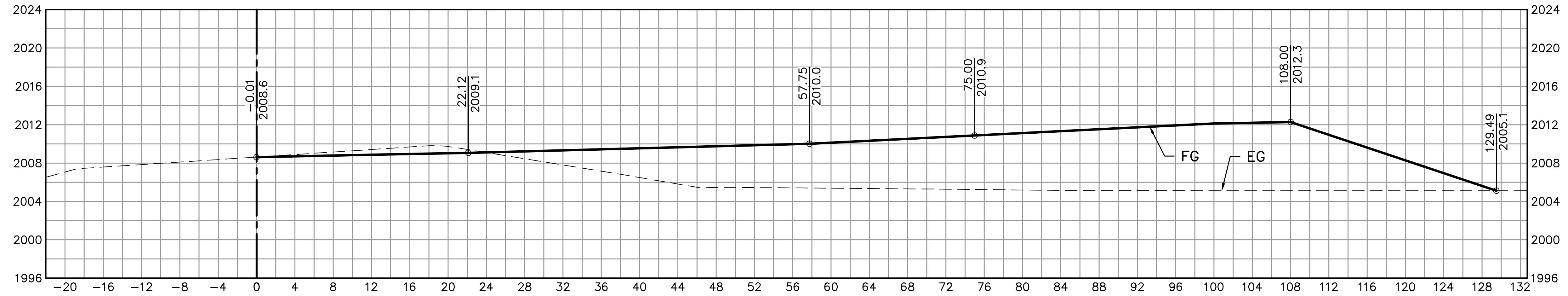

SL-5
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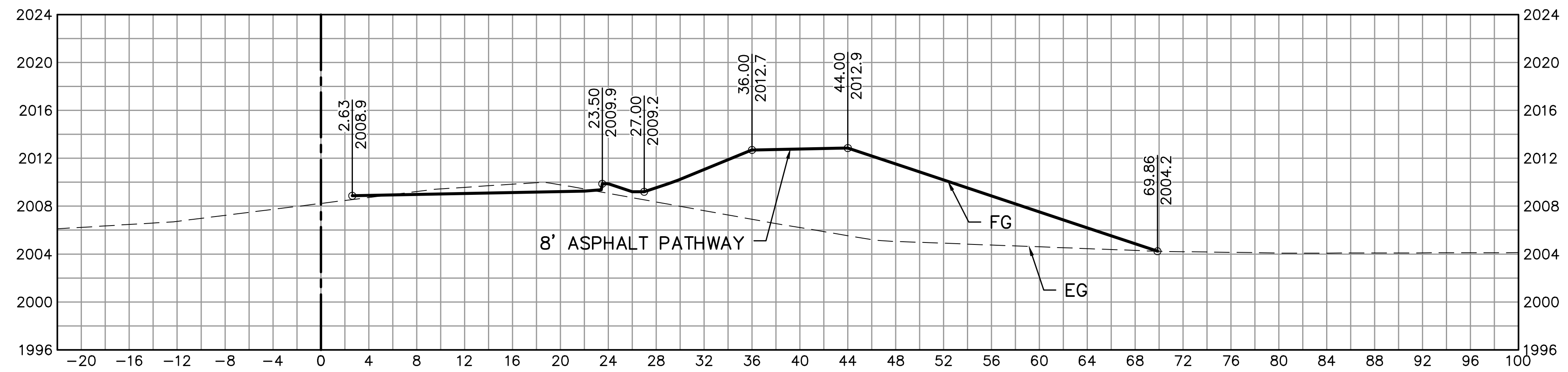


City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
PROPOSED LEVEE CROSS SECTIONS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C4.3

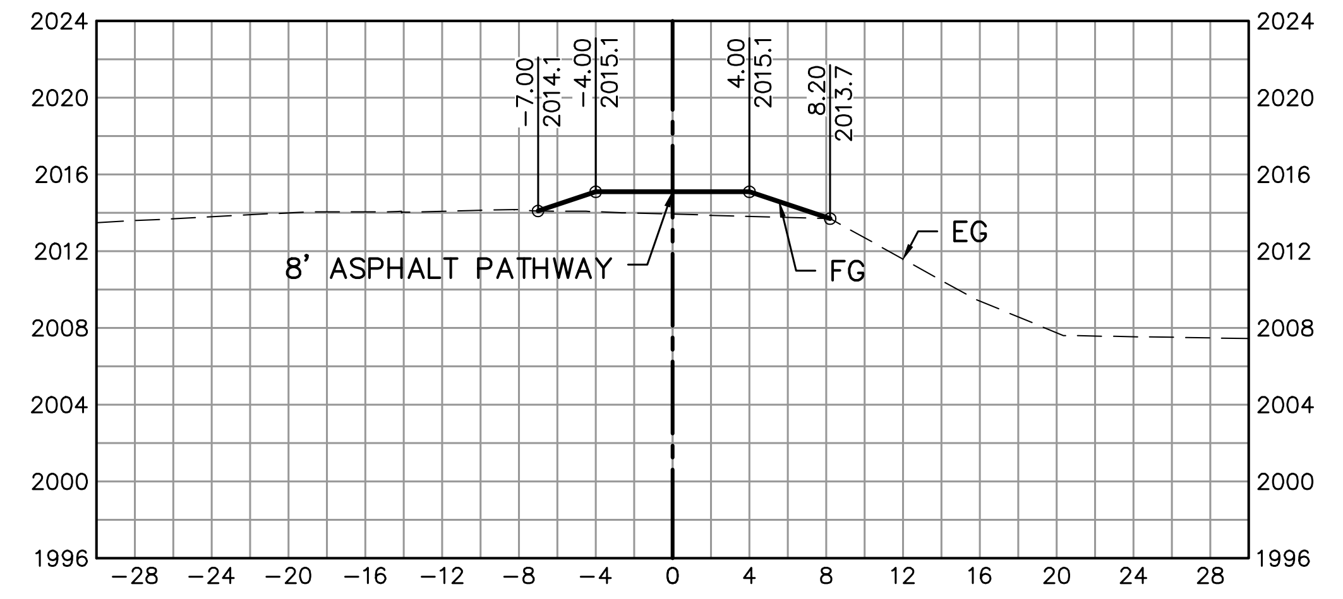
JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C4.0 LEVEE PLAN.dwg, 10/13/2016 3:08:31 PM

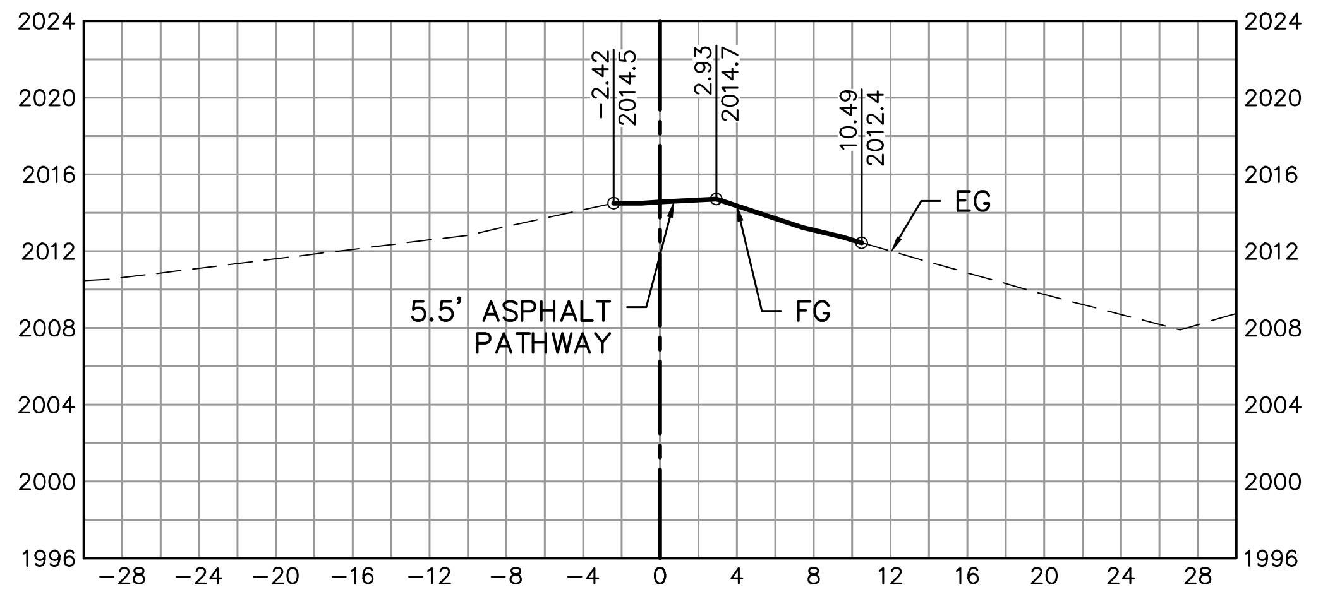
SE1/4, SEC.33, T.25N., R.44E., W.M.
SW1/4, SEC.34, T.25N., R.44E., W.M.
NE1/4, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

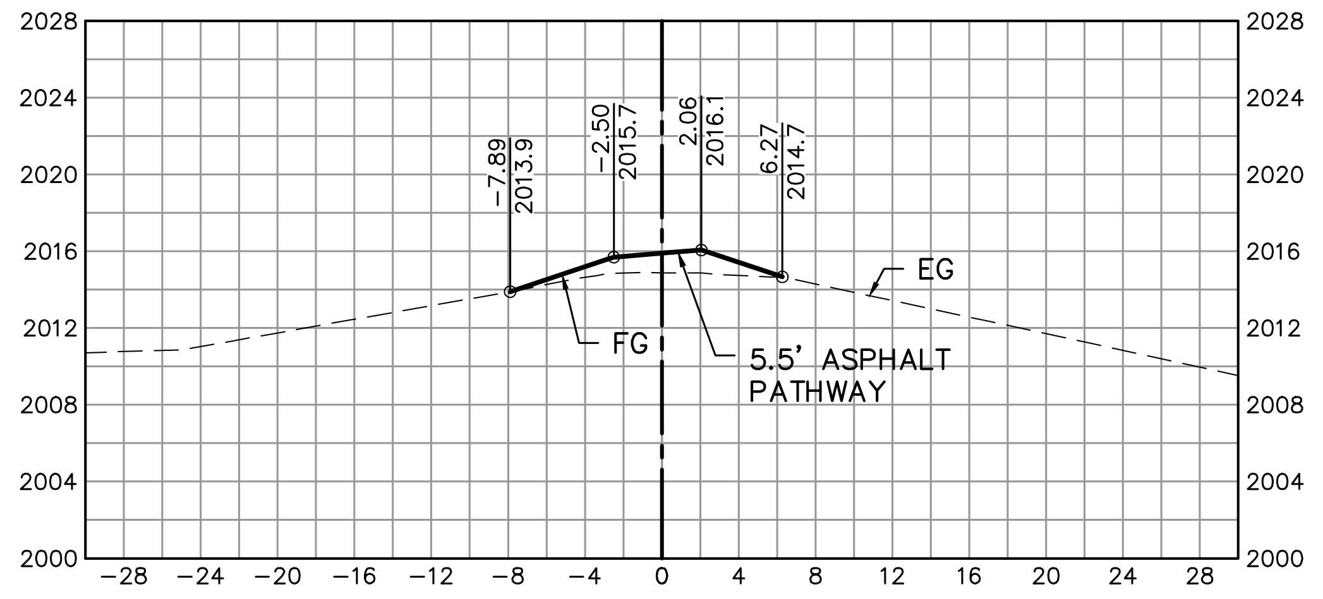
SL-12
3+00.00



SL-15
6+00.00



SL-17
8+00.00



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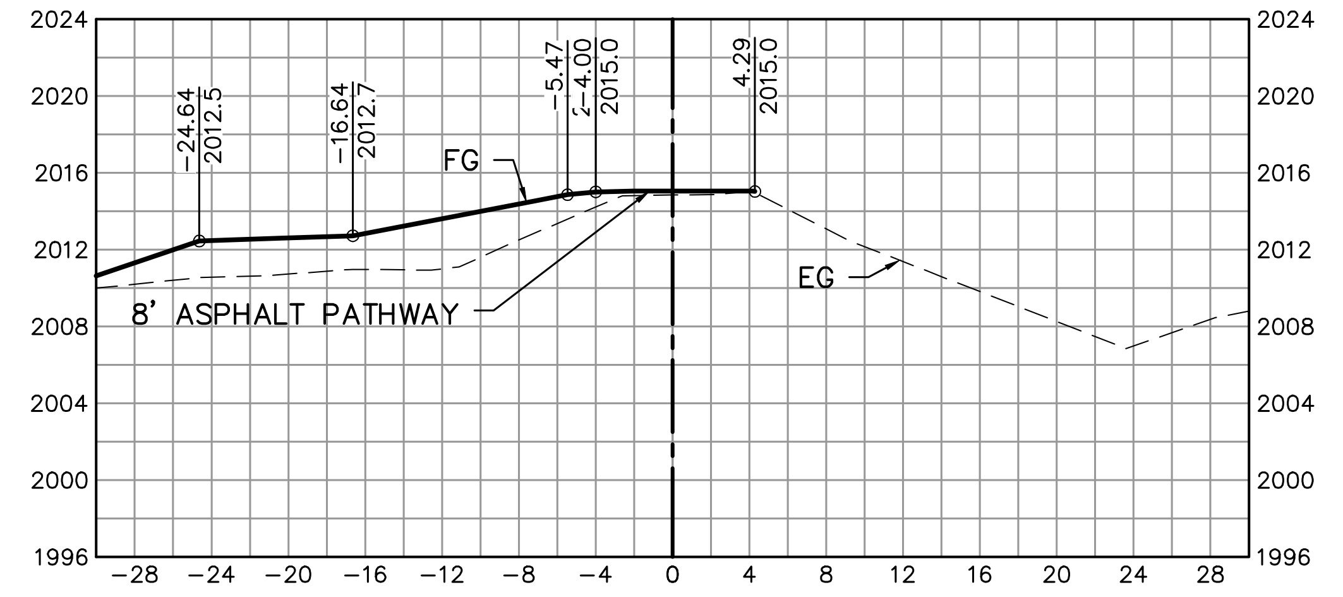
2+00.00



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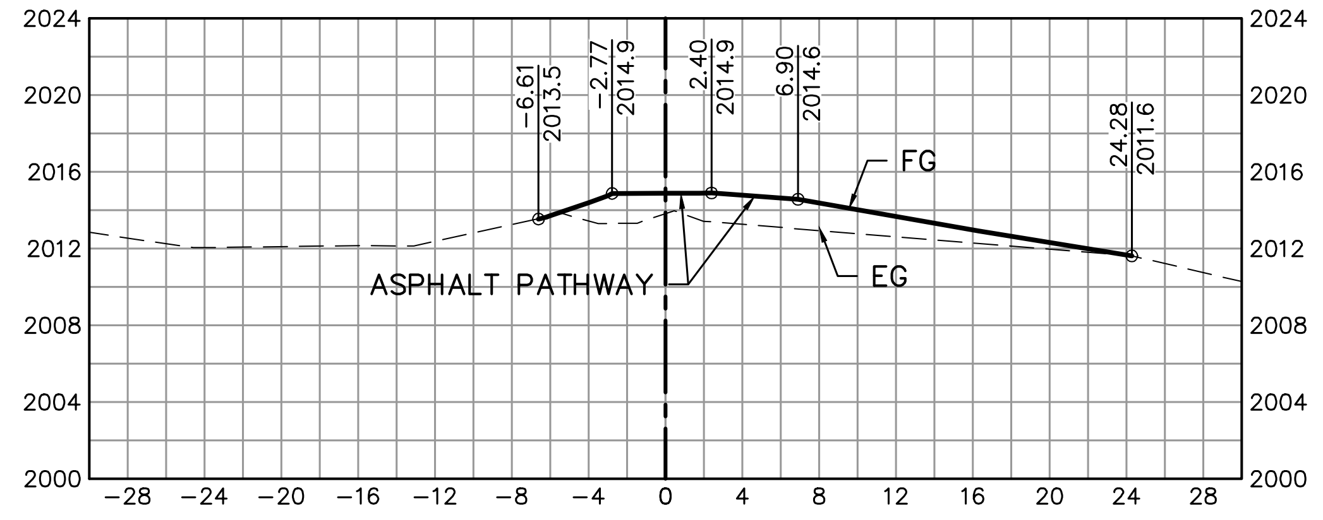

SL-16
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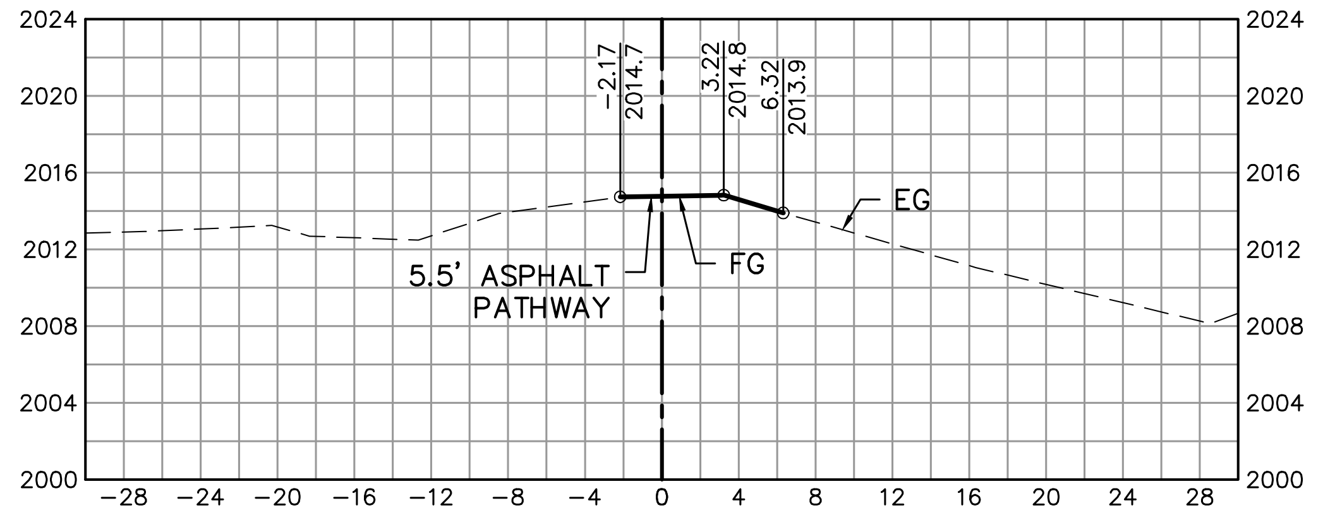

SL-10
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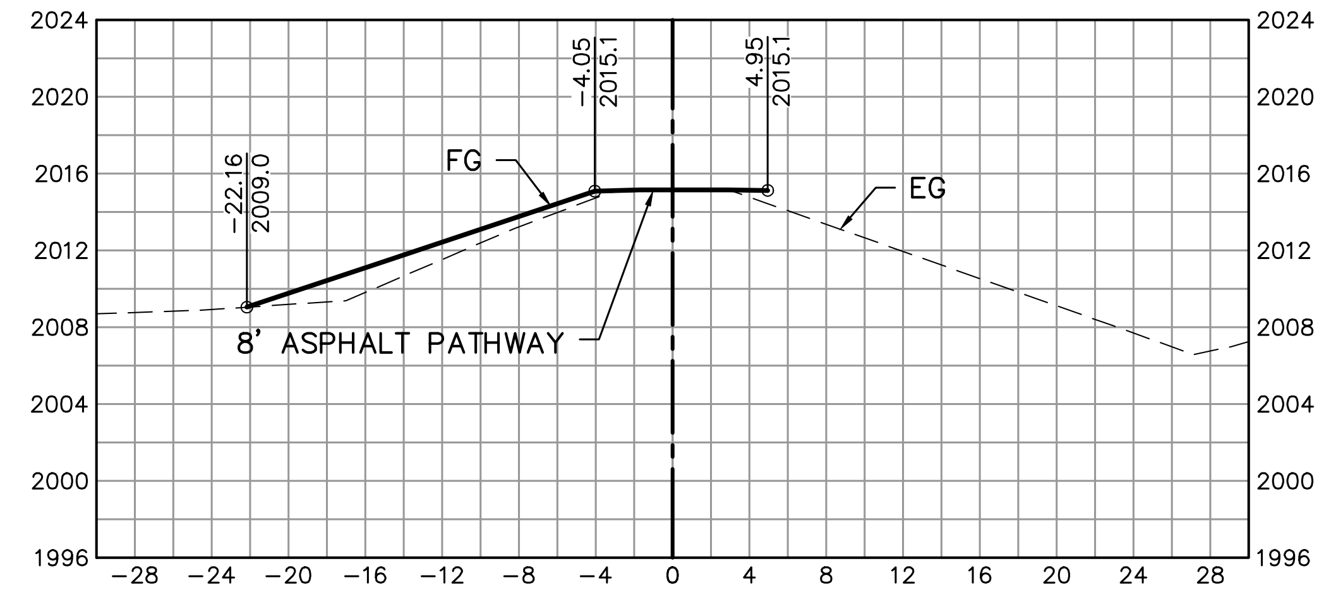
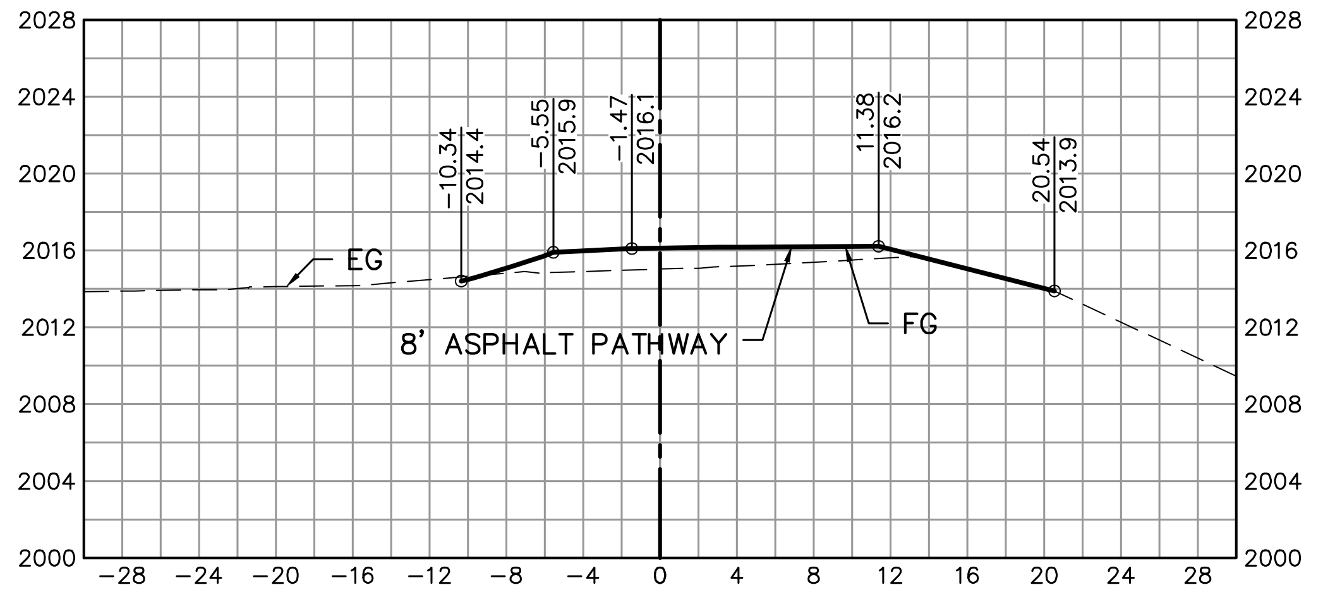


SL-13
4+00.00



City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=10'
VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
EXISTING LEVEE CROSS SECTIONS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C4.4

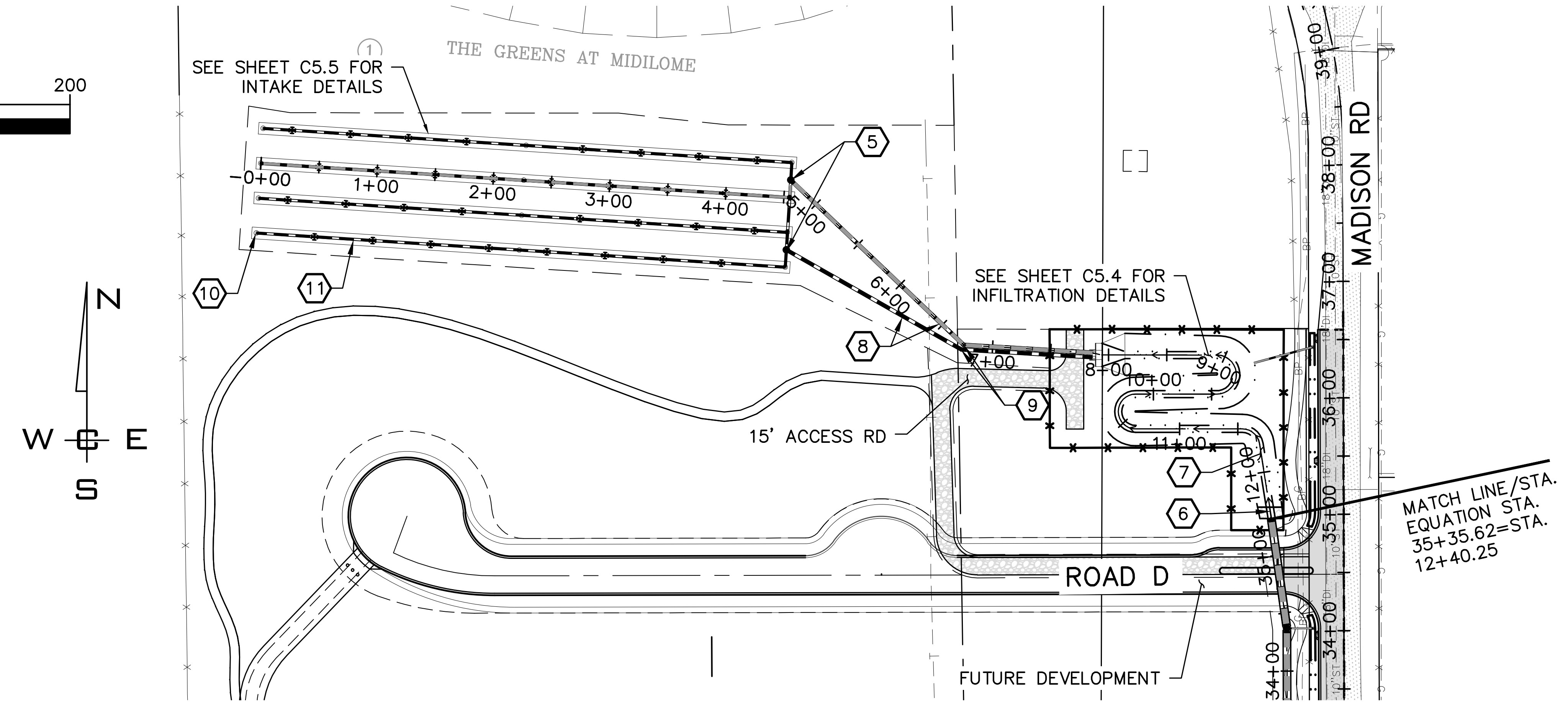
JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C4.0 LEVEE PLAN.dwg, 10/13/2016 3:09:10 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

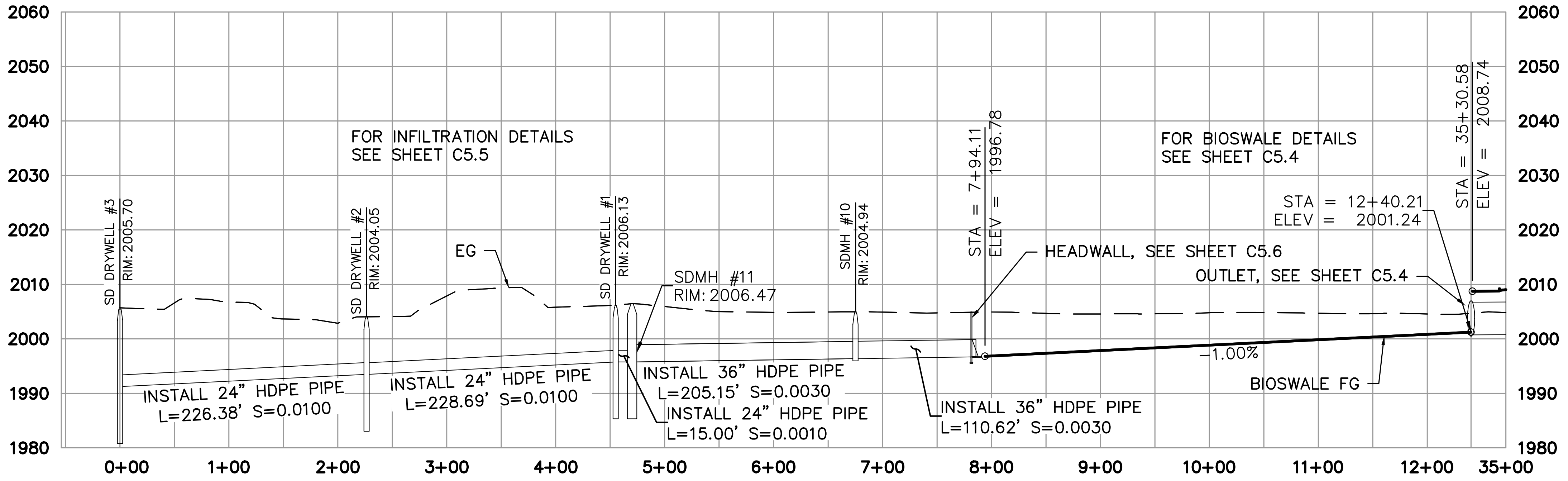
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.



CONSTRUCTION NOTES

① PROVIDE AND INSTALL BOX CULVERT, SEE SHEET C5.2 FOR DETAILS.
② PROVIDE AND INSTALL CONCRETE CHANNEL, SEE SHEET 5.1 FOR DETAILS.
③ PROVIDE AND INSTALL 48" CLASS III RCP PIPE PER WSDOT STANDARD SECTION 9–05.
④ PROVIDE AND INSTALL 60" CLASS III RCP PIPE PER WSDOT STANDARD SECTION 9–05.
⑤ PROVIDE AND INSTALL TYPE 3–84" SD MANHOLE WITH LID LABEDED "STORM" PER WSDOT STANDARD PLAN B–15.60–01.
⑥ PROVIDE AND INSTALL CONCRETE OUTLET PAD, SEE SHEET C5.4 FOR DETAILS.
⑦ PROVIDE AND INSTALL BIOINFILTRATION SWALE, SEE SHEET C5.4 FOR DETAILS.
⑧ PROVIDE AND INSTALL 36" HDPE PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
⑨ PROVIDE AND INSTALL 60" SD TYPE III MANHOLE PER SPOKANE COUNTY STANDARD PLAN U–6. LID TO BE LABELED "STORM".
⑩ PROVIDE AND INSTALL DRYWELL, SEE SHEET C5.5 FOR DETAILS.
⑪ PROVIDE AND INSTALL 24" HDPE PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.



City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

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☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER 2016
PLANS
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TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=100'
VERTICAL: 1"=20'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
STORM SYSTEM OVERVIEW
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

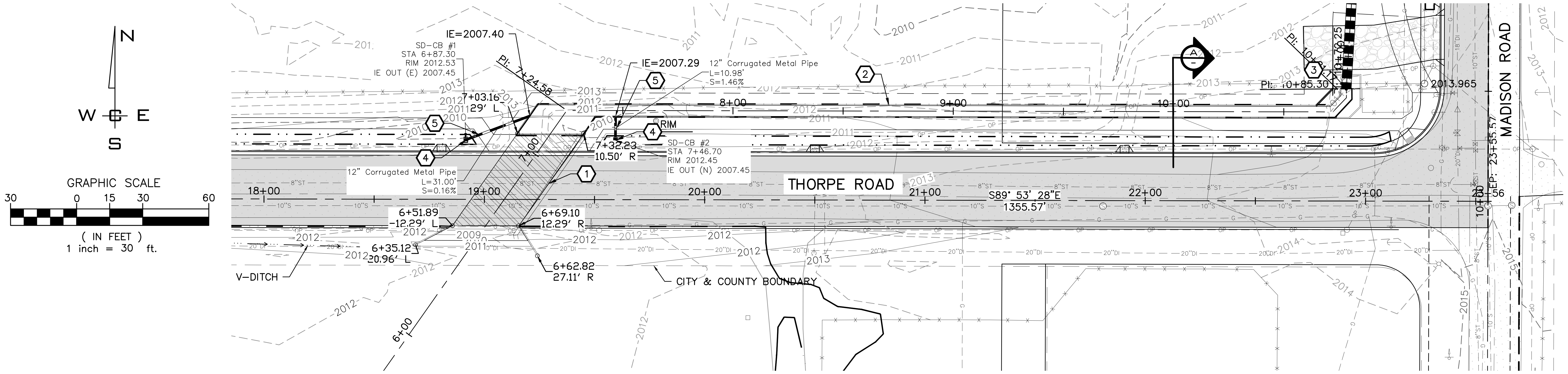
SHEET
C5.0

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.0 STORM SYSTEM.dwg, 10/13/2016 3:09:33 PM

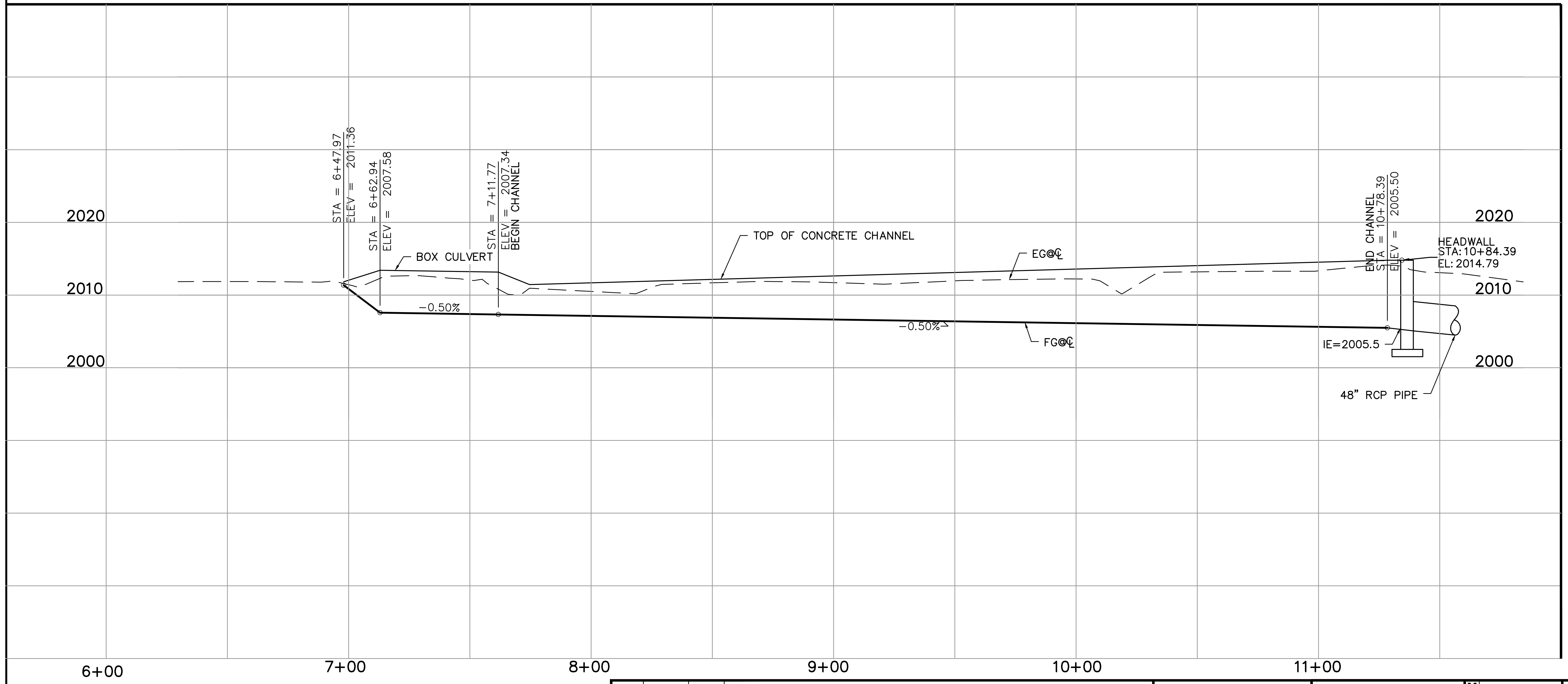
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

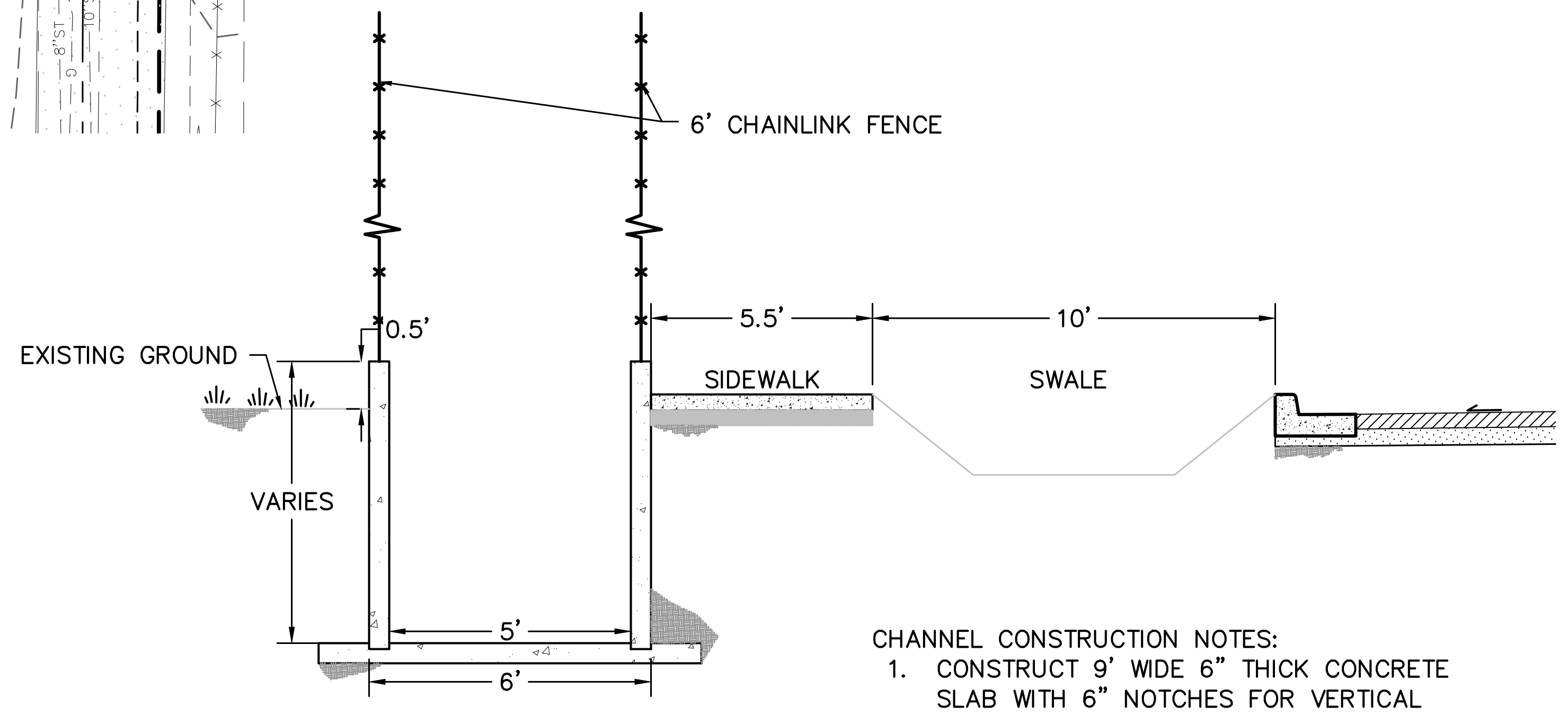
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



CONSTRUCTION NOTES

1. PROVIDE AND INSTALL BOX CULVERT, SEE SHEET C5.2 FOR DETAILS.
2. PROVIDE AND INSTALL CONCRETE CHANNEL, SEE SHEET 5.2 FOR DETAILS.
3. CONCRETE CHANNEL AND STORM PIPE CONNECTION. SEE DETAIL C, SHEET C5.2.
4. PROVIDE AND INSTALL TYPE I CATCH BASIN FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S-112. SEE PLAN FOR RIM ELEVATION.
5. PROVIDE AND INSTALL 12" CMP PIPE PER CITY SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE PLAN FOR INVERT ELEVATIONS AND LENGTH.





CHANNEL CONSTRUCTION NOTES:
1. CONSTRUCT 9' WIDE 6" THICK CONCRETE SLAB WITH 6" NOTCHES FOR VERTICAL WALLS. COMPACT SUBGRADE TO 95%
2. CONSTRUCT 6" CONCRETE VERTICALS WALLS.

CHANNEL CROSS SECTION

NOT TO SCALE

A

City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

⊕ DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

PROJ #:	**13-1166**
DATE:	**08/17/16**
DRAWN:	**JPP**
REVIEWED:	**TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
CONCRETE CHANNEL PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C5.1

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.1 CONCRETE CHANNEL.dwg, 10/13/2016 3:10:17 PM

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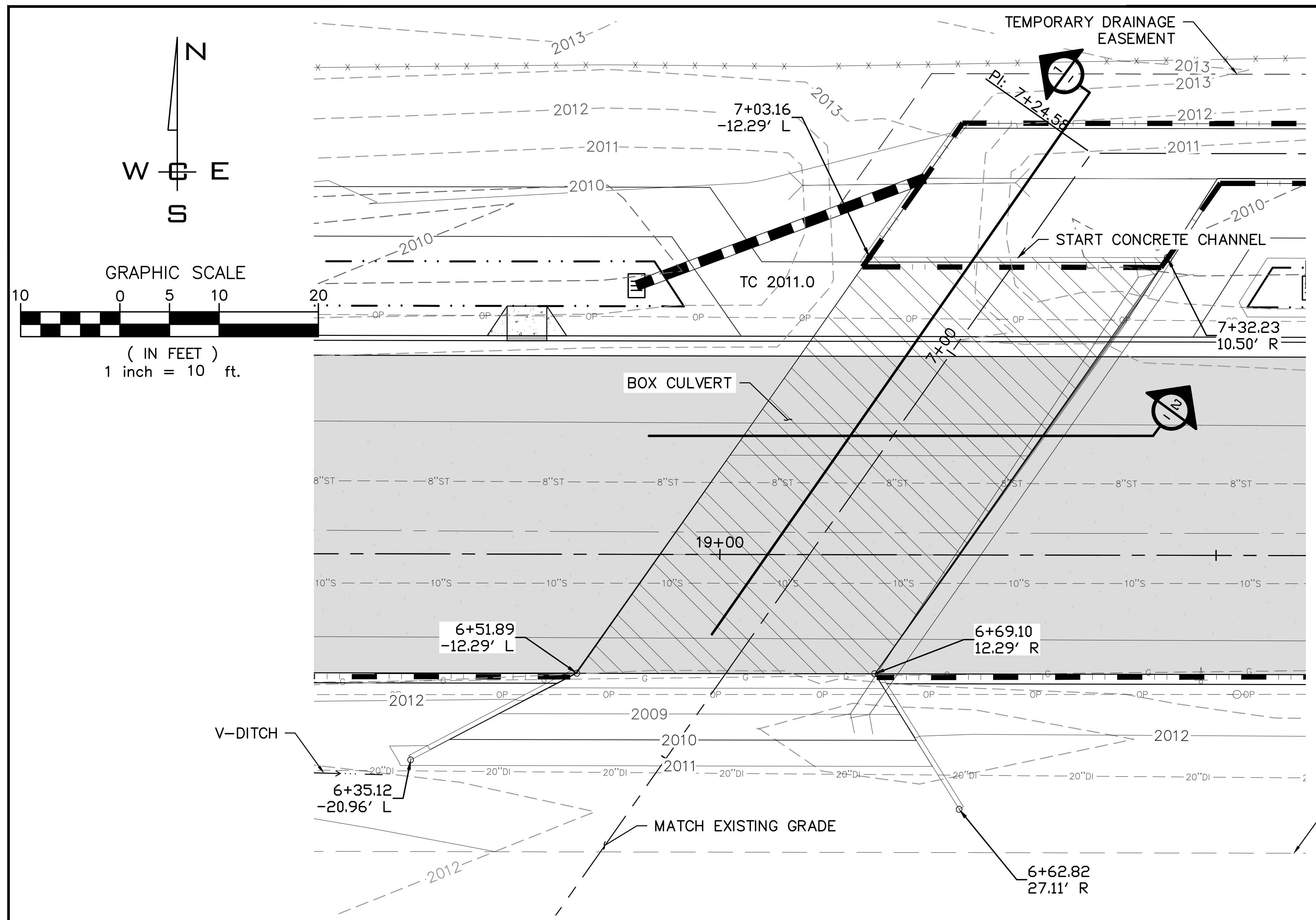
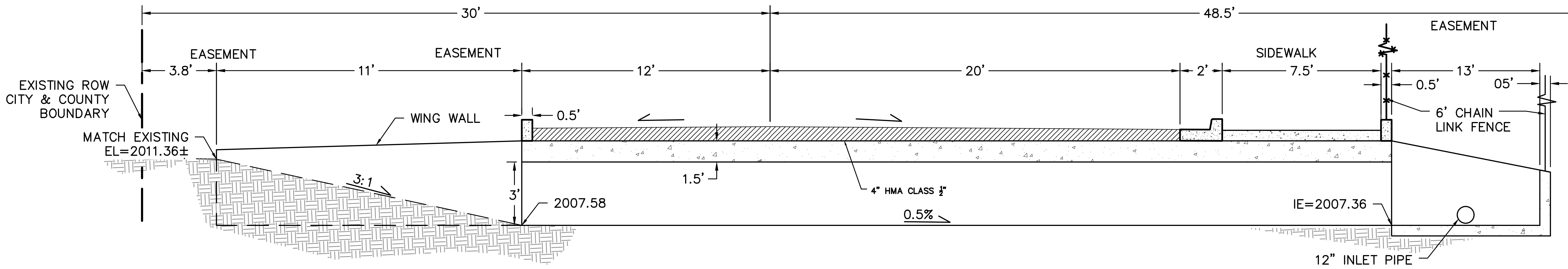
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

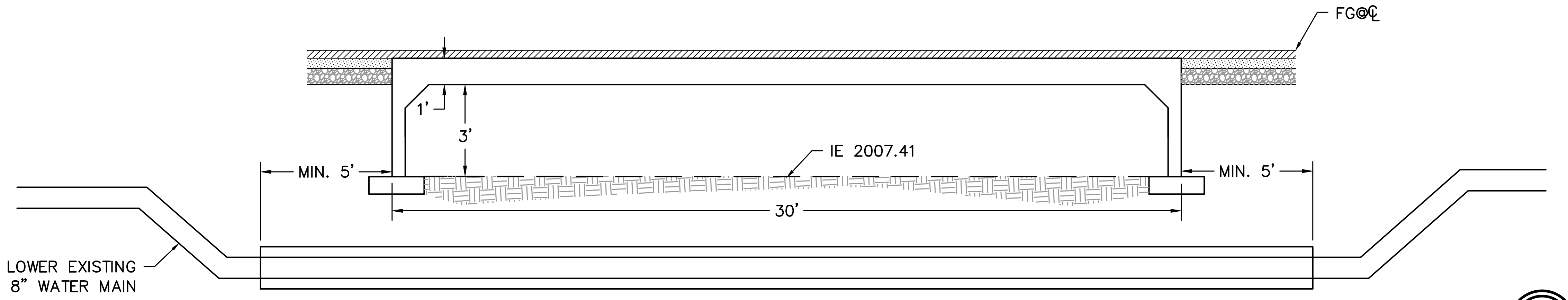
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG





BOX CULVERT CROSS SECTION ①

NOT TO SCALE



BOX CULVERT CROSS SECTION ②

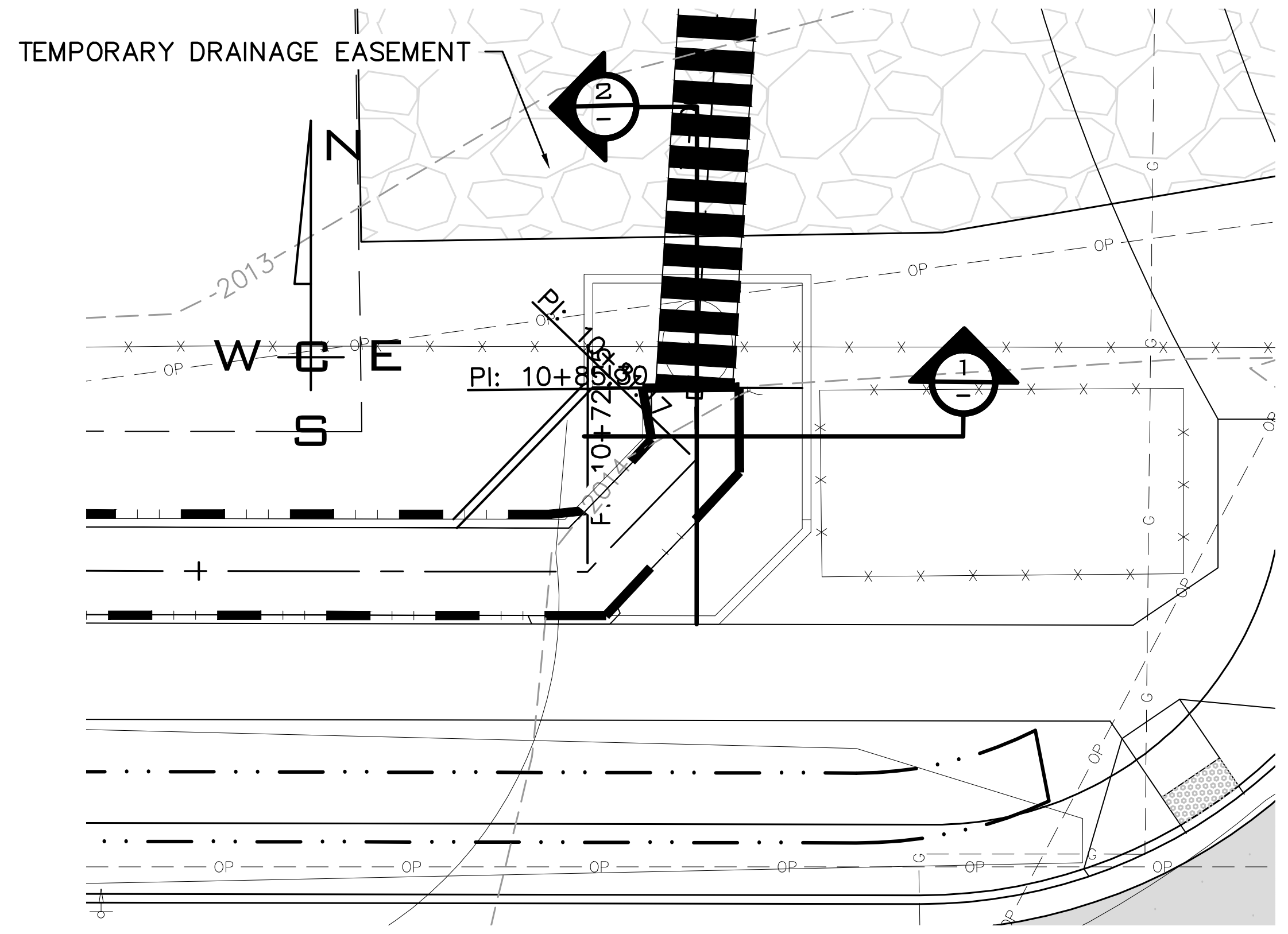
NOT TO SCALE

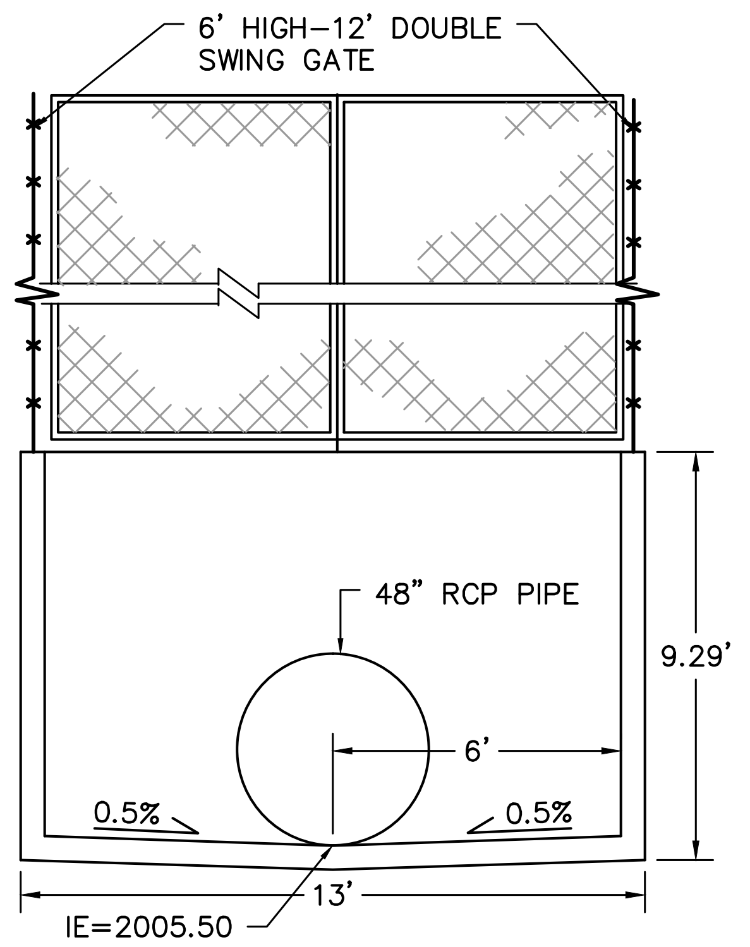
NOTE:
SEE SHEET C5.21 FOR BOX CULVERT DETAILS.

BOX CULVERT DETAIL

SCALE: 1"=10'

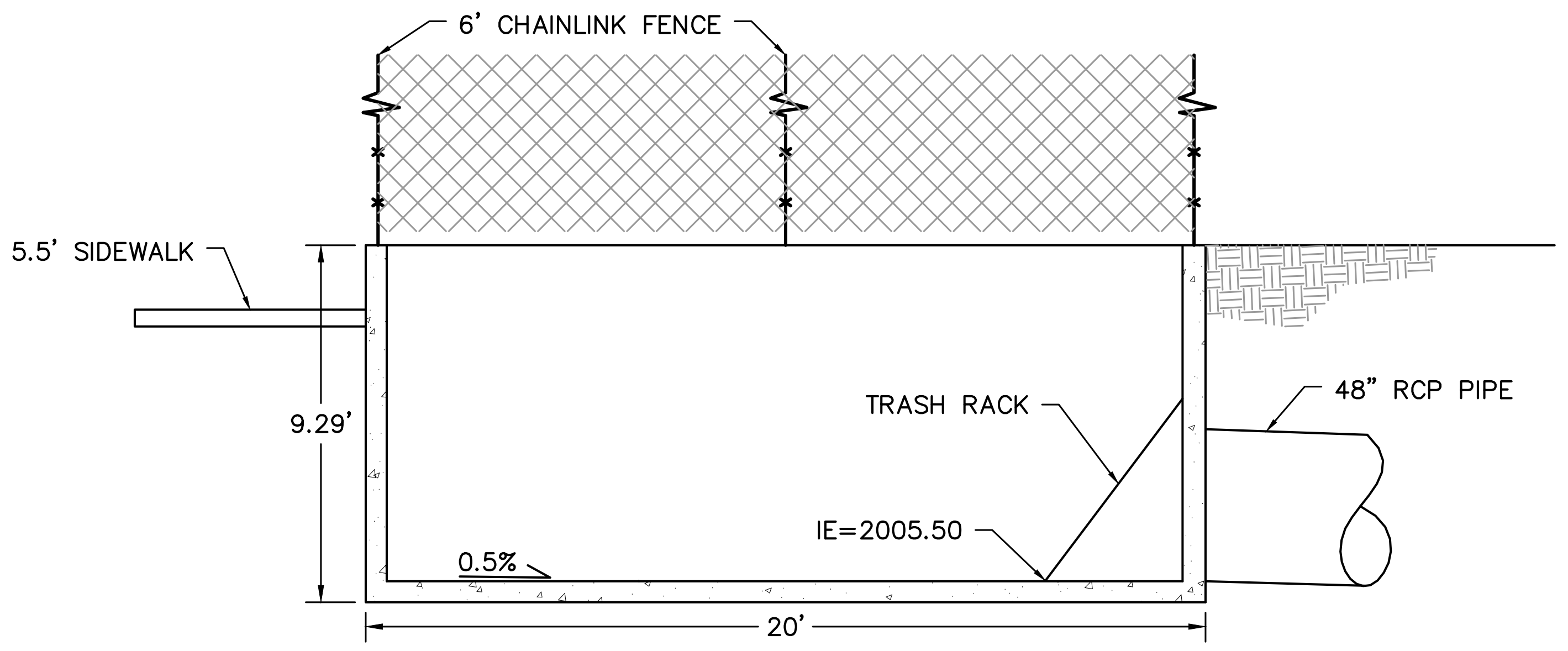
B





CHANNEL & PIPE CROSS SECTION ①

NOT TO SCALE



CHANNEL & PIPE CROSS SECTION ②

NOT TO SCALE

CHANNEL & PIPE CONNECTION

SCALE: 1"=10'

C

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
BOX CULVERT & CHANNEL DETAILS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C5.2

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.1 CONCRETE CHANNEL.dwg, 10/13/2016 3:10:39 PM

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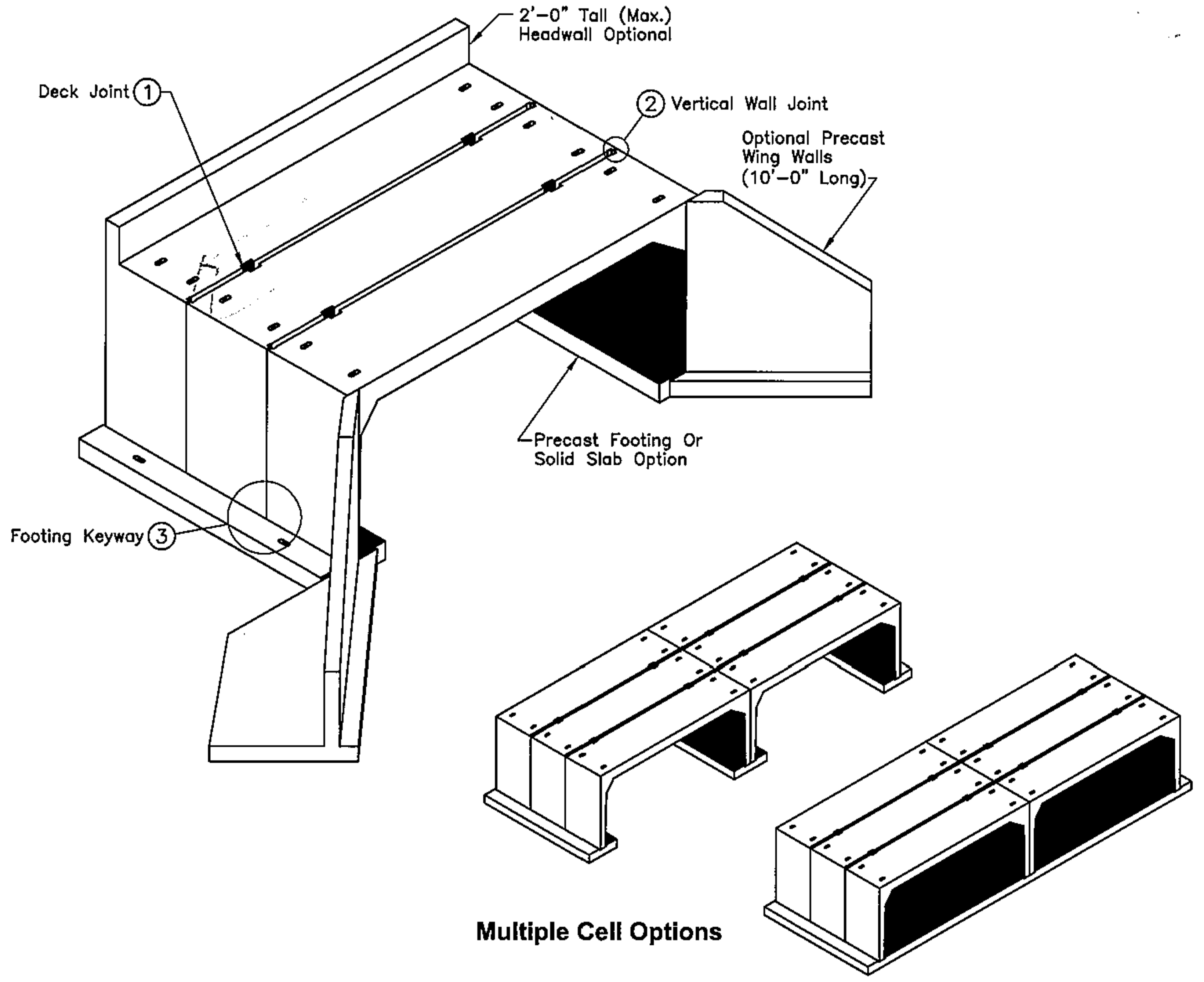
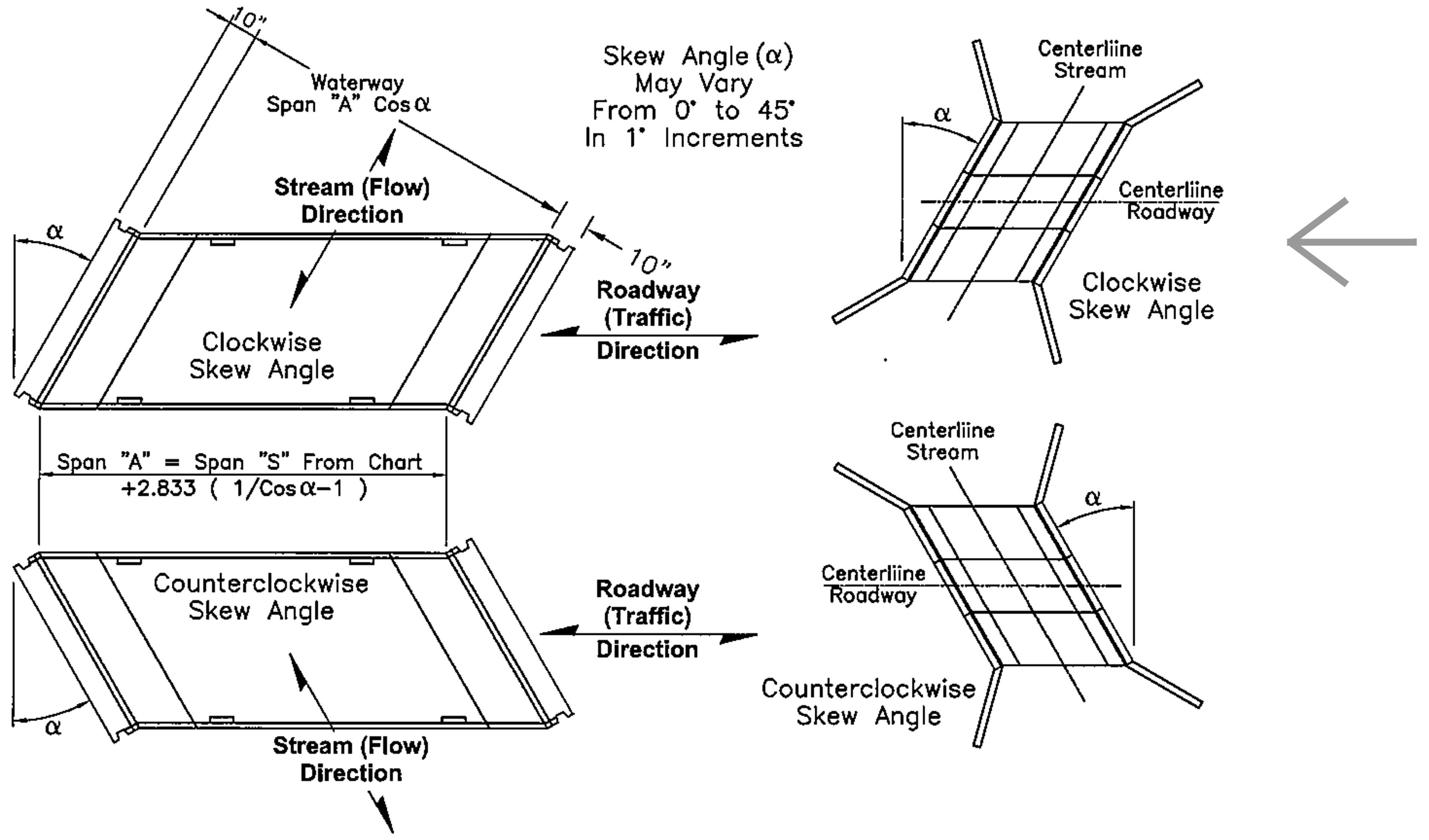
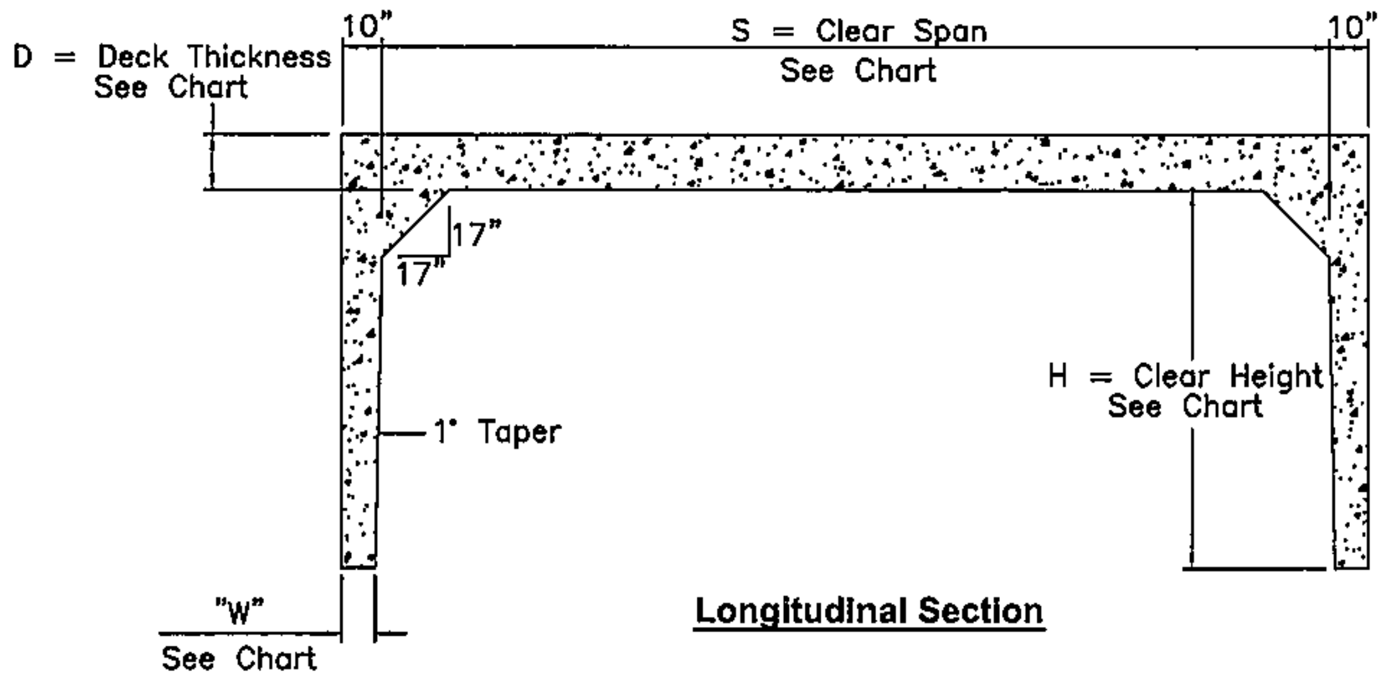
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

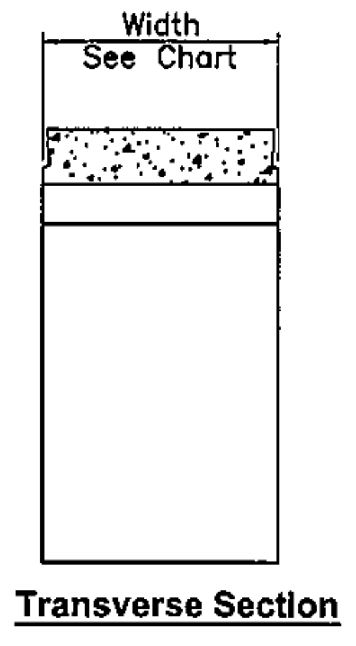


Multiple Cell Options

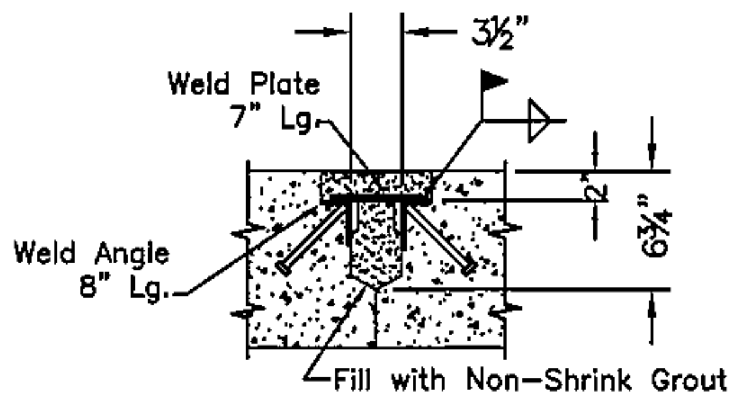




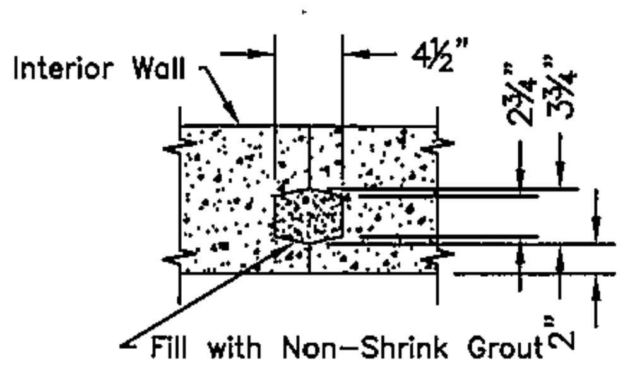
Longitudinal Section



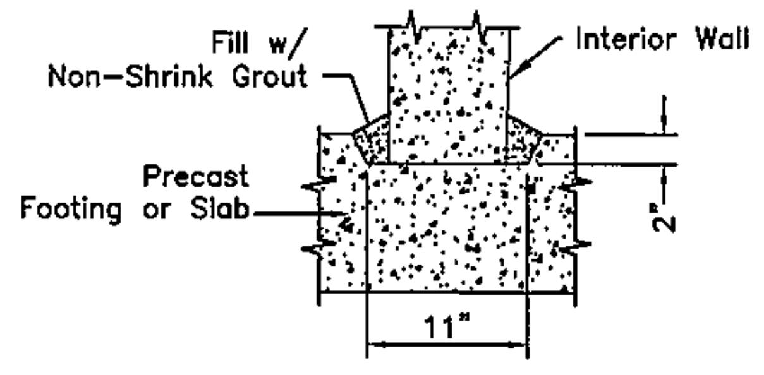
Transverse Section



① **Deck Joint**
Typical Between Top Sections & Flat Slab Base Sections



② **Vertical Wall Joint**
Typical Between Top Sections



③ **Footing Keyway**

Designed For HS-20 Or HS-25 Loads As Specified
(Heavier Loads Available Upon Request)

Sizing And Weights (KIPs) for Standard Product

		10'-0" Width Product											5'-0" Width Product														
SPAN Ft.	S	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	33'	34'	35'
DECK In.	D	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"	14"	14"	14"	14"	14"	14"	14"	18"	18"	18"	18"	18"	18"	18"	18"
W=9 5/8"	H=3'	25.2	26.4	27.6	28.8	30.0	31.2	32.6	33.8	35.0	36.2	37.6	25.1	25.9	26.8	27.7	28.6	29.4	30.3	38.6	39.7	40.8	42.0	43.1	44.2	45.3	46.5
W=9 3/8"	H=4'	27.4	28.6	29.8	31.2	32.4	33.6	34.8	36.2	37.4	38.6	39.8	26.2	27.1	28.0	28.9	29.7	30.6	31.5	39.8	40.9	42.0	43.2	44.3	45.4	46.5	47.7
W=9 1/8"	H=5'	29.8	31.0	32.2	33.4	34.8	36.0	37.2	38.4	39.8	41.0	42.2	27.4	28.3	29.2	30.0	30.9	31.8	32.7	40.9	42.1	43.2	44.3	45.4	46.6	47.7	48.8
W=8 7/8"	H=6'	32.0	33.2	34.4	35.8	37.0	38.2	39.4	40.8	42.0	43.2	44.4	28.5	29.4	30.3	31.2	32.0	32.9	33.8	42.1	43.2	44.3	45.4	46.6	47.7	48.8	49.9
W=8 5/8"	H=7'	34.2	35.4	36.6	38.0	39.2	40.4	41.6	43.0	44.2	45.4	46.6	29.6	30.5	31.4	32.3	33.1	34.0	34.9	43.2	44.3	45.4	46.6	47.7	48.8	49.9	51.1
W=8 1/2"	H=8'	36.4	37.6	38.8	40.0	41.4	42.6	43.8	45.0	46.4	47.6	48.8	30.7	31.6	32.5	33.3	34.2	35.1	36.0	44.2	45.4	46.5	47.6	48.7	49.9	51.0	52.1
W=8 1/4"	H=9'	38.6	39.8	41.0	42.2	43.4	44.6	46.0	47.2	48.4	49.6	51.0	31.8	32.6	33.5	34.4	35.3	36.1	37.0	45.3	46.4	47.5	48.7	49.8	50.9	52.0	53.2
W=8"	H=10'	40.6	41.8	43.0	44.2	45.4	46.6	48.0	49.2	50.4	51.6	52.0	32.8	33.6	34.5	35.4	36.3	37.1	38.0	46.3	47.4	48.6	49.7	50.8	51.9	53.1	54.2

NOTE:
USED A 3'X30' BOX CULVERT WITH A CLOCKWISE SKEW ANGLE

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL:
N/A
VERTICAL:
N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

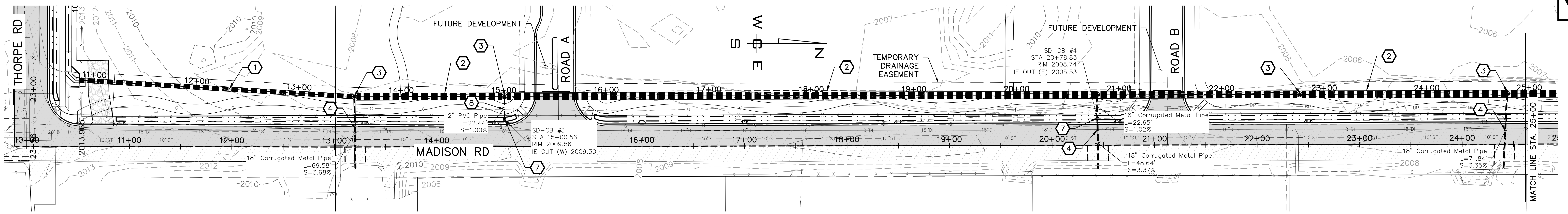
SPOKANE VALLEY PAINTED HILLS PRD
BOX CULVERT DETAILS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

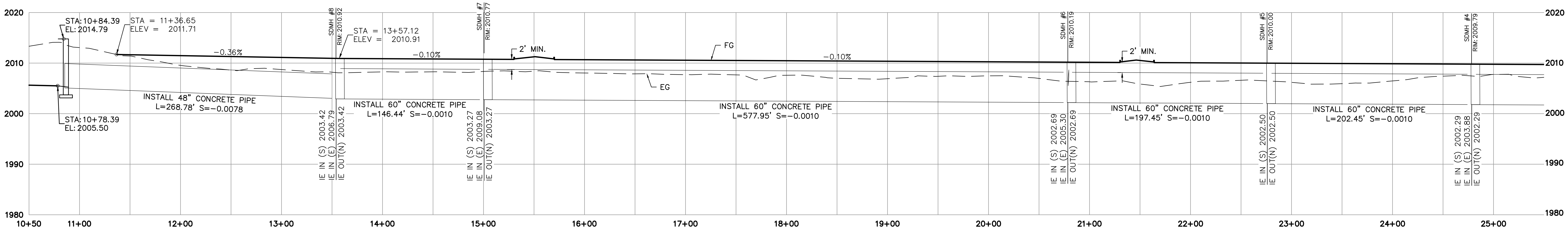
SHEET
C5.21

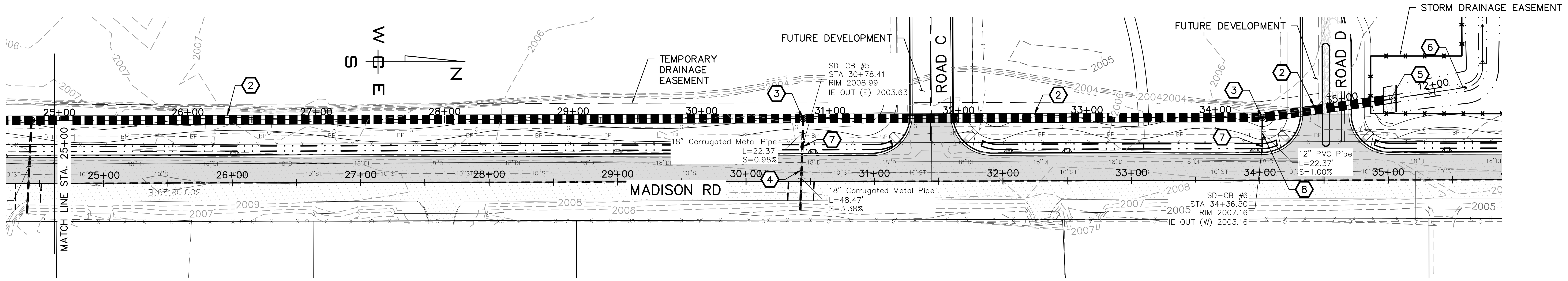
JOB NUMBER
13-1166

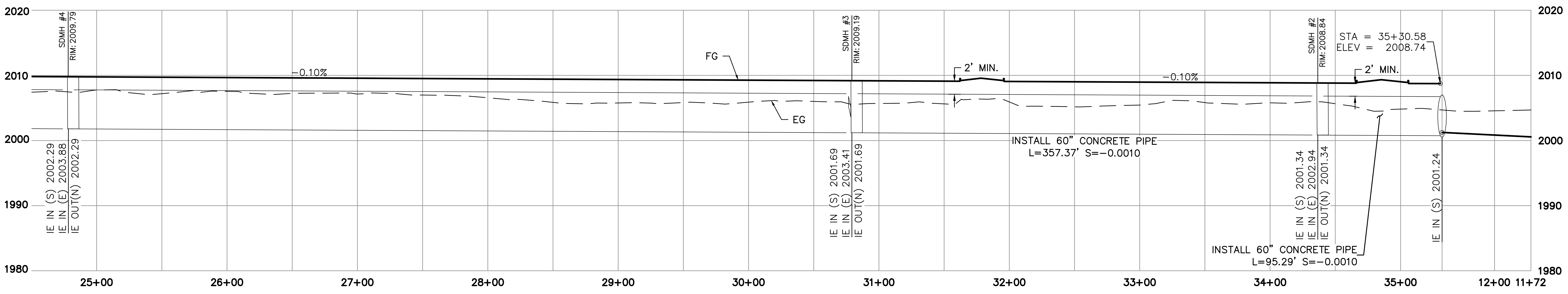
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG









CONSTRUCTION NOTES

1. PROVIDE AND INSTALL CLASS III 48" RCP PIPE PER WSDOT STANDARD SECTION 9–05.
2. PROVIDE AND INSTALL CLASS III 60" RCP PIPE PER WSDOT STANDARD SECTION 9–05.
3. PROVIDE AND INSTALL TYPE 3–84" SD MANHOLE WITH FLAT LID LABELED "STORM" PER WSDOT STANDARD PLAN B–15.60–01.
4. PROVIDE AND INSTALL 18" CMP CULVERT WITH RUBBER GASKET, SEE SHEET C3.24 FOR DETAILS.
5. PROVIDE AND INSTALL CONCRETE OUTLET PAD, SEE SHEET C5.4 FOR DETAILS.
6. PROVIDE AND INSTALL BIOINFILTRATION SWALE, SEE SHEET C5.4 FOR DETAILS.
7. PROVIDE AND INSTALL TYPE 1 CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S–112. SEE PLANS FOR DETAILS.
8. PROVIDE AND INSTALL 12" PVC PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE PLANS FOR DETAILS.

City of Spokane Valley Development Engineering
Reviewer: ____
New Street Miles – Public: ____
☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____
Acceptance Comments

GRAPHIC SCALE
50 0 25 50 100
(IN FEET)
1 inch = 50 ft.

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE 25462
10/13/16

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
MADISON STORM PIPE P&P
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

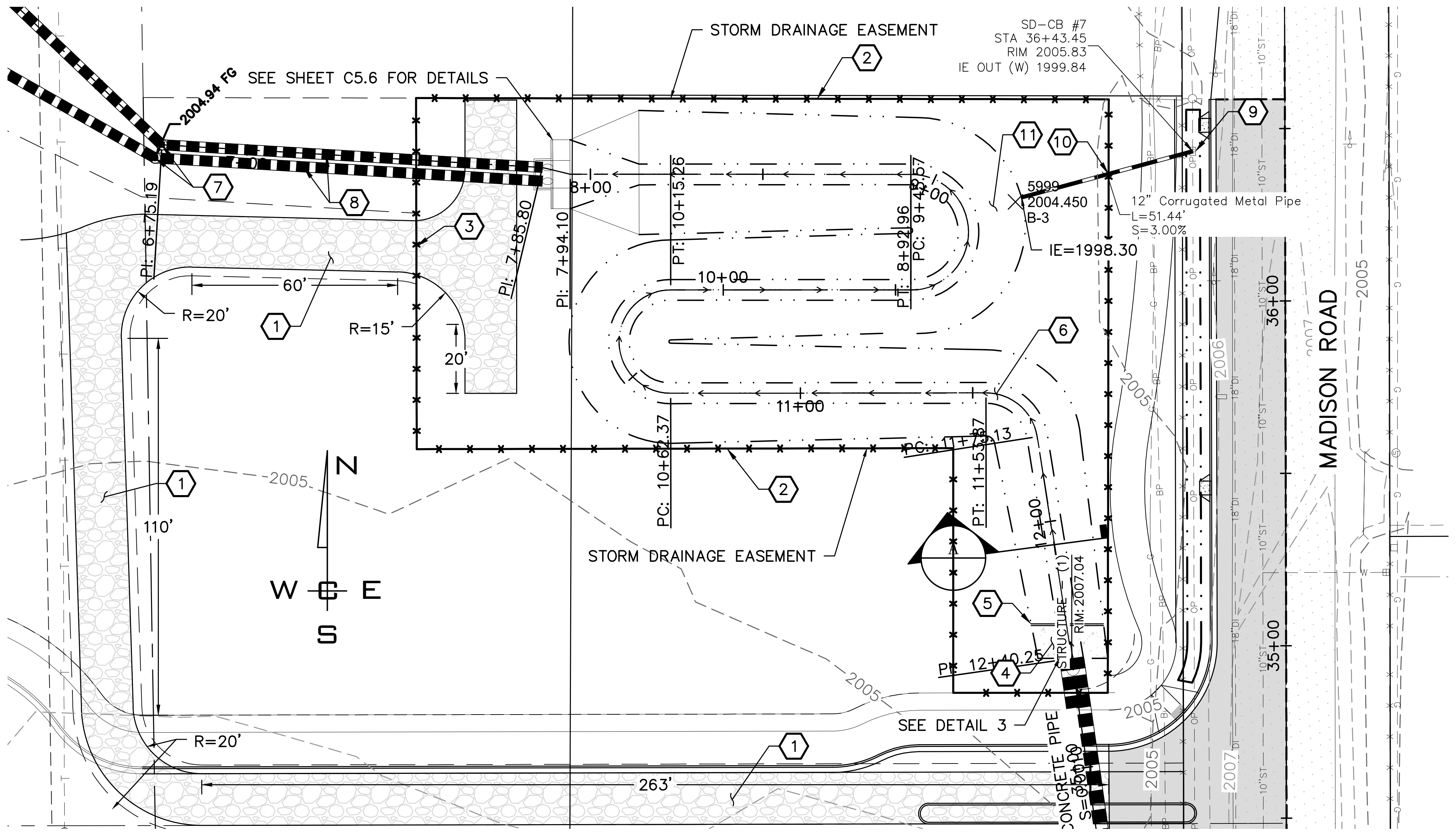
SHEET
C5.3

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.3 MADISON STORM PIPE.dwg, 10/13/2016 3:11:17 PM

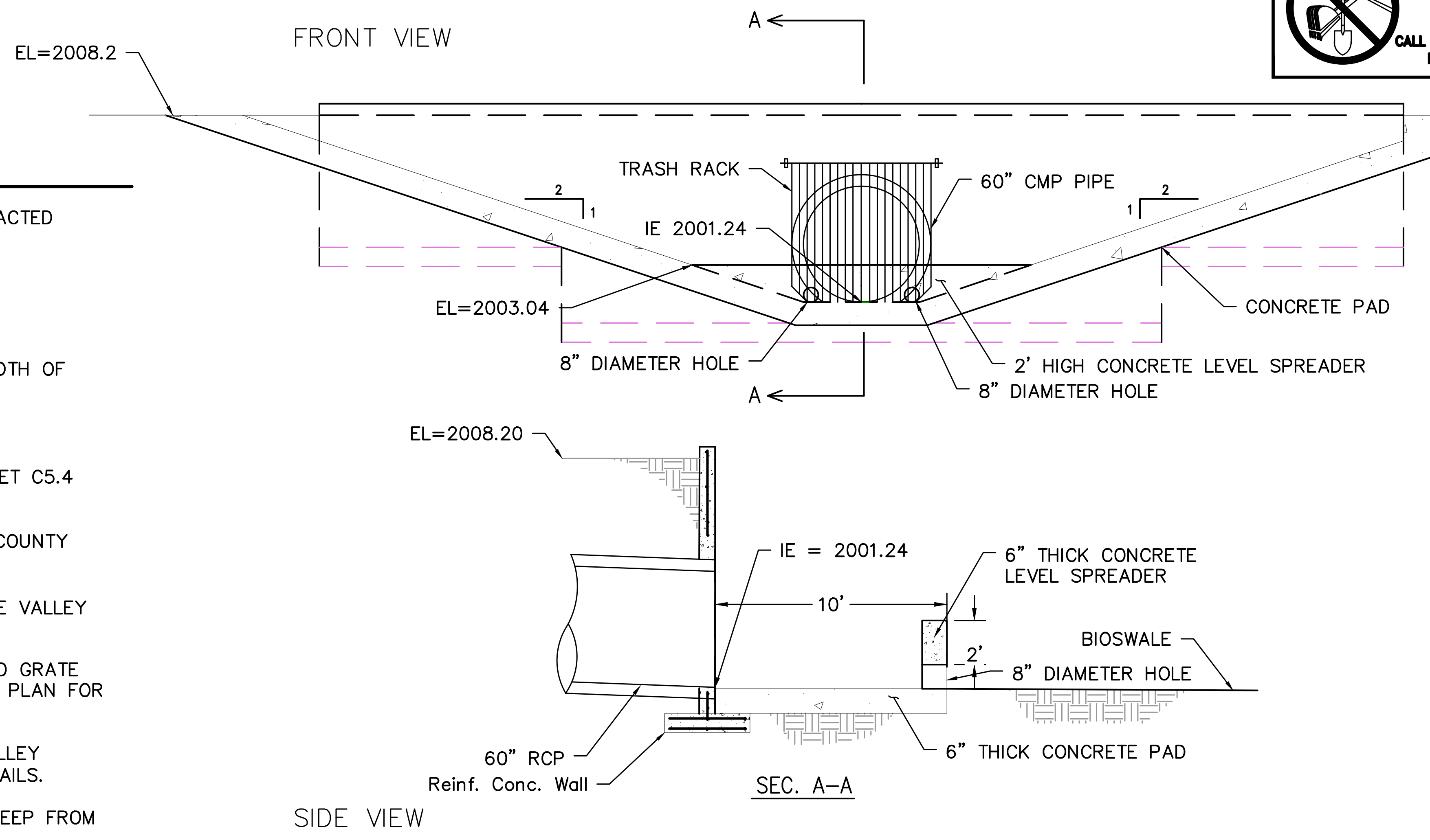
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



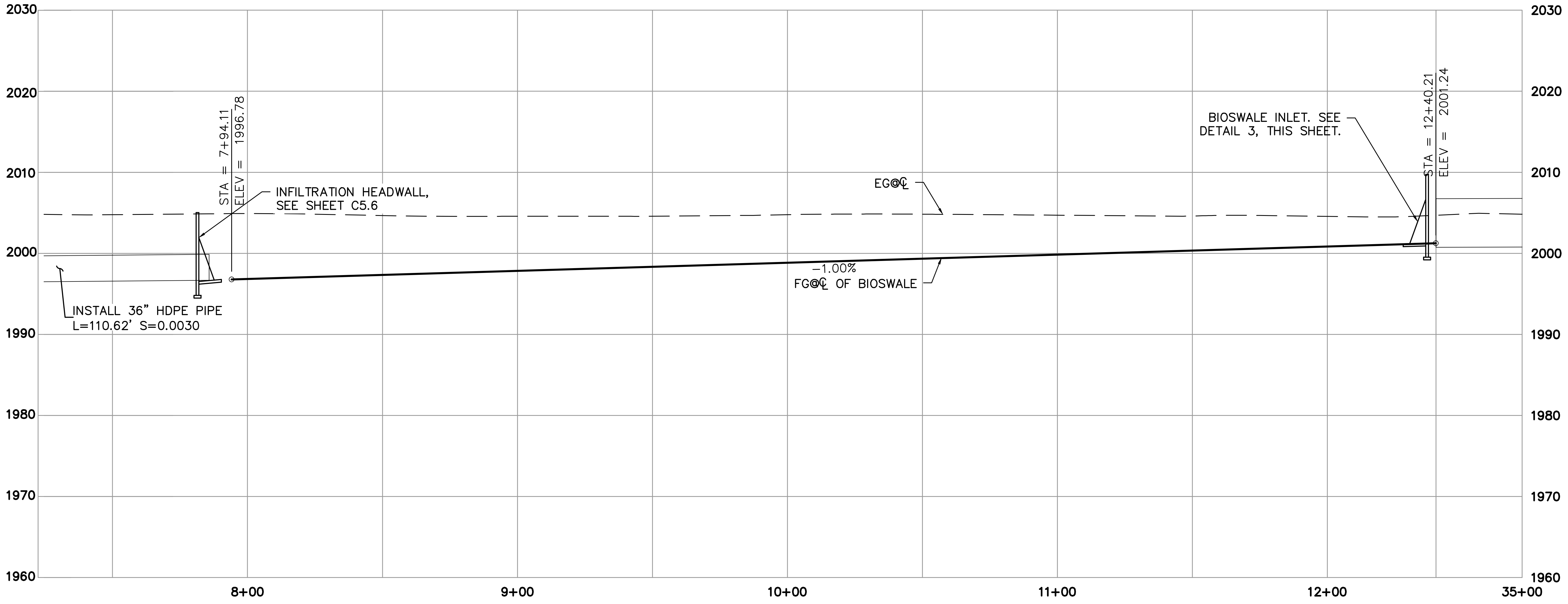
CONSTRUCTION NOTES

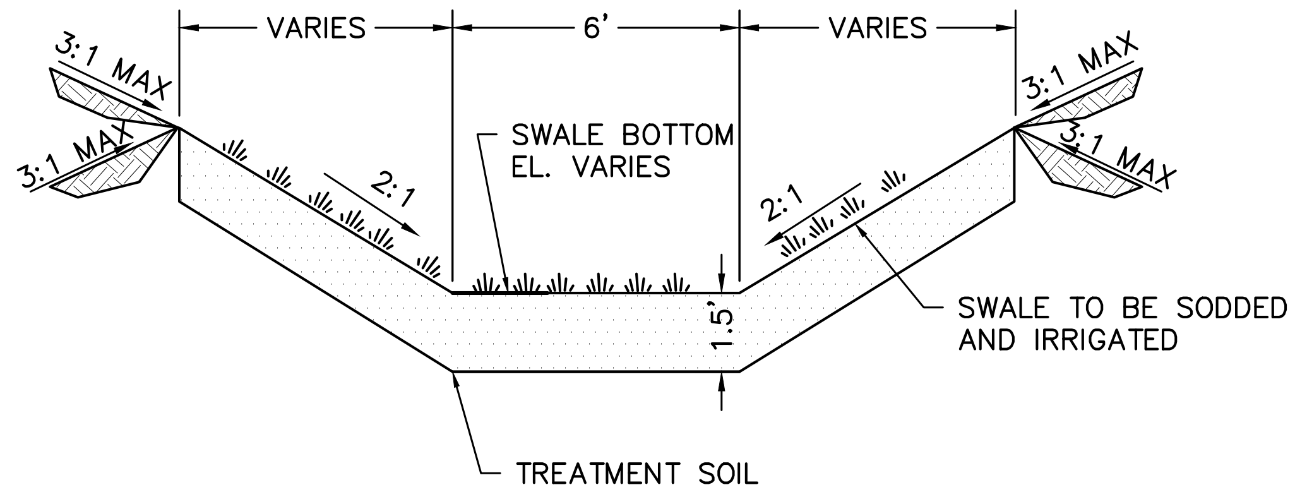
1. CONSTRUCT 15' WIDE ACCESS RD – 6" CSTC ON 95% COMPACTED SUBGRADE.
2. PROVIDE AND INSTALL 6' CHAINLINK FENCE.
3. PROVIDE AND INSTALL 12' WIDE DOUBLE SWING GATE.
4. PROVIDE AND INSTALL 10' CONCRETE SLAB ACROSS FULL WIDTH OF BIOSWALE. SEE DETAIL 3, THIS SHEET.
5. PROVIDE & INSTALL 2' LIP, SEE DETAIL 3, THIS SHEET.
6. PROVIDE AND INSTALL 6' BIOSWALE, SEE SECTION A ON SHEET C5.4 FOR DETAILS.
7. PROVIDE AND INSTALL 1–60" SDMH PER CITY OF SPOKANE COUNTY STANDARD PLAN U–6 WITH LID LABELED "STORM".
8. PROVIDE AND INSTALL 36" HDPE PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
9. PROVIDE AND INSTALL TYPE I CATCH BASIN WITH FRAME AND GRATE PER CITY OF SPOKANE VALLEY STANDARD PLAN S–112. SEE PLAN FOR DETAILS.
10. PROVIDE AND INSTALL 12" CMP PIPE PER CITY SPOKANE VALLEY STANDARDS AND SPECIFICATIONS. SEE SHEET PLAN FOR DETAILS.
11. PROVIDE AND INSTALL 6" DIAMETER RIP–RAP ARMOR 1 FT DEEP FROM PIPE INVERT TO BOTTOM OF SWALE 2 FT WIDE.



BIOSWALE INLET CROSS SECTION ③

NOT TO SCALE





TREATMENT SOIL NOTE:
18" OF TREATMENT SOIL WITH AN INFILTRATIVE RATE BETWEEN 0.25 AND 0.5 INCHES/HOUR AND AVERAGE CATION EXCHANGE CAPACITY OF AT LEAST 15 MILLIQUIVELENTS/100 GRAMS OR AT LEAST 2% OF ORGANIC MATTER BY WEIGHT. SEE TABLE 6–1, PG. 6–16 OF THE SPOKANE REGIONAL STORMWATER MANUAL

WARNING – THE USE OF SILTY LOAM IS PROHIBITED AS POND BOTTOM MATERIAL.

TYPICAL BIOSWALE SECTION Ⓐ

NOT TO SCALE

City of Spokane Valley Development Engineering

Reviewer: ______
New Street Miles – Public: ______

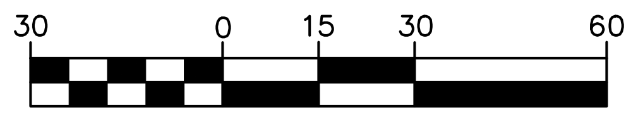
☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER 2016
PLANS NOT APPROVED BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

GRAPHIC SCALE



(IN FEET)
1 inch = 30 ft.

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=30'
VERTICAL: 1"=10'

PROJ #:	13-1166
DATE:	08/17/16
DRAWN:	JPP
REVIEWED:	TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

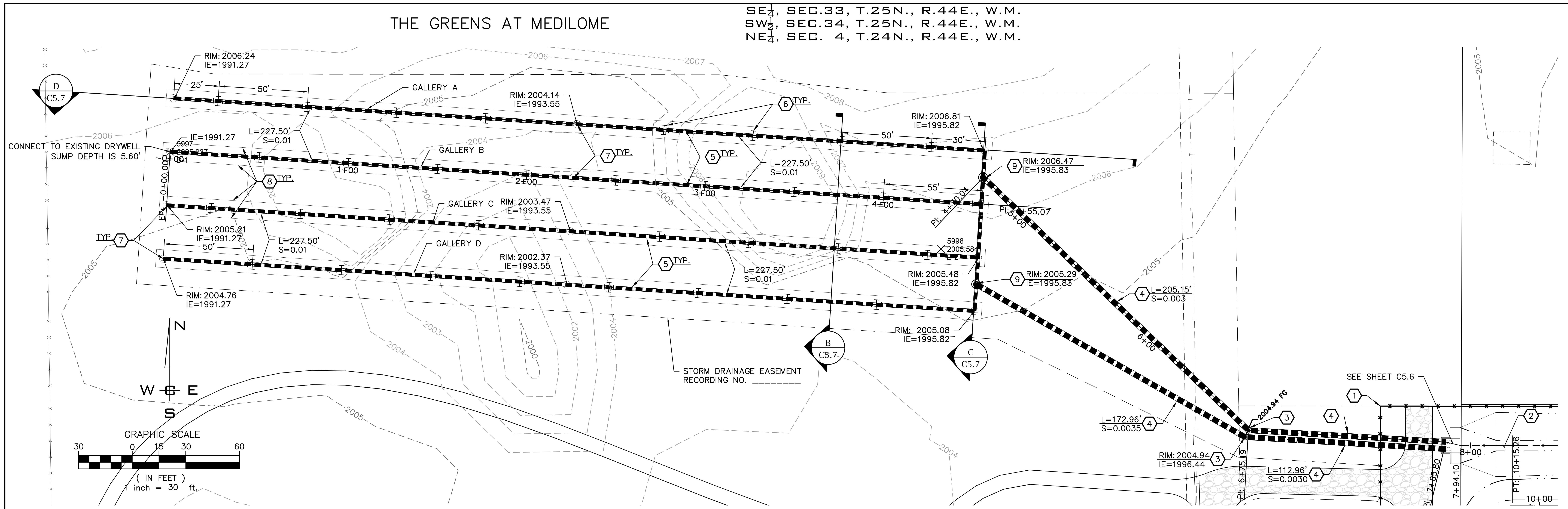
SPOKANE VALLEY PAINTED HILLS PRD
BIOSWALE PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

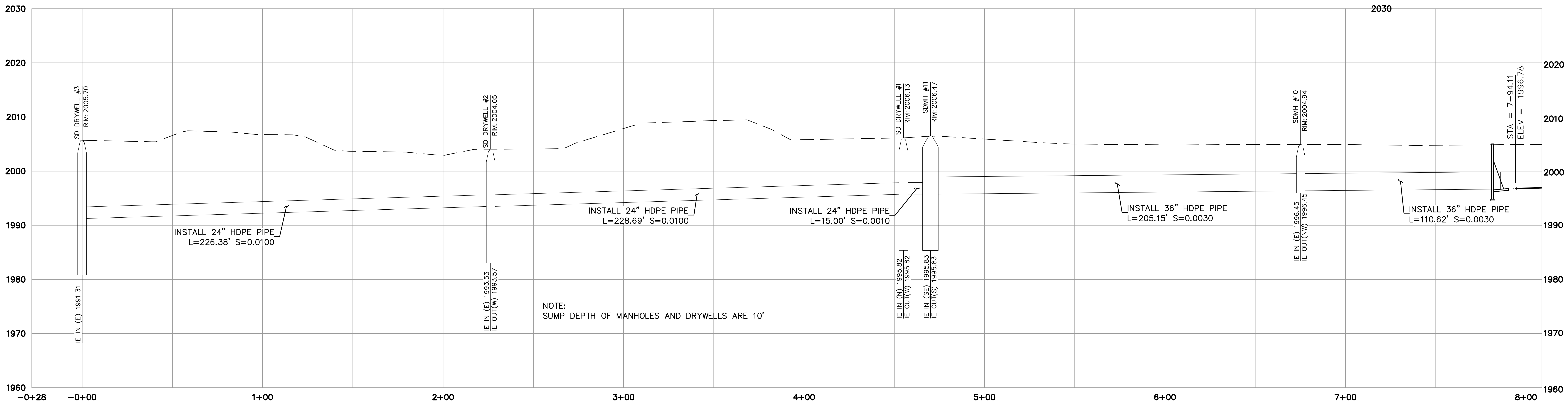
SHEET
C5.4

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.4 SWALE.dwg, 10/13/2016 3:11:44 PM

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG





NOTE:
SUMP DEPTH OF MANHOLES AND DRYWELLS ARE 10'

CONSTRUCTION NOTES

1. PROVIDE AND INSTALL 6' CHAINLINK FENCE.
2. PROVIDE AND INSTALL 6' BIOSWALE, SEE DETAIL 3 ON SHEET C5.4 FOR DETAILS.
3. PROVIDE AND INSTALL 60" SDMH PER CITY OF SPOKANE COUNTY STANDARD PLAN U-6 WITH LID LABELED "STORM".
4. PROVIDE AND INSTALL 36" HDPE PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
5. PROVIDE AND INSTALL 24" HDPE PIPE PER CITY OF SPOKANE VALLEY STANDARDS AND SPECIFICATIONS.
6. PROVIDE AND INSTALL 24" HDPE CROSS, WITH 2' STUB ON BOTH SIDE COVERED WITH NONWOVEN FILTER FABRIC AND BANDED, SEE DETAIL 3 ON SHEET C5.7 FOR DETAILS. SEE PLAN VIEW FOR SPACING.
7. PROVIDE AND INSTALL DRYWELL WITH SOLID LID PER CITY OF SPOKANE VALLEY STANDARD S-101. RIM ELEVATION PER PLAN. LID TO BE MARKED "STORM".
8. PROVIDE AND INSTALL NONWOVEN GEOTEXTILE FABRIC, MODERATE SURVIBABILITY PER WSDOT STD SPEC 9-33.2(1). OVERLAP FABRIC A MINIMUM OF 1'-6". SEE DETAIL B SHEET C5.7 FOR PLACEMENT.
9. PROVIDE AND INSTALL 84" SD MANHOLE PER SPOKANE COUNTY STANDARDS AND SPECIFICATIONS. LID LABELED "STORM".

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ______

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

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SCALE:
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VERTICAL: 1"=10'

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
INFILTRATION PLAN & PROFILE
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

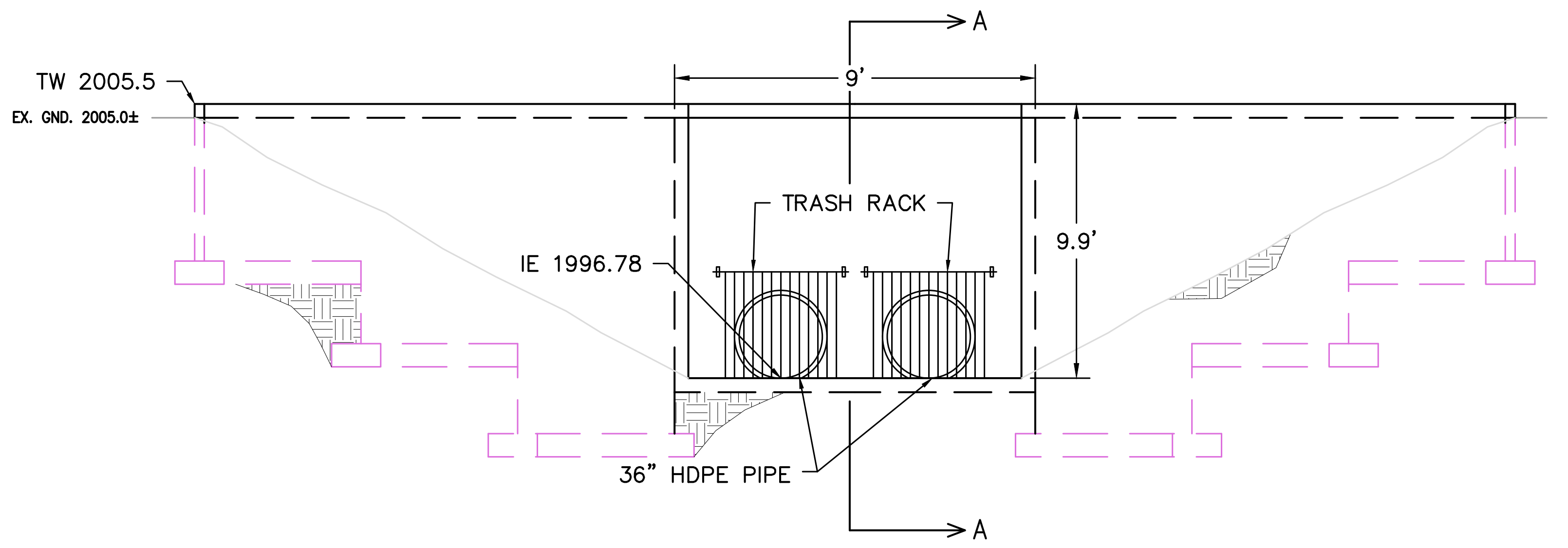
SHEET
C5.5

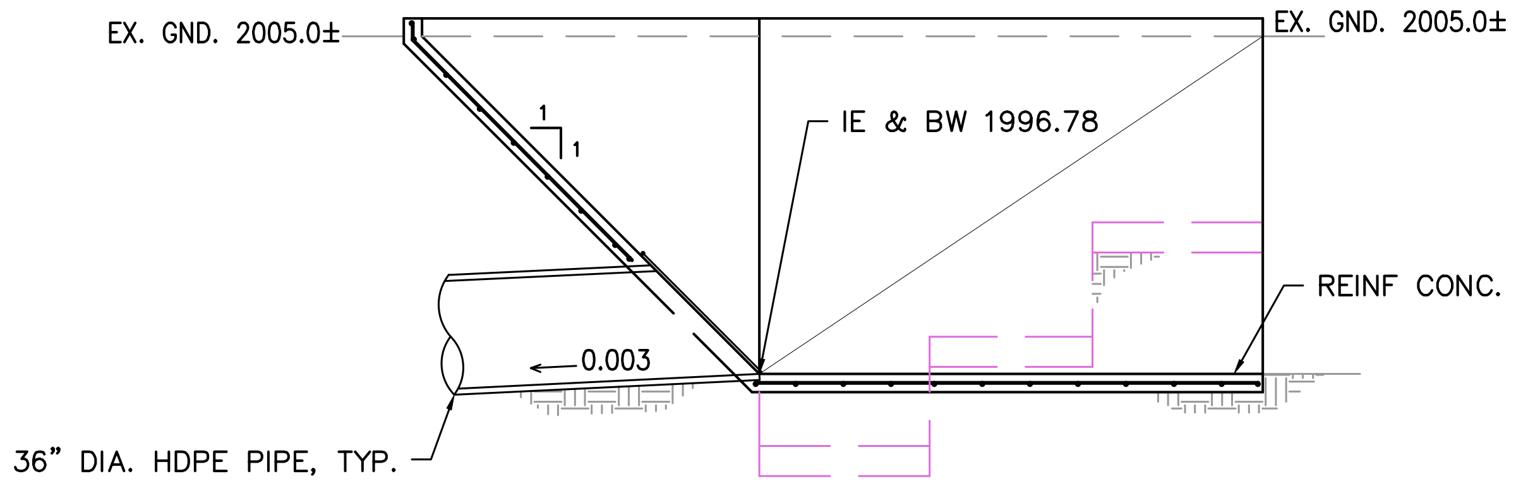
JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.4 SWALE.dwg, 10/13/2016 3:12:04 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



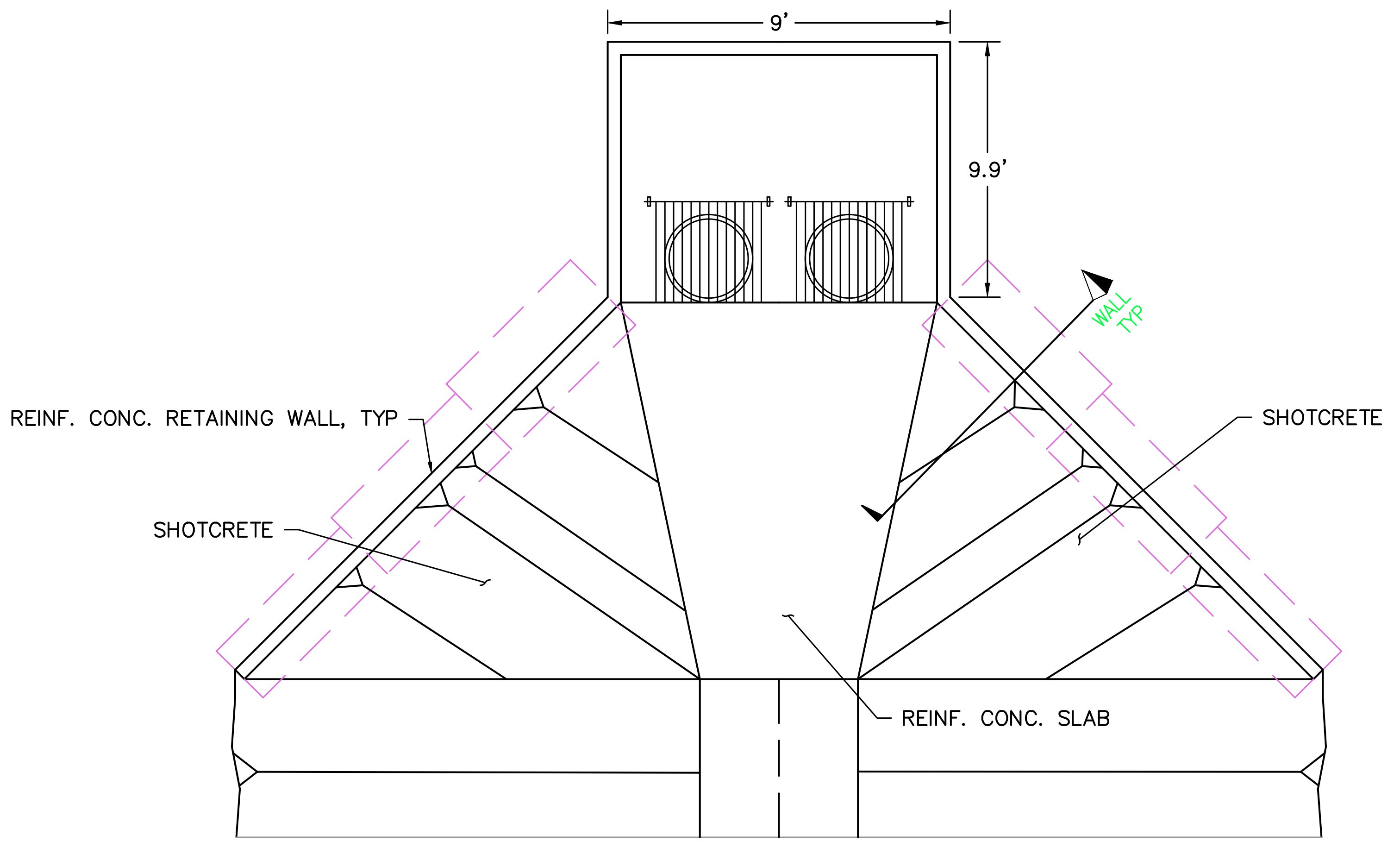


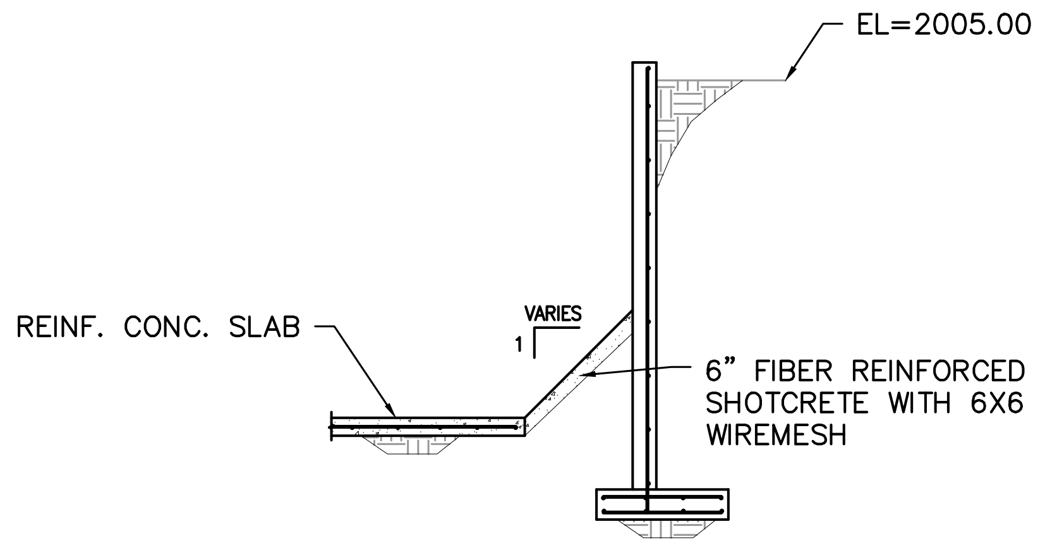
SEC. A–A

HEAD WALL - FRONT VIEW CROSS SECTION

NOT TO SCALE

①





WALL TYPICAL

NOT TO SCALE

HEAD WALL -TOP VIEW CROSS SECTION

NOT TO SCALE

②

City of Spokane Valley
Development Engineering
Reviewer: ____
New Street Miles – Public: ____

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____
Acceptance Comments

SEPTEMBER
2016
PLANS
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TODD R. WHIPPLE
25462
10/13/16

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SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
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REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
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WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
INFILTRATION HEADWALL DETAILS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

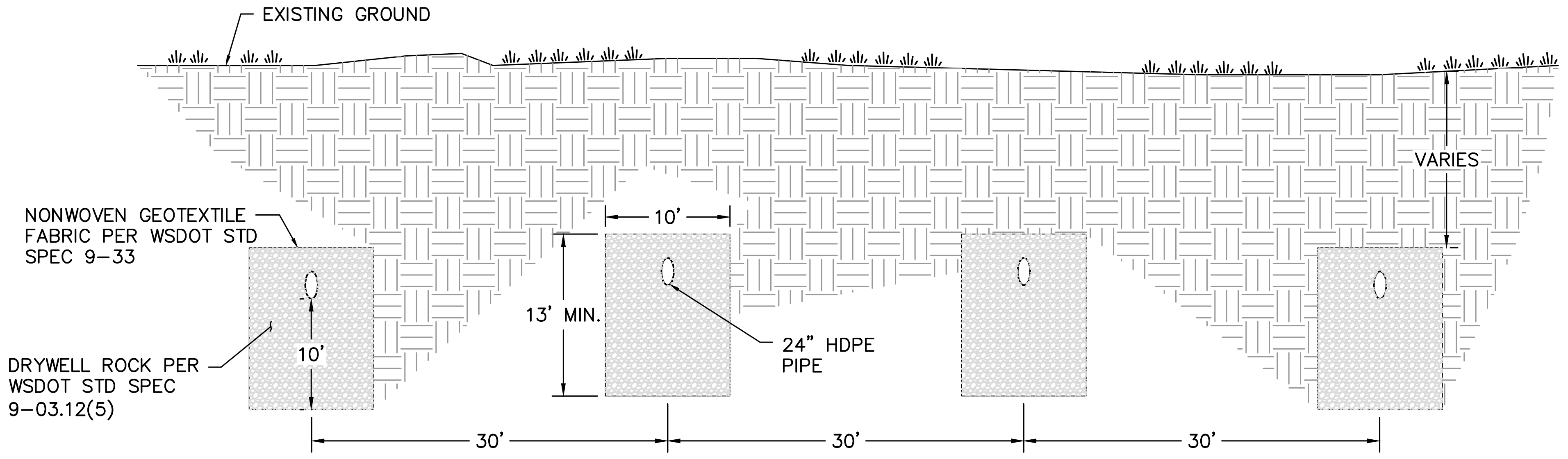
SHEET
C5.6

JOB NUMBER
13-1166

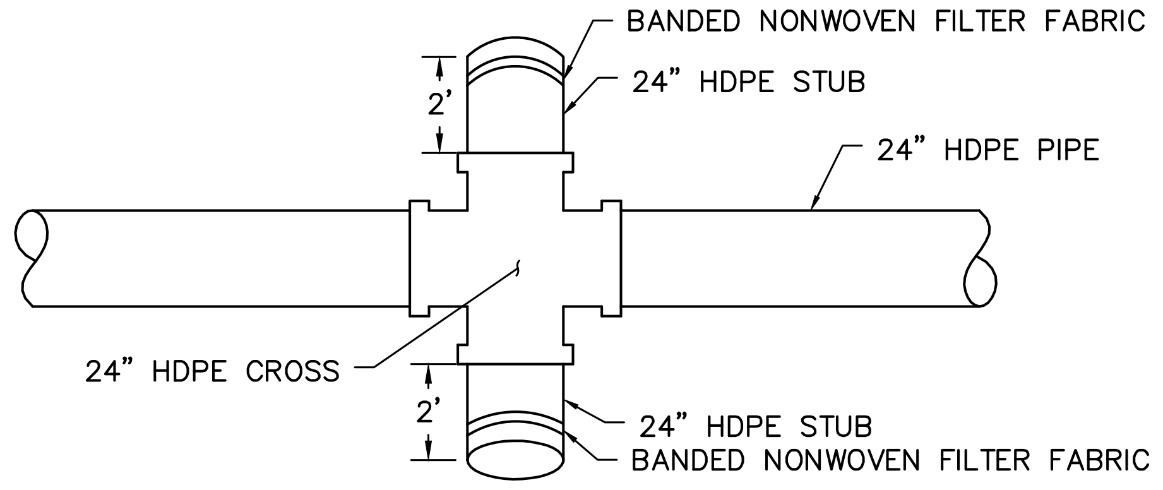
P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.4 SWALE.dwg, 10/13/2016 3:12:24 PM

SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{4}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

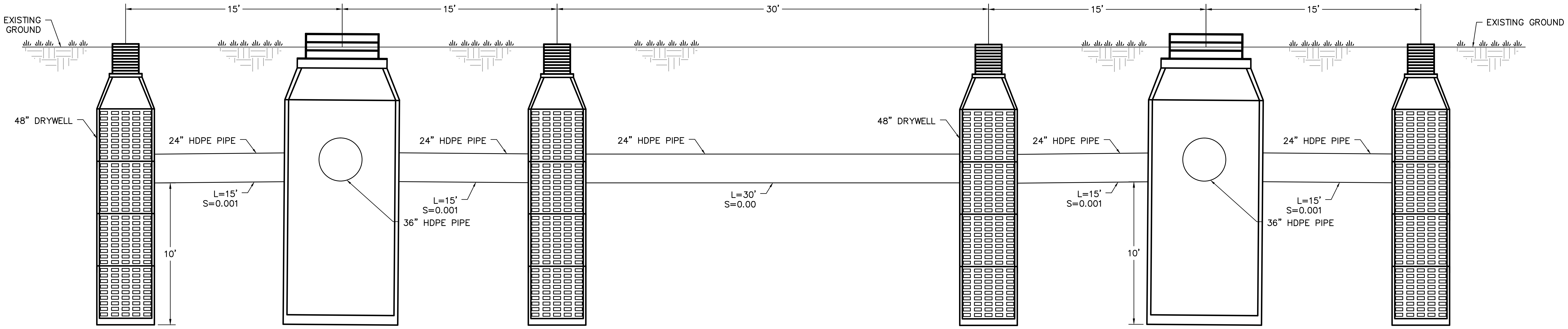
UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



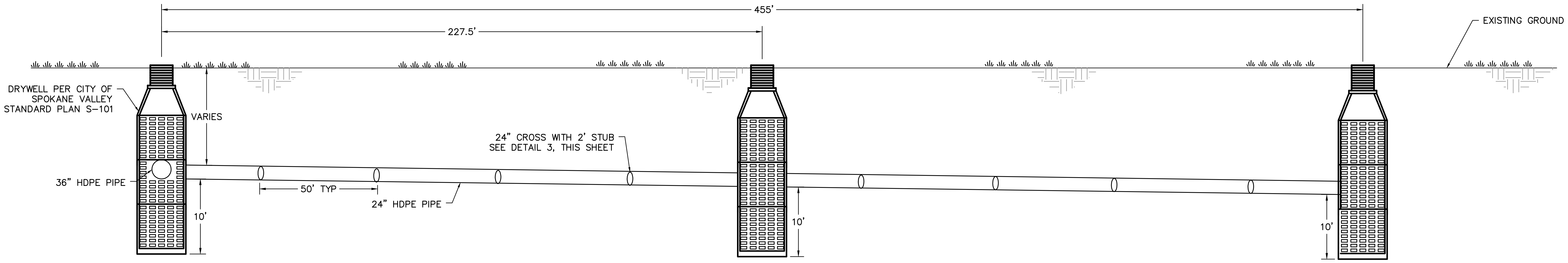
DRAIN FIELD CROSS SECTION B
NOT TO SCALE



24" HDPE CROSS DETAIL 3
NOT TO SCALE



DRAIN FIELD CROSS SECTION C
NOT TO SCALE



DRAIN FIELD CROSS SECTION D
NOT TO SCALE

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
INFILTRATION DETAILS
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C5.7

JOB NUMBER
13-1166

City of Spokane Valley Development Engineering
Reviewer: ____
New Street Miles – Public: ____
☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____
Acceptance Comments

SEPTEMBER 2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE 25462
10/13/16

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C5.4 SWALE.dwg, 10/13/2016 3:12:36 PM

SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{4}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

SWPPP/EROSION CONTROL PLAN

PAINTED HILLS PRD

DISHMAN-MICA ROAD & THORPE ROAD

SPOKANE VALLEY, WASHINGTON

SE, 1/4 OF S. 33, T. 25 N., R. 44 E., W.M.

GENERAL NOTES

1. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION OF SITE IMPROVEMENTS SHALL MEET OR EXCEED SITE WORK STANDARDS AND THE STANDARDS AND SPECIFICATIONS SET FORTH IN CITY OF SPOKANE VALLEY REGULATIONS AND APPLICABLE STATE AND FEDERAL REGULATIONS. WHERE THERE IS CONFLICT BETWEEN THESE PLANS AND THE SPECIFICATIONS, OR ANY APPLICABLE STANDARDS, THE HIGHER QUALITY STANDARD SHALL APPLY. ALL WORK WITHIN PUBLIC R.O.W. OR EASEMENTS SHALL BE INSPECTED AND APPROVED BY CITY OF SPOKANE VALLEY INSPECTOR. INSPECTION SERVICES AND CONSTRUCTION CERTIFICATION TO BE PROVIDED BY DESIGNEE OF PROJECT SPONSOR/OWNER.

2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES, AS SHOWN ON THESE PLANS, IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY PERTINENT LOCATIONS AND ELEVATIONS, ESPECIALLY AT THE CONNECTION POINTS AND AT POTENTIAL UTILITY CONFLICTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES THAT CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM ALL APPLICABLE AGENCIES. THE CONTRACTOR SHALL NOTIFY CITY OF SPOKANE VALLEY INSPECTOR AT LEAST 48 HOURS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITY OR CONSTRUCTION ON ANY AND ALL PUBLIC IMPROVEMENTS.

4. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH CITY OF SPOKANE VALLEY AND ALL UTILITY COMPANIES WITH REGARD TO RELOCATIONS OR ADJUSTMENTS OF EXISTING UTILITIES DURING CONSTRUCTION, TO ASSURE THAT THE WORK IS ACCOMPLISHED IN A TIMELY FASHION, AND WITH A MINIMUM DISRUPTION OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL PARTIES AFFECTED BY ANY DISRUPTION OF ANY UTILITY SERVICE.

5. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE APPROVED PLANS, ONE (1) COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS, AND ONE (1) COPY OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED FOR THE JOB ON-SITE AT ALL TIMES.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO: EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND SECURITY.

7. IF, DURING THE CONSTRUCTION PROCESS, CONDITIONS ARE ENCOUNTERED BY THE CONTRACTOR, HIS SUBCONTRACTORS, OR OTHER AFFECTED PARTIES WHICH COULD INDICATE A SITUATION THAT IS NOT IDENTIFIED IN THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY.

8. ALL REFERENCES TO ANY PUBLISHED STANDARDS SHALL REFER TO THE LATEST REVISION OF SAID STANDARD, UNLESS SPECIFICALLY STATED OTHERWISE.

9. FOR WORK AFFECTING PUBLIC ROADWAYS OR IF REQUIRED BY CITY OF SPOKANE VALLEY, THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL AND PHASING PLAN IN ACCORDANCE WITH M.U.T.C.D. FOR APPROVAL. PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN OR AFFECTING THE RIGHT-OF-WAY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY AND ALL TRAFFIC CONTROL DEVICES AS MAY BE REQUIRED BY SAID PLANS. PRIOR TO INSTALLATION.
A RECONSTRUCTION CONFERENCE SHALL BE HELD WITH CITY OF SPOKANE VALLEY.

10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETION OF THE INTENDED IMPROVEMENTS SHOWN ON THESE DRAWINGS OR DESIGNATED TO BE PROVIDED, INSTALLED, CONSTRUCTED, REMOVED OR RELOCATED UNLESS SPECIFICALLY NOTED OTHERWISE.

11. PER AGENCY STANDARDS THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING ROADWAYS FREE AND CLEAR OF ALL CONSTRUCTION DEBRIS AND DIRT TRACKED FROM THE SITE.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING RECORD INFORMATION ON A SET OF RECORD DRAWINGS KEPT AT THE CONSTRUCTION SITE AND AVAILABLE TO CITY OF SPOKANE VALLEY INSPECTOR AT ALL TIMES.

13. DIMENSIONS FOR LAYOUT AND CONSTRUCTION ARE NOT TO BE SCALED FROM ANY DRAWING. FOR ADDITIONAL INFORMATION CONTACT THE ENGINEER FOR CLARIFICATION AND NOTE ON THE RECORD DRAWINGS.

14. ALL EROSION AND SEDIMENT CONTROL (E.S.C.) MEASURES SHALL BE INSTALLED AT THE LIMITS OF CONSTRUCTION PRIOR TO GROUND DISTURBING ACTIVITY. ALL E.S.C. MEASURES SHALL BE MAINTAINED IN GOOD REPAIR BY THE CONTRACTOR UNTIL SUCH TIME AS THE ENTIRE DISTURBED AREAS ARE STABILIZED WITH HARD SURFACE OR LANDSCAPING.

15. THE CONTRACTOR SHALL SEQUENCE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO MINIMIZE POTENTIAL UTILITY CONFLICTS. IN GENERAL, STORM SEWER AND SANITARY SEWER SHOULD BE CONSTRUCTED PRIOR TO INSTALLATION OF WATER LINES AND DRY UTILITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL UTILITY RELOCATIONS CONSISTENT WITH THE CONTRACTORS SCHEDULE FOR THIS PROJECT, WHETHER SHOWN OR NOT SHOWN, AS IT RELATES TO THE CONSTRUCTION ACTIVITIES CONTEMPLATED IN THESE PLANS.

16. ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY IS SUBJECT TO THE JURISDICTION OF CITY OF SPOKANE VALLEY ENGINEERING DEPARTMENTS' STANDARD DETAILS AND SPECIFICATIONS.

17. ALL CONSTRUCTION OPERATIONS, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTH MOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED EQUIPMENT SHALL GENERALLY BE LIMITED TO THE TIME PERIOD APPROVED BY CITY OF SPOKANE VALLEY.

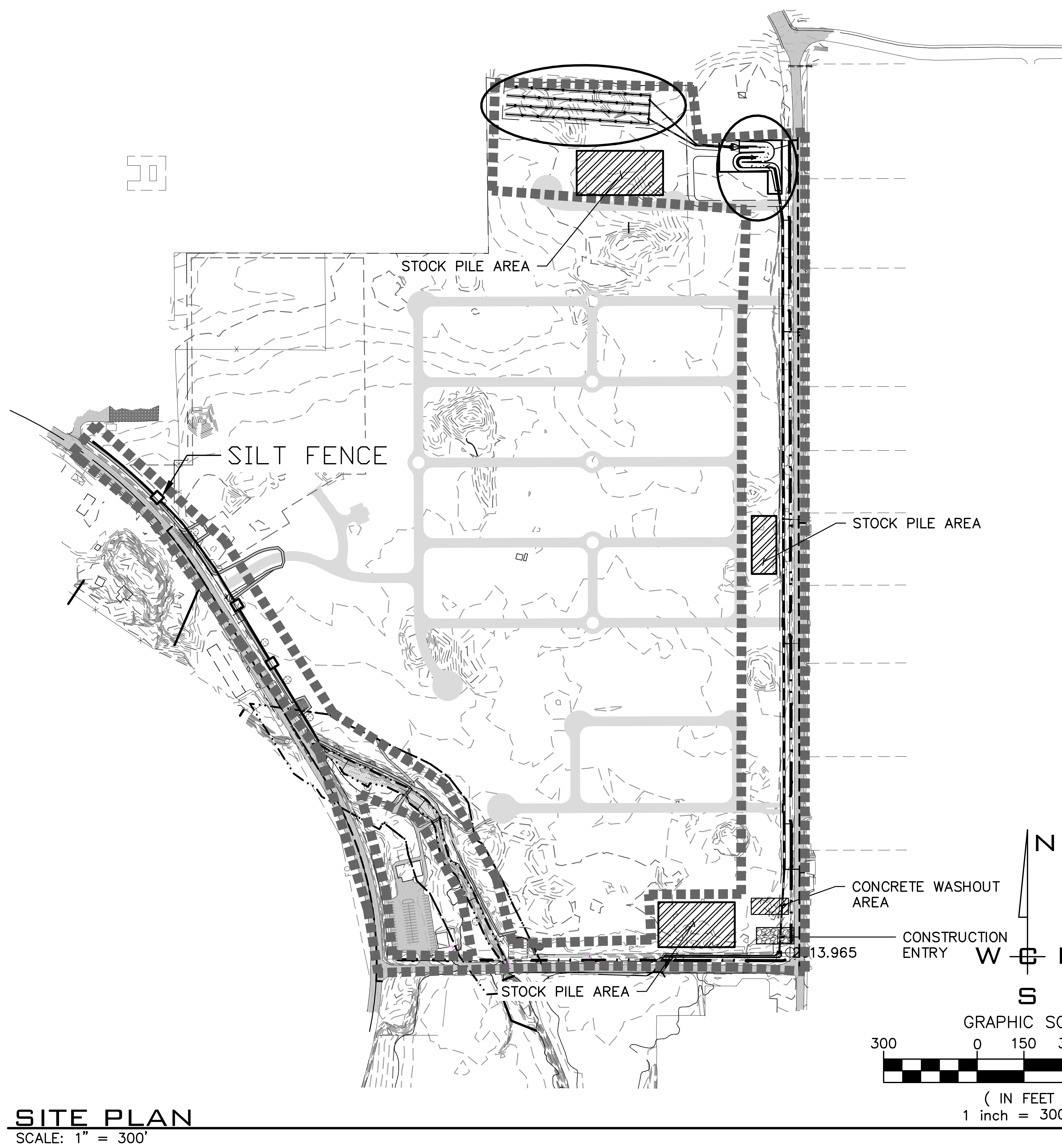
18. BASED ON REQUIREMENTS FROM CITY OF SPOKANE VALLEY, THE ENGINEER OR HIS DESIGNEE SHALL PERFORM MATERIALS TESTING AND QUALITY CONTROL ON THE PROJECT AND SHALL SUBMIT COPIES OF DAILY REPORTS, TEST REPORTS, PROJECT CERTIFICATION AND RECORD DRAWINGS TO THE CITY OF SPOKANE VALLEY ENGINEER.

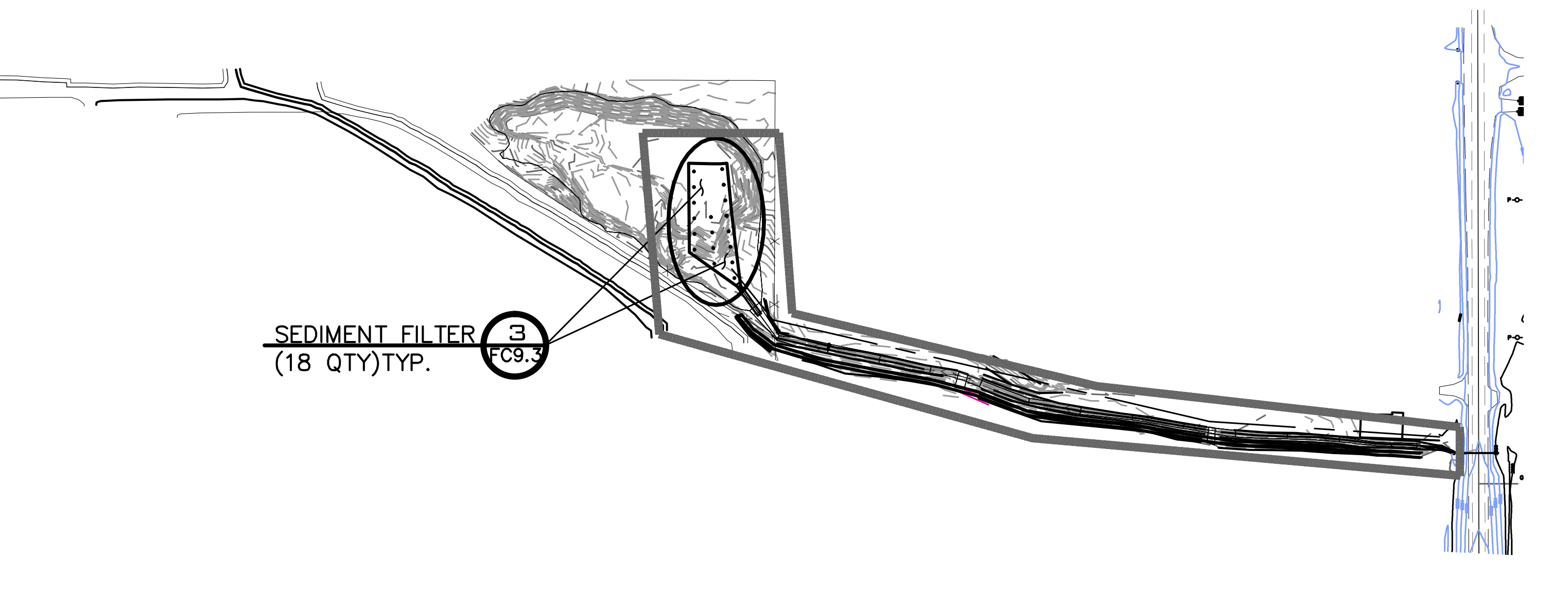
19. NO REVISIONS SHALL BE MADE TO THESE PLANS WITHOUT APPROVAL OF CITY OF SPOKANE VALLEY ENGINEERS AND NOTIFICATION OF THE ENGINEER OF RECORD.

20. ON-SITE GRADING SHALL BE IN ACCORDANCE WITH THE APPROVED GRADING PLAN AND E.S.C. PLAN. ANY IMPORT OR EXPORT OF MATERIAL SHALL BE FROM AN APPROVED SOURCE/DESTINATION AND COORDINATED WITH CITY OF SPOKANE VALLEY COMMUNITY AND ECONOMIC DEVELOPMENT DEPARTMENT 509-921-1000/SPOKANE COUNTY DEPARTMENT OF BUILDING AND PLANNING 509-477-3675. GRADING ON THIS SITE OR ANY OTHER SITE MUST COMPLY WITH ALL DEVELOPMENT REGULATIONS INCLUDING, BUT NOT LIMITED TO , GRADING PERMITS, S.E.P.A. REVIEW, TIMBER HARVEST PERMITS, CRITICAL AREAS, FLOOD PLAINS, DESIGNATED DRAINAGE WAYS, ETC.

21. THE CONTRACTOR IS CAUTIONED THAT IT IS THE UNDERSTANDING OF THE OWNER AND THE ENGINEER THAT SHOULD A CONFLICT OR DISCREPANCY IN THESE PLANS, SPECIFICATIONS, GENERAL NOTES OR PLANS ET.AL. DETERMINED TO BE PART OF THE OVERALL PROJECT, INCLUDING BUT NOT LIMITED TO THE ARCHITECTURAL PLANS, MECHANICAL PLANS, ELECTRICAL PLANS, LANDSCAPE PLANS, GENERAL SPECIAL PROVISIONS, ETC., THAT WITHOUT WRITTEN CLARIFICATION FROM THE ENGINEER, OWNER OR OTHER PROFESSIONAL, DURING THE BIDDING PROCESS, THAT IN ALL INSTANCES THE CONTRACTOR WILL BE REQUIRED TO BID THE HIGHER STANDARD. FAILURE TO DO SO MAY RESULT IN THE HIGHER STANDARD BEING REQUIRED BY THE OWNER, ENGINEER OR OTHER PROFESSIONAL WITH NO CHANGE IN VALUE TO THE CONTRACT VIA CHANGE ORDER OR OTHER MECHANISM.

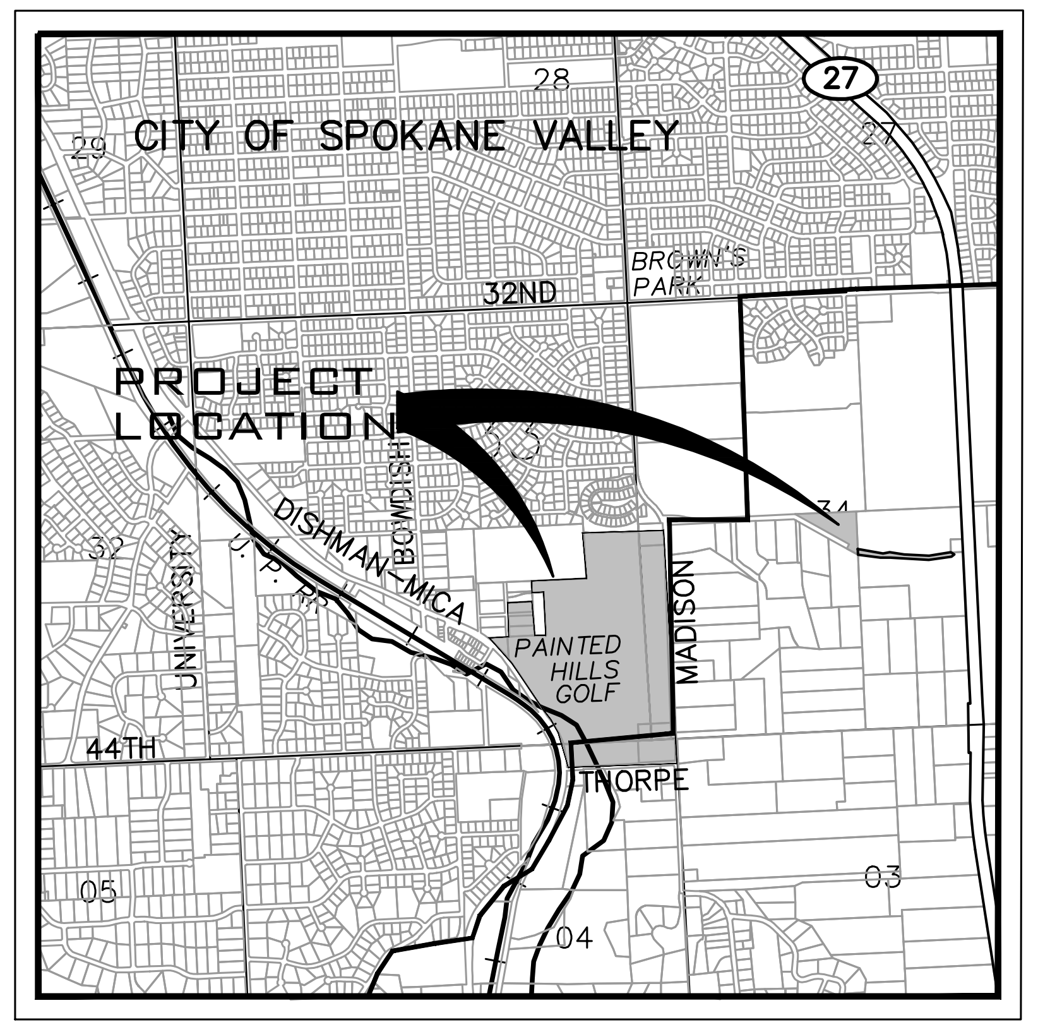
22. CONSTRUCTION OF EVERY DRYWELL, INCLUDING FABRIC AND DRAINROCK, SHALL BE OBSERVED BY THE ON-SITE INSPECTOR TO CONFIRM THAT IT MEETS THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL-SCALE DRYWELL TEST.





SITE PLAN

SCALE: 1" = 300'



LOCATION MAP

INDEX TO PLAN SHEETS

LEGEND

⬭	STORM DRAINAGE POND – NO CONCRETE TRUCK WASHOUT AREA.
—□—	BMP C233: SILT FENCE, SHEET FC9.2.
▦	BMP C105: STABILIZED CONSTRUCTION ENTRY, SHEET FC9.2
●	BMP C220: STORM DRAIN INLET PROTECTION, SHEET FC9.3.
▨	BMP C151: CONCRETE HANDLING – MAY ONLY TAKE PLACE ON UNCOMPACTED SUBGRADE AFTER ASPHALT REMOVAL, AND IN A NON-LANDSCAPED AREA. OTHERWISE ANY CONCRETE WASHOUT MUST BE OFF SITE. SHEET FC9.3.
■■■■■	LIMITS OF DISTURBANCE
▨	STOCK PILE AREA

PERMIT SPECIALIST
CITY OF SPOKANE VALLEY
PERMIT CENTER
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720-5240

DEV. CONST. INSP.
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720-5324
CONTACT: JOHN JOHNSON

SOLID WASTE
WASTE MANAGEMENT
PHONE: 1-866-909-4458

SEWER
SPOKANE COUNTY UTILITIES
1026 W BROADWAY AVE
SPOKANE, WA 99260
PHONE: 477-7180
CONTACT: CHRIS KNUDSON

HEALTH
SPOKANE REGIONAL HEALTH
1101 W COLLEGE AVE
SPOKANE, WA 99260
PHONE: 324-1578
CONTACT: PAUL SAVAGE

INSPECTION
I.P.E.C.
P. O. BOX 1566
VERADALE, WA 99037
PHONE: 209-6262
CONTACT: PAUL T. NELSON, P.E.

WATER
SPOKANE COUNTY WATER DISTRICT #3
1225 N YARDLEY ST
SPOKANE, WA 99212
PHONE: 536-0121
CONTACT: TY WICK

GAS
AVISTA UTILITIES
1411 E MISSION AVE
SPOKANE, WA 99220
PHONE: 495-8610
CONTACT: MIKE TRUEX

SURVEYOR
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893-2617
CONTACT: JON GORDON, P.L.S.

FIRE
SPOKANE VALLEY FIRE DEPT.
2120 N WILBUR RD
SPOKANE VALLEY, WA 99206
PHONE: 928-1700
CONTACT: TRACI HARVEY

TELEPHONE
CENTURY LINK
904 N COLUMBUS ST
SPOKANE, WA 99202
PHONE: 623-0305
CONTACT: DEBORAH GEIST

ENGINEERING
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2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893-2617
CONTACT: TODD WHIPPLE, P.E.

POWER
INLAND POWER & LIGHT
OPERATIONS DEPARTMENT
P.O. BOX A
SPOKANE, WASHINGTON 99219
PHONE: 789-4291
CONTACT: CONNIE NELSON

CABLE
COMCAST BROADBAND
1717 E BUCKEYE AVE
SPOKANE, WA 99207
PHONE: 755-4717
CONTACT: BRYAN RICHARDSON

OWNER
BRYAN WALKER
C/O NAI BLACK
107 S HOWARD ST
SPOKANE, WA 99201
PHONE: 623-1000
CONTACT: BRYAN WALKER

City of Spokane Valley
Development Engineering
Reviewer: ____________
New Street Miles – Public: ________
☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ____________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL:
1" = 300'
VERTICAL:
N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
SWPPP COVER
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C9.0
JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\C9.0 EROSION CONTROL.dwg, 10/13/2016 3:14:09 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW½, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

EROSION & SEDIMENT CONTROL

GENERAL NOTES AND INFORMATION

1. AN EROSION/SEDIMENT CONTROL **(E.S.C.)** PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THE **E.S.C. PLAN,** AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE **E.S.C.** FACILITIES ARE THE RESPONSIBILITY OF THE DEVELOPER UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY **THE CITY OF SPOKANE VALLEY,** OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY **THE CITY OF SPOKANE VALLEY,** WHICHEVER IS LATER.
2. APPROVAL OF THE **E.S.C. PLAN** DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM DRAINAGE, GRADING OR UTILITY DESIGN ELEMENTS SHOWN ON THE **E.S.C. PLAN.**
3. THE EROSION/SEDIMENT CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS FOR THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE **E.S.C.** MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT–LADEN WATER FROM EITHER FLOWING OFF SITE, OR INTO NEW/EXISTING STORM DRAINAGE FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.
4. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS, CATCH BASINS AND INLETS UNTIL SUCH TIME THAT THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.
5. THE SILT FENCES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO OTHER SITE WORK, AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION. AS WORK PROGRESSES, ADDITIONAL SILT FENCE MAY BE REQUIRED TO PROTECT STREAM AREAS AND PREVENT SEDIMENT FROM GOING OFFSITE.
6. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING ROCK CONSTRUCTION ENTRIES AT ANY AND ALL LOCATIONS USED TO ENTER OR EXIT THE PROJECT SITE. SEE DETAIL,
7. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT, NOT LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA.
8. PROPERTY OWNER: **NAI BLACK – BRYAN WALKER**
   PERMIT APPLICANT: **WHIPPLE CONSULTING ENGINEERS, INC. 509–893–2617**
   CONTACT PERSON ON SITE: **TBD**
9. PROJECT LOCATION: **DISHMAN–MICA ROAD & THORPE ROAD, IN SPOKANE COUNTY, WASHINGTON, IN SECTION 33, TOWNSHIP 25 N., RANGE 44 E. W.M.**
10. PROJECT DESCRIPTION: **DEVELOPMENT OF 99.7 ACRES +/– INTO COTTAGE, SINGLE FAMILY, ESTATE, APARTMENT, AND COMMERCIAL LOTS OF AN EXISTING VACANT GOLF COURSE.**
11. DESCRIPTION OF **E.S.C.** MEASURES: USE OF SILT FENCES AND SEDIMENTATION FILTERS. ALL **E.S.C.** MEASURES MENTIONED ABOVE ARE TEMPORARY AND WILL BE REMOVED AFTER SITE IS LANDSCAPED.
12. EXISTING VEGETATION: **VACANT LAND WITH GRASS AND WEED COVER.**
13. PLAN PREPARATION DATE: **SEPTEMBER – 2016**
14. SOILS: **ALLUVIAL LEAN CLAY, SILT, OR SILTY SAND.**
15. **STABILIZATION OF DENUDED AREAS:**
    ANY DISTURBED AREAS, WHICH WOULD BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30–45 DAYS SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 lbs/ACRE.
16. **CONTROL OF POLLUTANTS:**
    ANY SPILLS WILL BE HANDLED ACCORDING TO **D.O.E. AND D.O.H.** GUIDELINES.
17. **LIMITS OF GRADING:**
    DURING THE COURSE OF CONSTRUCTION, THE AMOUNT OF DISTURBED AREA SHALL BE KEPT TO A MINIMUM AND SHALL BE LIMITED TO THE AREA SHOWN AS "LIMITS OF GRADING" ON THIS SHEET OF THE EROSION CONTROL PLANS.

MAINTENANCE

1. **THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF THE TEMPORARY E.S.C.** MEASURES.
2. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RUNOFF–PRODUCING RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL.
3. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF FILTER FABRIC SHALL BE ACCOMPLISHED PROMPTLY.
4. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RUNOFF–PRODUCING RAINFALL. DEPOSITS MUST BE REMOVED WHEN THE LEVEL OF DEPOSITION REACHES APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
5. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE **E.S.C.** STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.
6. ALL TEMPORARY AND PERMANENT **E.S.C.** PRACTICES SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
7. ALL TEMPORARY **E.S.C.** MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD AND OTHER CONSTRUCTION DEBRIS WHICH MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING SWEEPING AND WATER TO WASH THE CONSTRUCTION DEBRIS FROM THE STREET.
9. ON–SITE DUST CONTROL SHALL BE ACCOMPLISHED BY USING WATER. APPLICATIONS OF WATER MAY BE REQUIRED SEVERAL TIMES PER DAY DURING CONSTRUCTION ACTIVITY.

E.S.C. STANDARD PLAN NOTES FROM APPENDIX 9A OF THE SPOKANE REGIONAL STORMWATER MANUAL

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS.
   (A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALL OF TEMPORARY **E.S.C.** BMP'S;
   (B) INSTALL TEMPORARY **E.S.C.** BMPs, CONSTRUCTING SEDIMENT TRAPPING BMP'S AS ONE OF THE FIRST STEPS PRIOR TO GRADING;
   (C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;
   (D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;
   (E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;
   (F) TEMPORARILY STABILIZE, THROUGH RE–VEGETATION OR OTHER APPROPRIATE BMP'S, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;
   (G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORMWATER FACILITIES. (I.E. INLETS, PONDS, U.I.C. FACILITIES, ETC.);
   (H) PROTECT ALL PERMANENT STORMWATER FACILITIES UTILIZING THE APPROPRIATE BMP'S;
   (I) INSTALL PERMANENT **E.S.C.** CONTROLS, WHEN APPLICABLE; AND,
   (J) REMOVE TEMPORARY **E.S.C.** CONTROLS WHEN;
2. PERMANENT **E.S.C.** CONTROLS. WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;
3. ALL LAND–DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION AND SEDIMENTATION PROBLEMS HAVE CEASED; AND,
4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED **E.S.C.** PLAN ON FILE WITH THE LOCAL JURISDICTION.
5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.
6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON–SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.
8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE–CONSTRUCTION CONDITION.
9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AND UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.
10. INSPECT SEDIMENT CONTROL BMP'S WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT, AND AFTER ANY DISCHARGE FROM THE SITE (STORMWATER OR NON–STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.
11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.
12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 TO SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THRU JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THE TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FORTH IN THE CONSTRUCTION STORMWATER GENERAL PERMIT.
13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORMWATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE,
14. KEEP ROADS ADJACENT TO INLETS CLEAN.
15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY FOR STORM EVENTS.
16. CONSTRUCT STORMWATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERABLE BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.
17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.
18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON–INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173–304 W.A.C. FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON–SITE FUELING TANKS.
19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEMS REPAIRS, SOLVENT AND DE_GREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL RECONVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.
20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORMWATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.
21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING EVENT) AND MAINTAIN ALL **EROSION AND SEDIMENT CONTROL** BMP'S TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMP'S. NOTE THAT INLET PROTECTIONS DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.
22. REMOVE TEMPORARY **E.SC.** BMP'S WITHIN 30 DAYS AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREA THAT ARE DISTURBED DURING REMOVAL PROCESS.
23. A DAILY LOG SHALL BE MAINTAINED ONSITE AND AVAILABLE FOR INSPECTION REGARDLESS OF STORM ACTIVITY. THE CONTRACTOR SHALL NOTE CHANGES (DAILY) TO EROSION CONTROL MEASURES. A SITE LOG SHALL BE COMPLETED WITH THE PROJECT PER COSV SS 5.4.

City of Spokane Valley
Development Engineering

Reviewer: ______
New Street Miles – Public: ______

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

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SPOKANE VALLEY PAINTED HILLS PRD
SWPPP PLAN
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C9.1

JOB NUMBER
13-1166

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SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

BMP C233: SILT FENCE

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

USE OF SILT FENCE REDUCES THE TRANSPORT OF COARSE SEDIMENT FROM A CONSTRUCTION SITE BY PROVIDING A TEMPORARY PHYSICAL BARRIER TO SEDIMENT AND REDUCING THE RUNOFF VELOCITIES OF OVERLAND FLOW. SEE FIGURE 7.3.20 OF THE EASTERN WASHINGTON STORMWATER MANUAL OR DETAIL BELOW FOR DETAILS ON SILT FENCE CONSTRUCTION.

CONDITIONS OF USE:

SILT FENCE MAY BE USED DOWNSLOPE OF ALL DISTURBED AREAS. SILT FENCE IS NOT INTENDED TO TREAT CONCENTRATED FLOWS, NOR IS IT INTENDED TO TREAT SUBSTANTIAL AMOUNTS OF OVERLAND FLOW. ANY CONCENTRATED FLOWS MUST BE CONVEYED THROUGH THE DRAINAGE SYSTEM TO A SEDIMENT POND. THE ONLY CIRCUMSTANCE IN WHICH OVERLAND FLOW CAN BE TREATED SOLELY BY A SILT FENCE, RATHER THAT BY A SEDIMENT POND, IS WHEN THE AREA DRAINING TO THE FENCE IS ONE ACRE OR LESS AND FLOW RATES ARE LESS THAN 0.5 CFS.

SILT FENCES SHOULD NOT BE CONSTRUCTED IN STREAMS OR USED IN V–SHAPED DITCHES. THEY ARE NOT AN ADEQUATE METHOD OF SILT CONTROL FOR ANYTHING DEEPER THAT SHEET OR OVERLAND FLOW.

DESIGN AND INSTALLATION:

DRAINAGE AREA OF 1 ACRE OR LESS OR IN COMBINATION WITH SEDIMENT BASIN IN A LARGER SITE.

MAXIMUM SLOPE STEEPNESS (NORMAL OR PERPENDICULAR TO FENCE LINE) 1:1.

MAXIMUM SHEET OR OVERLAND FLOW PATH LENGTH TO THE FENCE OF 100 FEET.

NO FLOWS GREATER THAN 0.5 CFS.

THE GEOTEXTILE USED SHALL MEET THE FOLLOWING STANDARDS. ALL GEOTEXTILE PROPERTIES LISTED BELOW ARE MINIMUM AVERAGE ROLL VALUES.

POLYMETRIC MESH AOS (ASTM D4751)	0.60MM MAX. FOR SLIT WOVENS (#30 SIEVE). 0.30MM MAX. FOR ALL OTHER GEOTEXTILE TYPES (#50 SIEVE). 0.15MM MAX. FOR ALL FABRIC TYPES (#100 SIEVE).
WATER PERMITTIVITY (ASTM D4491)	0.02/SEC MIN.
GRAB TENSILE STRENGTH (ASTM D4632)	180 LBS. MIN. FOR EXTRA STRENGTH FABRIC. 100 LBS. MIN. FOR STANDARD STRENGTH FABRIC
GRAB TENSILE ELONGATION (ASTM D4632)	30% MAX,
ULTRAVIOLET RESISTANCE (ASTM D4335)	70% MIN.

STANDARD STRENGTH FABRICS SHALL BE SUPPORTED WITH WIRE MESH, CHICKEN WIRE, 2–INCH X 2–INCH, SAFETY FENCE, OR JUST MESH TO INCREASE THE STRENGTH OF FABRIC. SILT FENCE MATERIALS ARE AVAILABLE THAT HAVE SYNTHETIC MESH BACKING ATTACHED.

FILTER FABRIC MATERIAL SHALL CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF SIX MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0°F. TO 120°F.

100 PERCENT BIODEGRADABLE SILT FENCE IS AVAILABLE THAT IS STRONG, LONG LASTING, AND CAN BE LEFT IN PLACE AFTER THE PROJECT IS COMPLETED, IF PERMITTED BY LOCAL REGULATIONS.

CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY SILT FENCES AT THE LOCATIONS SHOWN IN THE PLANS. THE SILT FENCE SHALL BE CONSTRUCTED IN THE AREAS OF CLEARING, GRADING, OR DRAINAGE PRIOR TO STARTING THOSE ACTIVITIES. A SILT FENCE SHALL NOT BE CONSIDERED TEMPORARY IF THE SILT FENCE MUST OPERATE BEYOND THE LENGTH OF THE CONTRACT. THE SILT FENCE SHALL PREVENT SOIL CARRIED BY RUNOFF WATER FROM GOING BENEATH, THROUGH, OR OVER THE TOP OF THE SILT FENCE, BUT SHALL ALLOW WATER TO PASS THROUGH THE FENCE.

THE MINIMUM HEIGHT OF THE TOP OF SILT FENCE SHALL BE 2 FEET AND THE MAXIMUM SHALL BE 2.5 FEET ABOVE THE ORIGINAL GROUND SURFACE.

DESIGN AND INSTALLATION: (CONTINUED)

THE GEOTEXTILE SHALL BE SEWN TOGETHER AT THE POINT OF MANUFACTURE, OR AT AN APPROVED LOCATION AS DETERMINED BY THE ENGINEER, TO FORM GEOTEXTILE LENGTHS AS REQUIRED. ALL SEWN SEAMS SHALL BE LOCATED AT A SUPPORT POST. ALTERNATIVELY, TWO SECTIONS OF SILT FENCE CAN BE OVERLAPPED, PROVIDED THE CONTRACTOR CAN DEMONSTRATE, TO THE SATISFACTION OF THE ENGINEER, THAT THE OVERLAP IS LONG ENOUGH AND THAT THE ADJACENT FENCE SECTIONS ARE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

THE GEOTEXTILE SHALL BE ATTACHED ON THE UP–SLOPE SIDE OF THE POSTS AND SUPPORT SYSTEM WITH STAPLES, WIRE, OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE GEOTEXTILE SHALL BE ATTACHED IN A MANNER THAT REDUCES THE POTENTIAL FOR GEOTEXTILE TEARING AT THE STAPLES, WIRE, OR OTHER CONNECTION DEVICE. SILT FENCE BACKUP SUPPORT FOR THE GEOTEXTILE IN THE FORM OF A WIRE OF PLASTIC MESH IS DEPENDENT ON THE PROPERTIES OF THE GEOTEXTILE SELECTED FOR SUE. IF WIRE OR PLASTIC BACK–UP MESH IS USED, THE MESH SHALL BE FASTENED SECURELY TO THE UP–SLOPE OF THE POSTS WITH THE GEOTEXTILE BEING UP–SLOPE OF THE MESH BACK SUPPORT.

THE GEOTEXTILE AT THE BOTTOM OF THE FENCE HALL BE BURIED IN A TRENCH TO A MINIMUM DEPTH OF 4" BELOW THE GROUND SURFACE. THE TRENCH SHALL BE BACKFILLED AND THE SOIL TAMPED IN PLACE OVER THE BURIED PORTION OF THE GEOTEXTILE, SUCH THAT NO FLOW CAN PASS BENEATH THE FENCE AND SCOURING CAN NOT OCCUR. WHEN WIRE OR POLYMETRIC BACK–UP SUPPORT MESH IS USED, THE WIRE OR POLYMERIC MESH SHALL EXTEND INTO THE TRENCH A MINIMUM OF 3".

THE FENCE POSTS SHALL BE PLACED OR DRIVEN A MIN. OF 18'. A MIN. DEPTH OF 12" IS ALLOWED IF TOPSOIL OR OTHER SOFT SUBGRADE SOIL IS NOT PRESENT AND A MIN. DEPTH OF 18' CANNOT BE REACHED. FENCE POST DEPTHS SHALL BE INCREASED 6' IF THE FENCE IS LOCATED ON SLOPES PF 3;1 OR STEEPER AND THE SLOPE IS PERPENDICULAR TO THE FENCE. IF REQUIRED POST DEPTHS CANNOT BE OBTAINED, THE POSTS SHALL BE ADEQUATELY SECURED BY BRACING OR GUYING TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT LOADING.

SILT FENCES SHALL BE LOCATED ON CONTOUR AS MUCH AS POSSIBLE, EXCEPT AT THE ENDS OF THE FENCE, WHERE THE FENCE SHALL BE TURNED UPHILL SUCH THAT THE SILF FENCE CAPTURES THE RUNOFF WATER AND PREVENTS WATER FROM FLOWING AROUND THE END OF THE FENCE.

IF THE FENCE MUST CROSS CONTOURS, WITH THE EXCEPTION OF THE END OF THE FENCE. GRAVEL CHECK DAMS PLACED PERPENDICULAR TO THE BACK OF THE FENCE SHALL BE USED TO MINIMIZE CONCENTRATED FLOW AND EROSION ALONG THE BACK OF THE FENCE. THE GRAVEL CHECK DAMS SHALL BE APPROXIMATELY 1' DEEP AT THE BACK OF THE FENCE. IT SHALL BE CONTINUED PERPENDICULAR TO THE FENCE AT THE SAME ELEVATION UNTIL THE TOP OF THE CHECK DAM INTERCEPTS THE THE GROUND SURFACE BEHIND THE FENCE. THE GRAVEL CHECK DAMS SHALL CONSIST OF CRUSHED SURFACING TOP COURSE, GRAVEL BACKFILL FOR WALLS, OR SHOULDER BALLAST. THE GRAVEL CHECK DAMS SHALL BE LOCATED EVERY 10' ALONG THE FENCE WHERE THE FENCE MUST CROSS THE CONTOURS. THE SLOPE OF THE FENCE LINE WHERE THE CONTOURS MUST BE CROSSED SHALL NOT BE STEEPER THAN 3:1

WOOD, STEEL OR EQUIVALENT POSTS SHALL BE USED. WOOD POSTS SHALL HAVE MINIMUM DIMENSIONS OF 2"X2"X3' MIN. LENGTH, AND SHALL BE FREE OF DEFECTS SUCH AS KNOTS, SPLITS, OR GOUGES. STEEL POSTS SHALL CONSIST OF EITHER SIZE NO. 6 REBAR OR LARGER, ASTM A 120 STEEL PIPE WITH A MIN. DIAMETER. OR 1–INCH, U, T, L, OR C SHAPE STEEL POSTS WITH A MIN. WEIGHT OF 1.35 LBS./FT. OR OTHER STEEL POSTS HAVING EQUIVALENT STRENGTH AND BENDING RESISTANCE TO THE POST SIZES LISTED. THE SPACING OF THE SUPPORTS POSTS SHALL BE A MAXIMUM OR 6'.

FENCE BACK–UP SUPPORT, IF USED, SHALL CONSIST OF STEEL WIRE WITH A MAX. MESH SPACING OF 2', OR A PREFABRICATED POLYMERIC MESH. THE STRENGTH OF WIRE ON POLYMERIC MESH SHALL BE EQUIVALENT TO OR GREATER THAT 180 LBS. GRAB TENSILE STRENGTH. THE POLYMERIC MESH MUST BE AS RESISTANT TO ULTRAVIOLET. RADIATION AS THE GEOTEXTILE IT SUPPORTS.

SILT FENCE INSTALLATION USING THE SLICING METHOD SPECIFICATION DETAILS FOLLOW.

THE BASE OF BOTH END POSTS MUST BE AT LEAST 2–4"ABOVE THE TOP OF THE SILT FENCE FABRIC ON THE MIDDLE POSTS FOR DITCH CHECKS TO DRAIN PROPERLY. USE A HAND LEVEL OR STRING LEVEL, IF NECESSARY, TO MARK BASE POINTS BEFORE INSTALLATION.

INSTALL POSTS 3–4' APART IN CRITICAL RETENTION AREAS. AND 6–7' APART IN STANDARD APPLICATIONS.

INSTALL POSTS 24" DEEP ON THE DOWNSTREAM SIDE OF THE SILT FENCE, AND AS CLOSE AS POSSIBLE TO THE FABRIC. ENABLING POSTS TO SUPPORT THE FABRIC FROM THE UPSTREAM WATER PRESSURE.

INSTALL POSTS WITH NIPPLES FACING AWAY FROM THE SILT FENCE FABRIC.

ATTACH THE FABRIC TO EACH POST WITH THREE TIES, ALL SPACED WITH THE TOP 8" OF THE FABRIC. ATTACH EACH TIE DIAGONALLY 45 DEGREES THROUGH THE FABRIC, WITH EACH PUNCTURE AT LEAST 1 INCH VERTICALLY APART, IN ADDITION, EACH TIE SHOULD BE POSITIONED TO HANG ON A POST NIPPLE WHEN TIGHTENING TO PREVENT SAGGING.

WRAP APPROXIMATELY 6 INCHES OF FABRIC AROUND THE END POSTS AND SECURE WITH 3 TIES.

NO MORE THEN 24" OF A 36" FABRIC IS ALLOWED ABOVE GROUND LEVEL.

THE ROPE LOCK SYSTEM MUST BE USED IN ALL DITCH CHECK APPLICATIONS.

THE INSTALLATION SHOULD BE CHECKED AND CORRECTED FOR ANY DEVIATION BEFORE COMPACTION. USE A FLAT–BLADED SHOVEL TO TUCK FABRIC DEEPER INTO THE GROUND IF NECESSARY.

COMPACTION IS VITALLY IMPORTANT FOR EFFECTIVE RESULTS. COMPACT THE SOIL IMMEDIATELY NEXT TO THE SILT FENCE WITH THE FRONT WHEEL OF A TRACTOR, SKID STEER, OR ROLLER EXERTING 60 PSI, COMPACT THE UPSTREAM SIDE FIRST AND THEN EACH SIDE TWICE FOR A TOTAL OF FOUR TRIPS

MAINTENANCE STANDARDS:

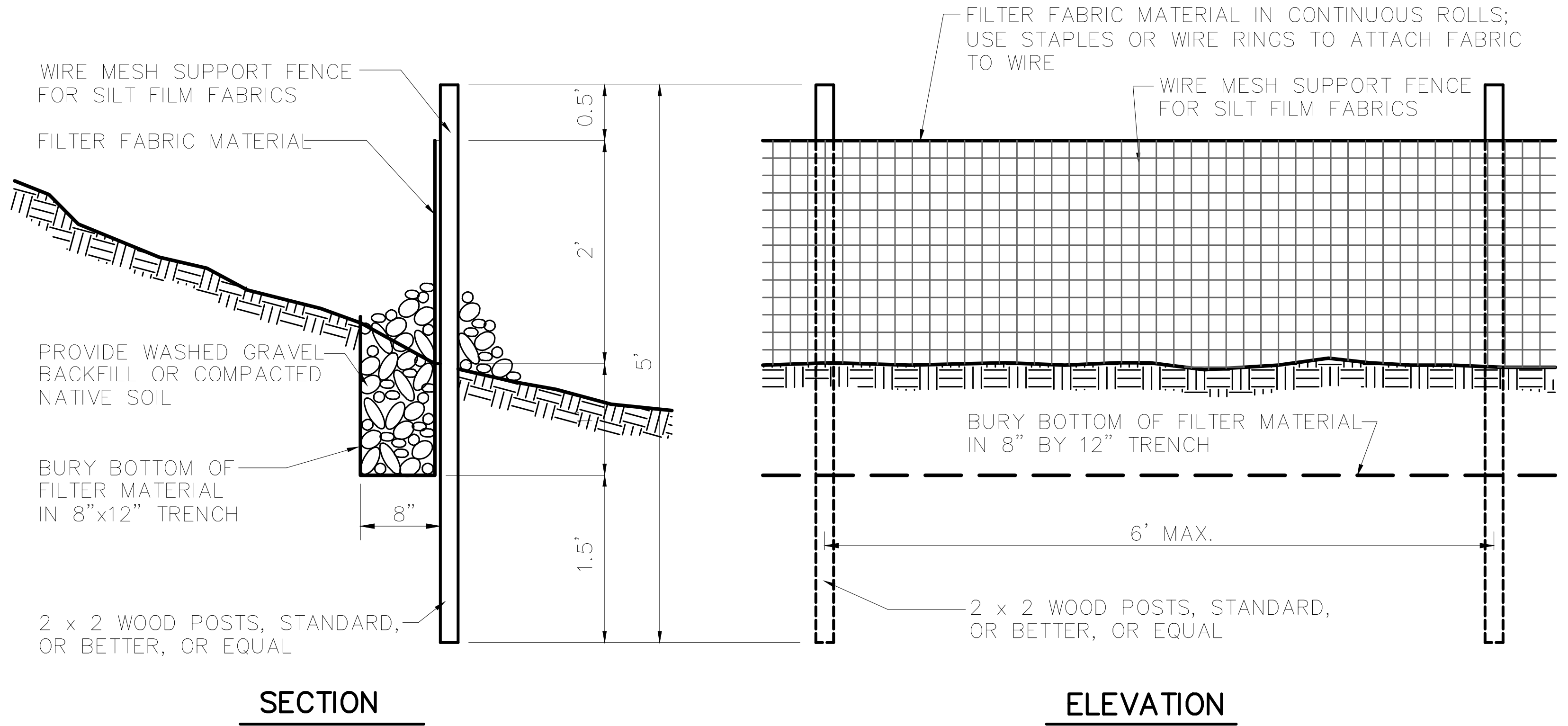
ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.

IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT POND.

IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGNS OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF THE FLOWS PARALLEL TO THE FENCE, IF THIS OCCURS, REPLACE THE FENCE OR REMOVE THE TRAPPED SEDIMENT.

SEDIMENT DEPOSITS SHALL EITHER BE REMOVED WHEN THE DEPOSIT REACHES APPROXIMATELY ONE–THIRD THE HEIGHT OF THE SILT FENCE, OR A SECOND SILT FENCE INSTALLED.

IF THE FILTER FABRIC OR GEOTEXTILE HAS DETERIORATED DUE TO ULTRAVIOLENT BREAKDOWN, IT SHALL BE REPLACED.



SILT FENCE DETAIL

NOT TO SCALE

1
-

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS
BEFORE YOU DIG

BMP C105: STABILIZED CONSTRUCTION ENTRANCE

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

CONSTRUCTION ENTRANCES ARE STABILIZED TO REDUCE THE AMOUNT OF SEDIMENT TRANSPORTED ONTO PAVED ROADS BY VEHICLES OR EQUIPMENT BY CONSTRUCTING A STABILIZED PAD OF QUARRY SPALLS AT ENTRANCES TO CONSTRUCTION SITES.

CONDITIONS OF USE:

CONSTRUCTION ENTRANCES SHALL BE STABILIZED WHEREVER TRAFFIC WILL BE LEAVING A CONSTRUCTION SITE AND TRAVELING ON PAVED ROADS OR OTHER PAVED AREAS WITHIN 1,000 FEET OF THE SITE.

ON LARGE COMMERCIAL, HIGHWAY, AND ROAD PROJECTS, THE DESIGNER AND OR CONTRACTOR SHOULD INCLUDE ENOUGH MATERIALS IN THE CONTRACT TO ALLOW FOR ADDITIONAL STABILIZED ENTRANCES NOT SHOWN IN THE INITIAL CONSTRUCTION SWPPP. IT IS DIFFICULT TO DETERMINE EXACTLY WHERE ACCESS TO THESE PROJECTS WILL TAKE PLACE; ADDITIONAL MATERIALS WILL ENABLE THE CONTRACTOR TO INSTALL THEM WHERE NEEDED.

DESIGN AND INSTALLATION:

SEE FIGURE 7.3.2 OF THE EASTERN WATER STORMWATER MANAGEMENT MANUAL OR DETAIL BELOW.

THE SURFACE MATERIAL SHALL BE 4"–8" QUARRY SPALLS. SMALLER CRUSHED ROCK SUCH AS BASE COURSE MAY BE APPROPRIATE IN SOME SITUATIONS BUT, SINCE IT IS MORE LIKELY TO BE TRACKED OFF–SITE, MUST BE APPROVED BY THE LOCAL JURISDICTION.

A SEPARATION GEOTEXTILE SHALL BE PLACED UNDER THE SPALLS TO PREVENT FINE SEDIMENT FROM PUMPING UP INTO THE ROCK PAD. THE GEOTEXTILE SHALL MEET THE FOLLOWING STANDARDS:

GRAB TENSILE STRENGTH (ASTM D4751)	200 PSI MIN.
GRAB TENSILE ELONGATION (ASTM D4632)	30% MAX.
MULLEN BURST STRENGTH (ASTM D3786–80A)	400 PSI MIN.
AOS (ASTM D4751)	20–45 (U.S. STANDARD SIEVE SIZE)

IF SITE CONDITIONS DO NOT WARRANT THE USE OF GEOTEXTILE, IT IS NOT REQUIRED.

MAINTENANCE STANDARDS:

IF QUARRY SPALLS (OR HOG FUEL) SHALL BE ADDED IF THE PAD IS NO LONGER IN ACCORDANCE WITH THE SPECIFICATIONS.

IF THE ENTRANCE IS NOT PREVENTING SEDIMENT FROM BEING TRACKED ONTO PAVEMENT, THEN ALTERNATIVE MEASURES TO KEEP THE STREETS FREE OF SEDIMENT SHALL BE USED. THIS MAY INCLUDE STREET SWEEPING, AN INCREASE IN THE DIMENSIONS OF THE ENTRANCE, OR THE INSTALLATION OF A WHEEL WASH.

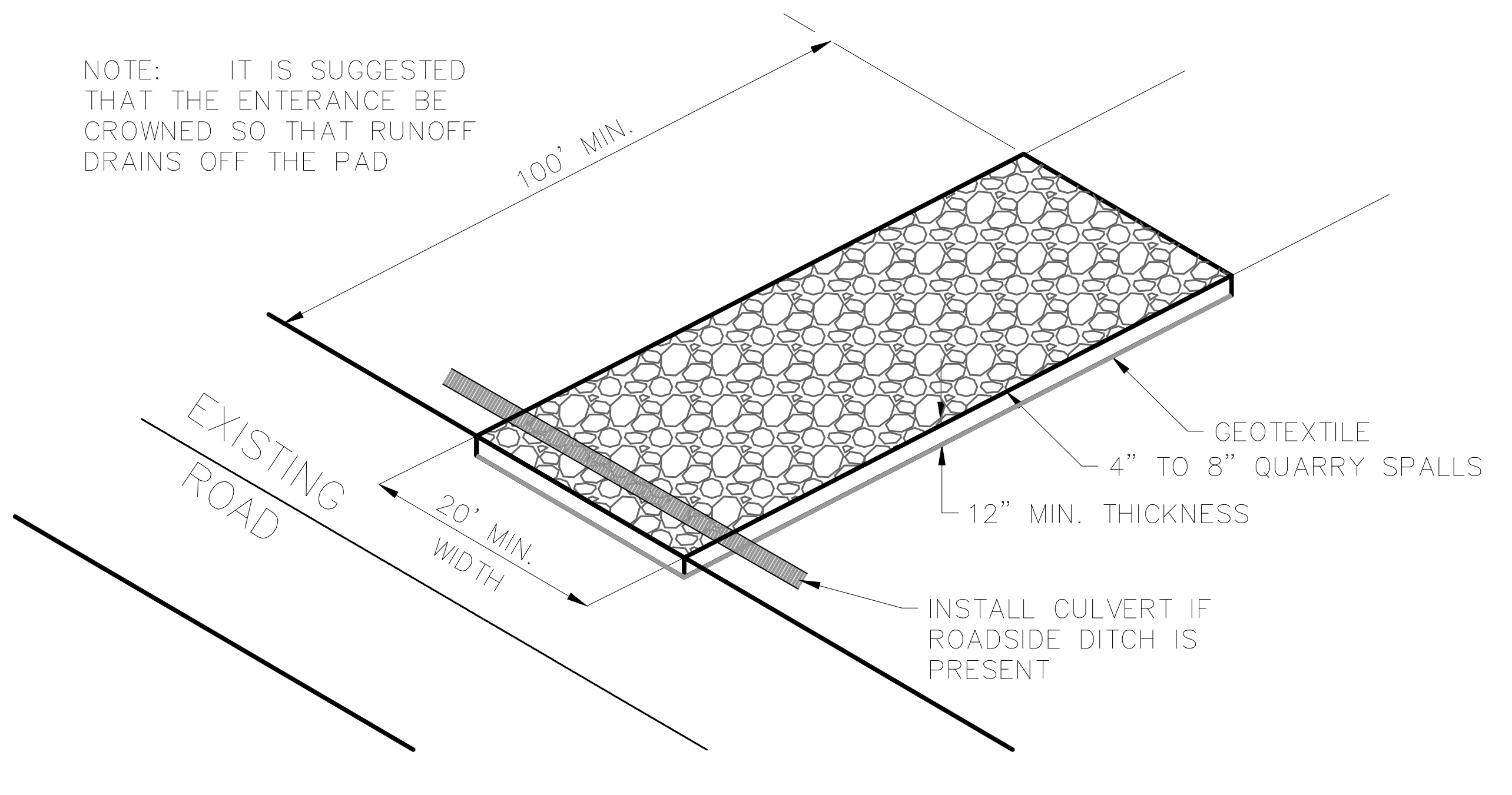
ANY SEDIMENT THAT IS TRACKED ONTO PAVEMENT SHALL BE REMOVED BY SHOVELING OR STREET SWEEPING. THE SEDIMENT COLLECTED BY SWEEPING SHALL BE REMOVED RO STABILIZED ON SITE. THE PAVEMENT SHALL NOT BE CLEANED BY WASHING DOWN THE STREET, EXCEPT WHEN SWEEPING IS INEFFECTIVE AND THERE IS A THREAT TO PUBLIC SAFETY. IF IT IS NECESSARY TO WASH THE STREETS. THE CONSTRUCTION OF A SMALL SUMP SHALL BE CONSIDERED. THE SEDIMENT WOULD THEN BE WASHED INTO THE SUMP WHERE IT CAN BE CONTROLLED.

ANY QUARRY SPALLS THAT ARE LOOSENED FROM THE PAD, WHICH END UP ON THE ROADWAY SHALL BE REMOVED IMMEDIATELY.

IF VEHICLES ARE ENTERING OR EXITING THE SITE AT POINTS OTHER THAN THE CONSTRUCTION ENTERANCE(S), FENCING (SEE BMPS C103 AND C104) SHALL BE INSTALLED TO CONTROL TRAFFIC.

UPON PROJECT COMPLETION AND SITE STABILIZATION, ALL CONSTRUCTION ACCESSES INTENDED AS PERMANENT ACCESS FOR MAINTENANCE SHALL BE PERMANENTLY STABILIZED.

NOTE: IT IS SUGGESTED THAT THE ENTERANCE BE CROWNED SO THAT RUNOFF DRAINS OFF THE PAD



ROCK CONSTRUCTION ENTRY

NOT TO SCALE

2
-

City of Spokane Valley
Development Engineering

Reviewer: ____
New Street Miles – Public: ____

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ____
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL:
N/A
VERTICAL:
N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: RMA
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☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
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SPOKANE VALLEY PAINTED HILLS PRD
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SHEET
C9.2

JOB NUMBER
13-1166

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SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

BMP C220: STORM DRAIN INLET PROTECTION

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE: TO PREVENT COARSE SEDIMENT FROM ENTERING DRAINAGE SYSTEMS PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA

CONDITIONS OF USE: WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE DISTURBED DRAINAGE AREA. PROTECTION SHOULD BE PROVIDED FOR ALL STORM DRAIN INLETS DOWNSLOPE AND WITHIN 500 FEET OF A DISTURBED OR CONSTRUCTION AREA, UNLESS THE RUNOFF THAT ENTERS THE CATCH BASIN WILL BE CONVEYED TO A SEDIMENT POND OR TRAP. INLET PROTECTION MAY BE USED ANYWHERE TO PROTECT THE DRAINAGE SYSTEM. IT IS LIKELY THAT THE DRAINAGE SYSTEM WILL REQUIRE CLEANING.

TABLE 7.3.9 (IN THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL) LISTS SEVERAL OPTIONS FOR INLET PROTECTION. ALL OF THE METHODS FOR STORM DRAIN INLET PROTECTION ARE PRONE TO PLUGGING AND REQUIRE A HIGH FREQUENCY OF MAINTENANCE. DRAINAGE AREAS SHOULD BE LIMITED TO 1 ACRE OR LESS. EMERGENCY OVERFLOWS MAY BE REQUIRED WHERE STORMWATER PONDING WOULD CAUSE A HAZARD. IF AN EMERGENCY OVERFLOW IS PROVIDED, ADDITIONAL END-OF-PIPE TREATMENT MAY BE REQUIRED.

DESIGN AND INSTALLATION: EXCAVATED DROP INLET PROTECTION – AN EXCAVATED IMPOUNDMENT AROUND THE STORM DRAIN. SEDIMENT SETTLES OUT OF THE STORMWATER PRIOR TO ENTERING THE STORM DRAIN.

DEPTH 1–2 FT AS MEASURED FROM THE CREST OF THE INLET STRUCTURE.

SIDE SLOPES OF EXCAVATION NO STEEPER THAT 2:1

MINIMUM VOLUME OF EXCAVATION 35 CUBIC YARDS

SHAPE THE BASIN TO FIT THE SITE WITH THE LONGEST DIMENSION ORIENTED TOWARD THE LONGEST INFLOW AREA.

INSTALL PROVISIONS FOR DRAINING TO PREVENT STANDING WATER PROBLEMS.

CLEAR THE AREA OF ALL DEBRIS.

GRADE THE APPROACH TO THE INLET UNIFORMLY.

DRILL WEEP HOLES INTO THE SIDES OF THE INLET.

PROTECT WEEP HOLES WITH SCREEN WIRE AND WASHED AGGREGATE.

SEAL WEEP HOLES WHEN REMOVING STRUCTURE AND STABILIZING AREA.

IT MAY BE NECESSARY TO BUILD A TEMPORARY DIKE TO THE DOWN SLOPE STRUCTURE TO PREVENT BYPASS FLOW.

BLOCK AND GRAVEL FILTER – A BARRIER FORMED AROUND THE STORM DRAIN INLET WITH STANDARD CONCRETE BLOCKS AND GRAVEL. SEE FIGURE 4.15 IN THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

HEIGHT 1–2 FT ABOVE THE INLET.

RECESS THE FIRST ROW 2" INTO THE GROUND FOR STABILITY.

SUPPORT SUBSEQUENT COURSES BY PLACING A 2X4 THROUGH THE BLOCK OPENING.

DO NOT USE MORTAR.

LAY SOME BLOCKS IN THE BOTTOM ROW ON THEIR SIDE FOR DEWATERING THE POOL.

PLACE HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2" OPENINGS OVER ALL BLOCK OPENINGS.

PLACE GRAVEL JUST BELOW THE TOP OF BLOCKS ON SLOPES 2:1 OR FLATTER.

AN ALTERNATIVE DESIGN IN A GRAVEL DONUT.

INLET SLOPE OF 3:1.

OUTLET SLOPE OF 2:1.

1–FOOT WIDE LEVEL STONE AREA BETWEEN THE STRUCTURE AND THE INLET.

INLET SLOPES STONES 3" IN DIAMETER OR LARGER.

OUTLET SLOPE USE GRAVEL 1/2" TO 3/4" AT A MINIMUM THICKNESS OF 1 FOOT.

GRAVEL AND WIRE MESH INLET – A GRAVEL BARRIER PLACED OVER TOP OF THE INLET. THIS STRUCTURE DOES NOT PROVIDE AND OVERFLOW

HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2" OPENINGS.

COARSE AGGREGATE.

HEIGHT 1–FOOT OR MORE, 18" WIDER THAN INLET ON ALL SIDES.

PLACE WIRE MESS OVER THE DROP INLET SO THAT THE WIRE EXTENDS A MINIMUM OF 1–FOOT BEYOND EACH SIDE OF THE INLET STRUCTURE,

IF MORE THAN ONE STRIP OF MESH IN NECESSARY, OVERLAP THE STRIPS.

PLACE COARSE AGGREGATE OVER THE WIRE MESH.

THE DEPTH OF THE GRAVEL SHOULD BE AT LEAST 12" OVER THE ENTIRE INLET OPENING AND EXTEND AT LEAST 18" ON ALL SIDES.

DESIGN AND INSTALLATION CONTINUED: CATCH BASIN FILTERS – INSERTS SHOULD BE DESIGNED BY THE MANUFACTURER FOR USE AT CONSTRUCTION SITES. THE LIMITED SEDIMENT STORAGE CAPACITY INCREASES THE AMOUNT OF INSPECTION AND MAINTENANCE REQUIRED, WHICH MAY BE DAILY FOR HEAVY SEDIMENT LOADS, THE MAINTENANCE REQUIREMENTS CAB BE REDUCED BY COMBINING A CATCH BASIN FILTER WITH ANOTHER TYPE OF INLET PROTECTION. THIS TYPE OF INLET PROTECTION PROVIDES FLOW BYPASS WITHOUT OVERFLOW AND THEREFORE MAY BE A BETTER METHOD FOR INLETS LOCATED ALONG ACTIVE RIGHTS–OF–WAY.

5 CUBIC FEET OF STORAGE

DEWATERING PROVISIONS

HIGH–FLOW BYPASS THAT WILL NOT CLOG UNDER NORMAL USE AT A CONSTRUCTION SITE.

THE CATCH BASIN FILTER IS INSERTED IN THE CATCH BASIN JUST BELOW THE GRATING.

CURB INLET PROTECTION WITH WOODED WEIR – BARRIER FORMED AROUND CURB INLET WITH A WOODEN FRAME AND GRAVEL.

WIRE MESH WITH 1/2" OPENINGS.

EXTRA STRENGTH FILTER FABRIC TO THE FRAME.

PILE COARSE WASHED AGGREGATE AGAINST THE WIRE/FABRIC.

PLACE WEIGHT ON FRAME ANCHORS.

BLOCK AND GRAVEL CURB INLET PROTECTION – BARRIER FORMED AROUND AN INLET WITH CONCRETE BLOCKS AND GRAVEL. SEE FIGURE 7.3.16 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

WIRE MESH WITH 1/2" OPENINGS.

PLACE 2 CONCRETE BLOCKS ON THEIR SIDES ABUTTING THE CURB AT EITHER SIDE OF THE INLET OPENING. THESE ARE SPACER BLOCKS.

PLACE A 2X4 STUD THROUGH THE OUT HOLES OF EACH SPACER BLOCK TO ALIGN THE FRONT BLOCKS.

PLACE BLOCKS ON THEIR SIDES ACROSS THE FRONT OF THE INLET AND ABUTTING THE SPACER BLOCKS.

PLACE WIRE MESH OVER THE OUTSIDE VERTICAL FACE.

PILE COARSE AGGREGATE AGAINST THE WIRE TO THE TOP OF THE BARRIER.

CURB AND GUTTER SEDIMENT BARRIER – SANDBAG OR ROCK BERM (RIPRAP AND AGGREGATE) 3 FEET HIGH AND 3 FEET WIDE IN A HORSESHOE SHAPE. SEE FIGURE 7.3.17 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

CONSTRUCT HORSESHOE SHAPED BERM, FACED WITH COARSE AGGREGATE IF USING RIPRAP, 3 FEET HIGH AND 3 FEET WIDE, AT LEAST 2 FEET FROM THE INLET.

CONSTRUCT A HORSESHOE SHAPED SEDIMENTATION TRAP ON THE OUTSIDE OF THE BERM SIZED TO SEDIMENT TRAP STANDARDS FOR PROTECTING A CULVERT INLET.

MAINTENANCE STANDARDS: CATCH BASIN FILTERS SHOULD BE INSPECTED FREQUENTLY, ESPECIALLY AFTER STORM EVENTS. IF THE INSERT BECOMES CLOGGED, IT SHOULD BE CLEANED OR REPLACED.

FOR SYSTEMS USING STONE FILTERS: IF THE STONE FILTER BECOMES CLOGGED WITH SEDIMENT, THE STONES MUST BE PULLED AWAY FROM THE INLET AND CLEANED OR REPLACED. SINCE CLEANING OF GRAVEL AT A CONSTRUCTION SITE MAY BE DIFFICULT, AN ALTERNATIVE APPROACH WOULD BE USED TO USE THE CLOGGED STONE AS FILL AND PUT FRESH STONE AROUND THE INLET.

DO NOT WASH SEDIMENT INTO STORM DRAINS WHILE CLEANING. SPREAD ALL EXCAVATED MATERIAL EVENLY OVER THE SURROUNDING LAND AREA OR STOCKPILE AND STABILIZE AS APPROPRIATE.

BMP C151: CONCRETE HANDLING

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE: CONCRETE WORK CAN GENERATE PROCESS WATER AND SLURRY THAT CONTAIN FINE PARTICLES AND HIGH PH, BOTH OF WHICH CAN VIOLATE WATER QUALITY STANDARDS IN THE RECEIVING WATER. THIS BMP IS INTENDED TO MINIMIZE AND ELIMINATE CONCRETE PROCESS WATER AND SLURRY FROM ENTERING WATERS OF THE STATE.

CONDITIONS OF USE: ANY TIME CONCRETE IS USED, THESE MANAGEMENT PRACTICES SHALL BE UTILIZED. CONCRETE CONSTRUCTION PROJECTS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- CURBS
- SIDEWALKS
- ROADS
- BRIDGES
- FOUNDATIONS
- FLOORS
- RUNWAYS

DESIGN AND INSTALLATION: CONCRETE TRUCK CHUTES, PUMPS, AND INTERNALS SHALL BE WASHED OUT ONLY INTO FORMED AREAS AWAITING INSTALLATION OF CONCRETE OR ASPHALT.

UNUSED CONCRETE REMAINING IN THE TRUCK AND PUMP SHALL BE RETURNED TO THE ORIGINATING BATCH PLANT FOR RECYCLING.

HAND TOOLS INCLUDING, BUT NOT LIMITED TO, SCREEDS, SHOVELS, RAKES, FLOATS, AND TROWELS SHALL BE WASHED OFF ONLY INTO FORMED AREAS AWAITING INSTALLATION OF CONCRETE OR ASPHALT.

EQUIPMENT THAT CANNOT BE EASILY MOVED, SUCH AS CONCRETE PAVERS, SHALL ONLY BE WASHED IN AREAS THAT DO NOT DIRECTLY DRAIN TO NATURAL OR CONSTRUCTED STORMWATER CONVEYANCES.

WASHDOWN FROM AREAS SUCH AS CONCRETE AGGREGATE DRIVEWAYS SHALL NOT DRAIN DIRECTLY TO NATURAL OR CONSTRUCTED STORMWATER CONVEYANCES.

WHEN NO FORMED AREAS ARE AVAILABLE, WASHWATER AND LEFTOVER PRODUCT SHALL BE CONTAINED IN A LINED CONTAINER. CONTAINED CONCRETE SHALL BE DISPOSED OF IN A MANNER THAT DOES NOT VIOLATE GROUNDWATER OR SURFACE WATER QUALITY STANDARDS.

MAINTENANCE STANDARDS: CONTAINERS SHALL BE CHECKED FOR HOLES IN THE LINER DAILY DURING CONCRETE POURS AND REPAIRED THE SAME DAY.

CONCRETE TRUCK WASHOUT STANDARDS

NOT TO SCALE

4
-

BMP C140: DUST CONTROL

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE: DUST CONTROL PREVENTS WIND TRANSPORT OF DUST FROM DISTURBED SOIL SURFACES ONTO ROADWAYS, DRAINAGE WAYS, AND SURFACE WATERS. WIND EROSION IS A SIGNIFICANT CAUSE OF SOIL MOVEMENT FROM CONSTRUCTION SITES IN EASTERN WASHINGTON. ALTHOUGH WIND EROSION CAN CONTRIBUTE TO WATER QUALITY IMPACTS, DUST CONTROL IS REGULATED IN SOME AREAS OF EASTERN WASHINGTON PRIMARILY THROUGH LOCAL AIR QUALITY AUTHORITIES. WHERE SUCH AN ENTITY EXISTS, CONTACT THE LOCAL AIR QUALITY AUTHORITY FOR APPROPRIATE AND REQUIRED BMPS FOR DUST CONTROL TO IMPLEMENT AT YOUR PROJECT SITE.

CONDITIONS OF USE: IN AREAS (INCLUDING ROADWAYS) SUBJECT TO SURFACE AND AIR MOVEMENT OF DUST WHERE ON–SITE AND OFF–SITE IMPACTS TO ROADWAYS, DRAINAGE WAYS, OR SURFACE WATERS ARE LIKELY.

DESIGN AND INSTALLATION: CONTACT YOUR LOCAL AIR POLLUTION CONTROL AUTHORITY FOR GUIDANCE AND TRAINING ON OTHER DUST CONTROL MEASURES. COMPLIANCE WITH THE LOCAL AIR POLLUTION CONTROL AUTHORITY CONSTITUTES COMPLIANCE WITH THIS BMP.

WATER APPLIED TO CONSTRUCTION SITES FOR DUST CONTROL MUST NOT LEAVE THE SITE AS SURFACE RUNOFF.

SEE ALSO "TECHNIQUES FOR DUST PREVENTION AND SUPPRESSION," ECOLOGY PUBLICATION NUMBER 96–433, REVISED APRIL 2002.

TECHNIQUES THAT CAN BE USED FOR CONSTRUCTION PROJECTS INCLUDE:

VEGETATE OR MULCH AREAS THAT WILL NOT RECEIVE VEHICLE TRAFFIC. IN AREAS WHERE PLANTING, MULCHING, OR PAVING IS IMPRACTICAL, APPLY GRAVEL OR LANDSCAPING ROCK.

LIMIT DUST GENERATION BY CLEARING ONLY THOSE AREAS WHERE IMMEDIATE ACTIVITY WILL TAKE PLACE, LEAVING THE REMAINDER AREA(S) IN THE ORIGINAL CONDITION, IF STABLE. MAINTAIN THE ORIGINAL GROUND COVER AS LONG AS PRACTICAL.

CONSTRUCT NATURAL OR ARTIFICIAL WINDBREAKS OR WINDSCREENS. THESE MAY BE DESIGNED AS ENCLOSURES FOR SMALL DUST SOURCES.

SPRINKLE THE SITE WITH WATER UNTIL THE SURFACE IS WET. REPEAT AS NEEDED. TO PREVENT CARRYOUT OF MUD ONTO STREET, REFER TO STABILIZED CONSTRUCTION ENTRANCE (BMP C105).

IRRIGATION WATER CAN BE USED FOR DUST CONTROL. IRRIGATION SYSTEMS SHOULD BE INSTALLED AS A FIRST STEP ON SITES WHERE DUST CONTROL IS A CONCERN.

SPRAY EXPOSED SOIL AREAS WITH A DUST PALLIATIVE, FOLLOWING THE MANUFACTURER'S INSTRUCTIONS AND CAUTIONS REGARDING ANDLING AND APPLICATION. USED OIL IS PROHIBITED FROM USE AS A DUST SUPPRESSANT. LOCAL GOVERNMENTS MAY APPROVE OTHER DUST PALLIATIVES SUCH AS CALCIUM CHLORIDE OR PAM.

PAM (BMPC126) ADDED TO WATER AT A RATE OF 0.5LBS PER 1,000 GALLONS OF WATER PER ACRE AND APPLIED FROM A WATER TRUCK IS MORE EFFECTIVE THAT WATER ALONE. THE IS DUE TO THE INCREASED INFILTRATION OF WATER INTO THE SOIL AND REDUCED EVAPORATION. IN ADDITION, SMALL SOIL PARTICLES ARE BONDED TOGETHER AND ARE NOT AS EASILY TRANSPORTED BY WIND. ADDING PAM MAY ACTUALLY REDUCE THE QUANTITY OF WATER NEEDED FOR DUST CONTROL, ESPECIALLY IN EASTERN WASHINGTON. SINCE THE WHOLESALE COST OF PAM IS ABOUT $4.00 PER POUND, THIS IS AN EXTREMELY COST–EFFECTIVE DUST CONTROL METHOD.

TECHNIQUES THAT CAN BE USED FOR UNPAVED ROADS AND LOTS INCLUDE:

LOWER SPEED LIMITS. HIGH VEHICLE SPEEDS INCREASES THE AMOUNT OF DUST STIRRED UP FROM UNPAVED ROADS AND LOTS.

UPGRADE ROAD SURFACE STRENGTH BY IMPROVING PARTICLE SIZE, SHAPE, AND MINERAL TYPES THAT MAKE UP THE SURFACE AND BASE MATERIALS.

ADD SURFACE GRAVEL TO REDUCE THE SOURCE OF DUST EMISSION. LIMIT THE AMOUNT OF FINE PARTICLES (THOSE SMALLER THAN .075 MILLIMETERS) 10 TO 20 PERCENT.

USE GEOTEXTILE FABRIC TO INCREASE THE STRENGTH OF NEW ROADS OR ROADS UNDERGOING RECONSTRUCTION.

ENCOURAGE THE USE OF ALTERNATE, PAVED ROUTES, IF AVAILABLE.

RESTRICT USE BY TRACKED VEHICLES AND HEAVY TRUCKS TO PREVENT DAMAGE TO ROAD SURFACE AND BASE.

APPLY CHEMICAL DUST SUPPRESSANTS USING THE ADMIX METHOD, BLENDING THE PRODUCT WITH THE TOP FEW INCHES OF MATERIAL. SUPPRESSANTS MAY ALSO BE APPLIED AS SURFACE TREATMENTS.

PAVE UNPAVED PERMANENT ROADS AND OTHER TRAFFICKED AREAS.

USE VACUUM STREET SWEEPERS.

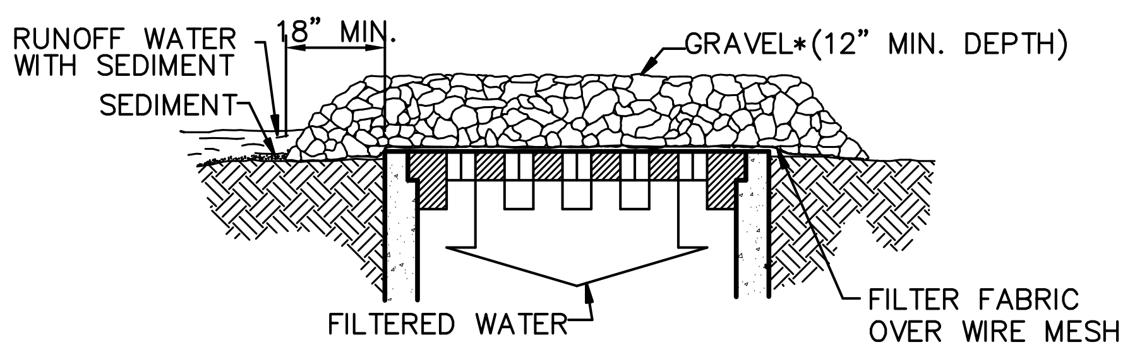
REMOVED MUD AND OTHER DIRT PROMPTLY SO IT DOES NOT DRY AND THEN TURN INTO DUST.

LIMIT DUST–CAUSEING WORK ON WINDY DAYS.

MAINTENANCE STANDARDS: REPAY AREA AS NECESSARY TO KEEP DUST TO A MINIMUM. WATER APPLIED TO CONSTRUCTION SITES FOR DUST CONTROL MUST NOT LEAVE THE SITE AS SURFACE RUNOFF.

UNDERGROUND SERVICE ALERT
ONE–CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

* GRAVEL SHALL BE 2"–3" CLEAN STONE



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY CONCENTRATED FLOWS ARE EXPECTED, BUT NOT WHERE PONDING AROUND THE STRUCTURE MIGHT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED ACRES.

GRAVEL AND WIRE MESH INLET SEDIMENT FILTER

NOT TO SCALE

3
-

City of Spokane Valley
Development Engineering

Reviewer: ____________
New Street Miles – Public: ________

☐ Not Reviewed

☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.2

Date Accepted ________
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

DATUM: NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/17/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

SPOKANE VALLEY PAINTED HILLS PRD
SWPPP BMPs
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C9.3

JOB NUMBER
13-1166

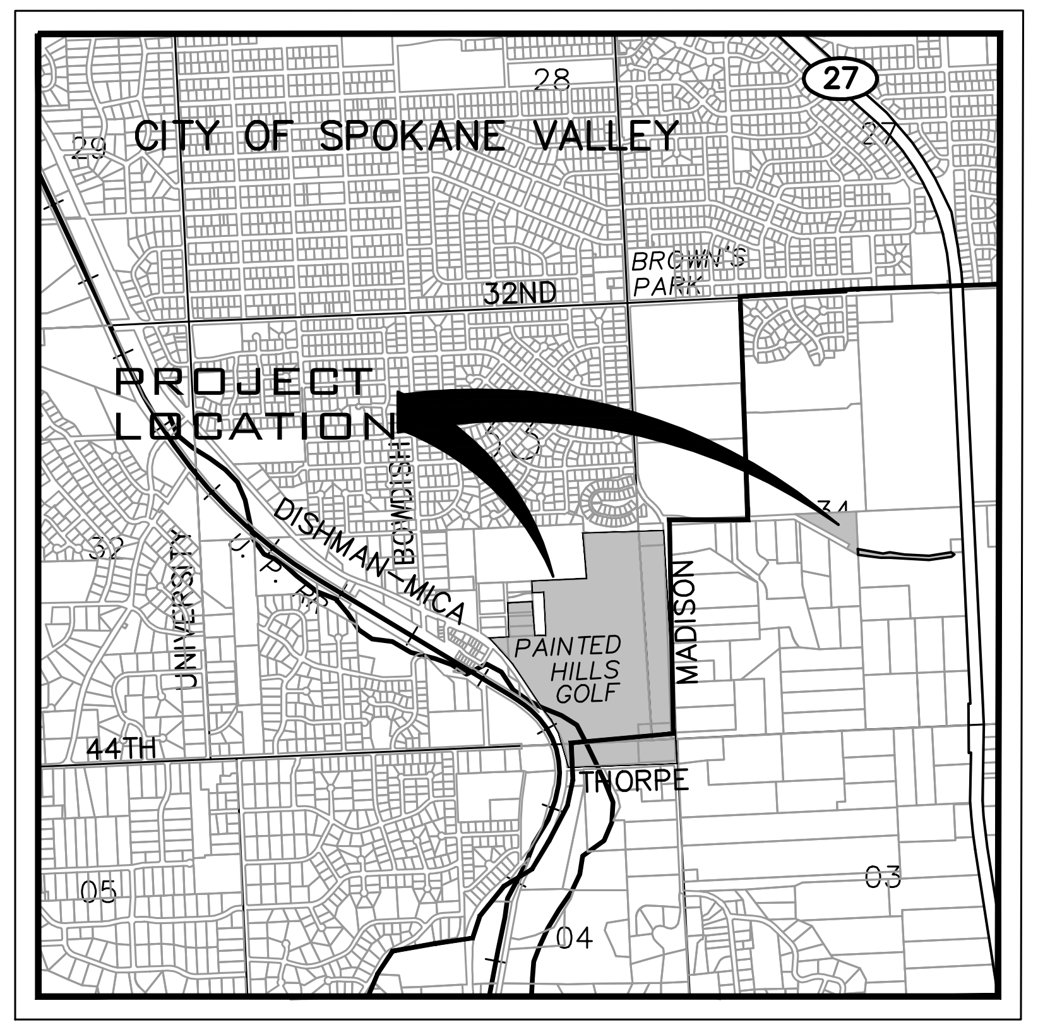
SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

IMPROVEMENT PLANS

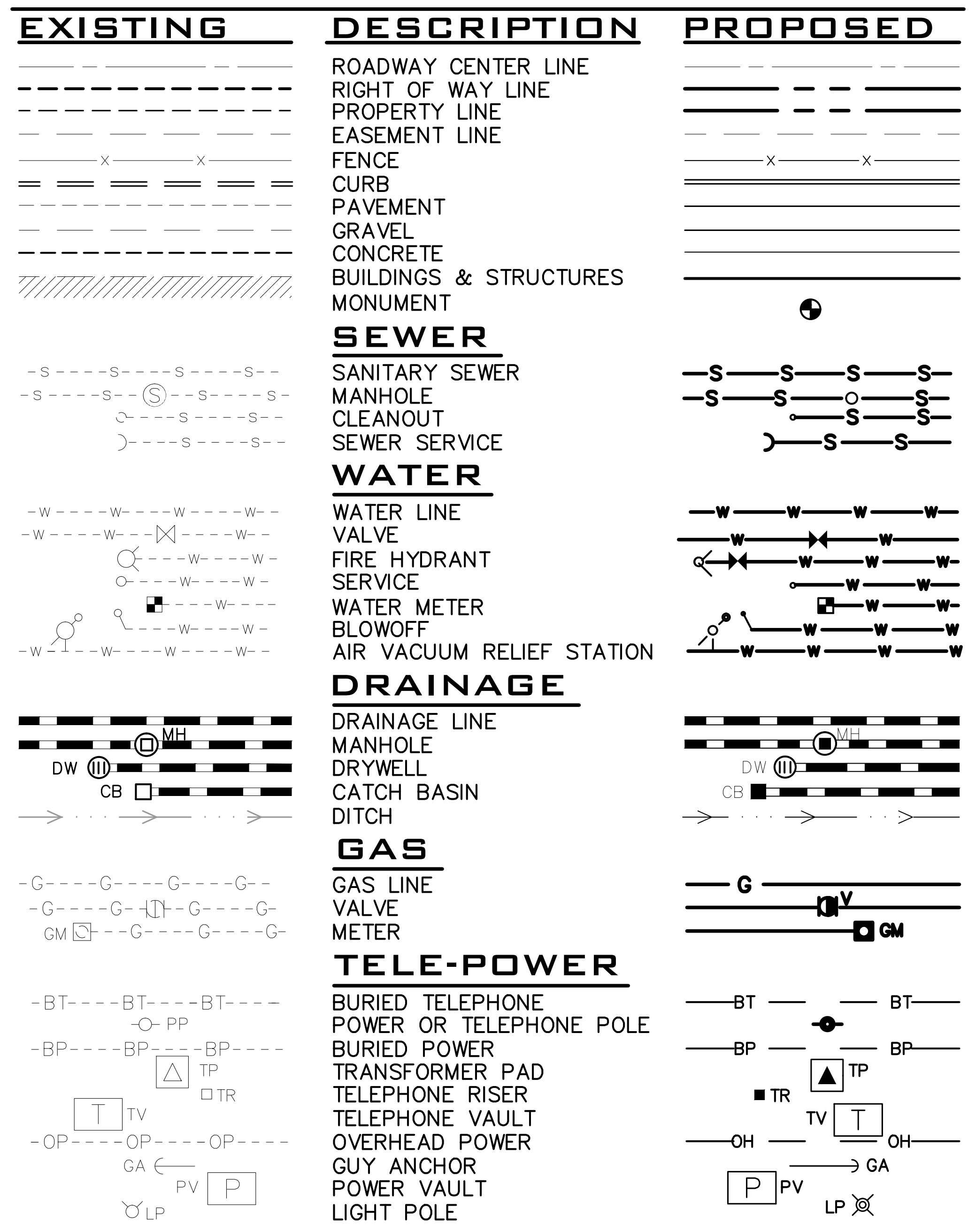
PAINTED HILLS PRD - GUSTIN DITCH

LOCATED IN A PORTION OF
SE1/4, SEC. 33, T.25N., R. 44E., W.M.
SPOKANE COUNTY, WA



LOCATION MAP

LEGEND



DESCRIPTION

- ROADWAY CENTER LINE
- RIGHT OF WAY LINE
- PROPERTY LINE
- EASEMENT LINE
- FENCE
- CURB
- PAVEMENT
- GRAVEL
- CONCRETE
- BUILDINGS & STRUCTURES
- MONUMENT

SEWER

- SANITARY SEWER
- MANHOLE
- CLEANOUT
- SEWER SERVICE

WATER

- WATER LINE
- VALVE
- FIRE HYDRANT
- SERVICE
- WATER METER
- BLOWOFF
- AIR VACUUM RELIEF STATION

DRAINAGE

- DRAINAGE LINE
- MANHOLE
- DRYWELL
- CATCH BASIN
- DITCH

GAS

- GAS LINE
- VALVE
- METER

TELE-POWER

- BURIED TELEPHONE
- POWER OR TELEPHONE POLE
- BURIED POWER
- TRANSFORMER PAD
- TELEPHONE RISER
- TELEPHONE VAULT
- OVERHEAD POWER
- GUY ANCHOR
- POWER VAULT
- LIGHT POLE

ABBREVIATIONS

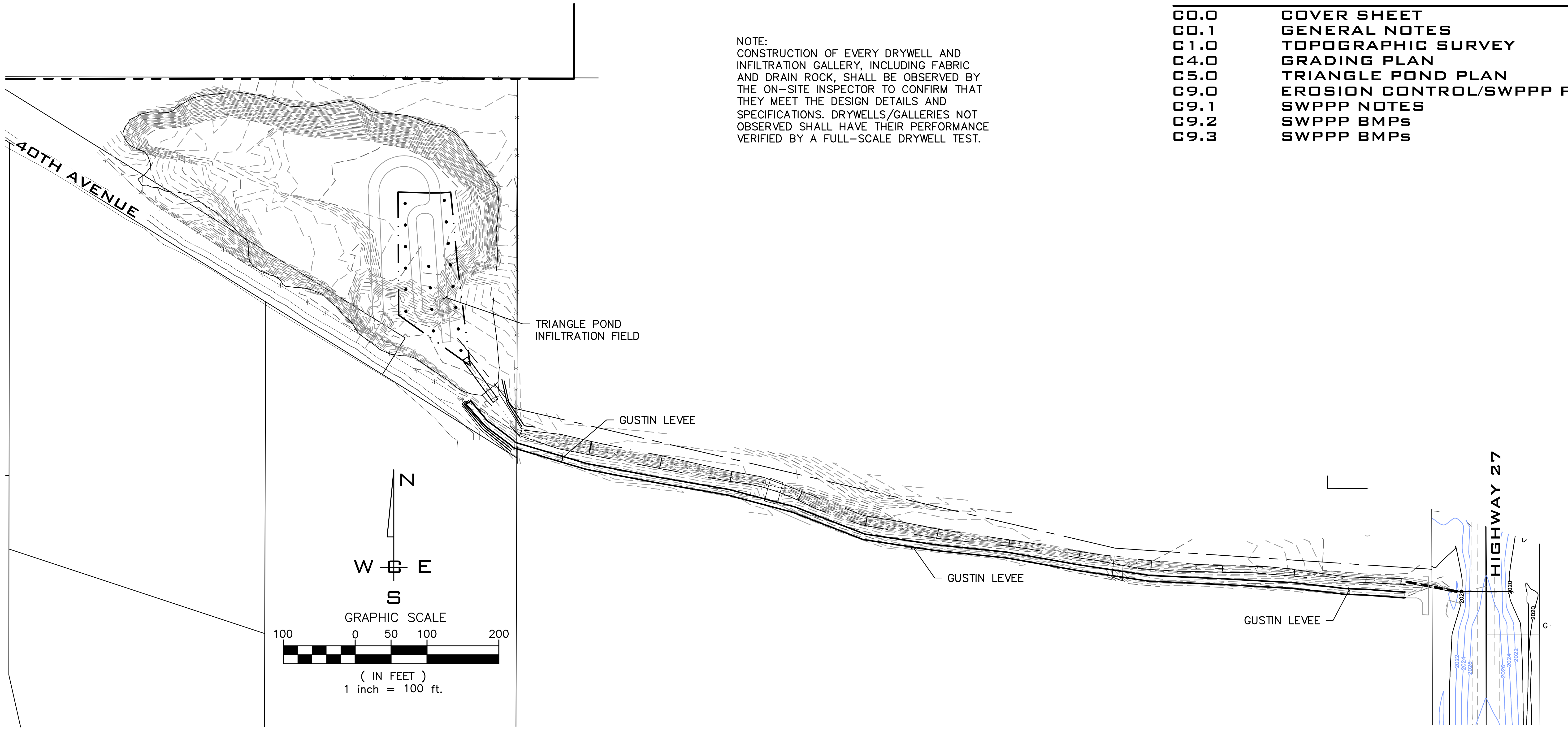
ACT. LEN.	ACTUAL LENGTH
BCR	BEGINNING OF CURVE RADIUS
BDRY.	BOUNDARY
CO.	SEWER CLEANOUT
CSTC	CRUSHED SURFACE TOP COURSE
CT.	COURT
DIA.	DIAMETER
ECR	END OF CURVE RADIUS
EXIST.	EXISTING
G	GRADE
GB	GRADE BREAK
FT./FT.	FEET PER FOOT
HYD.	HYDRANT
I.E.	INVERT ELEVATION
LN.	LANE
LT.	LEFT
MH	MANHOLE
MCR	MIDDLE OF CURVE RADIUS
PC	POINT OF CURVATURE
PET.	PETROLEUM
PI	POINT OF INTERSECTION
PRC	POINT OF REVERSE CURVE
PT	POINT OF TANGENCY
RIM EL.	RIM ELEVATION
RD	ROAD
RT.	RIGHT
SI	STREET INTERSECTION
SS	SANITARY SEWER
STA.	STATION
STA. LEN.	STATION LENGTH
TG	TOP OF GRATE
TC	TOP OF CURB

⊕ NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NOTE:
CONSTRUCTION OF EVERY DRYWELL AND INFILTRATION GALLERY, INCLUDING FABRIC AND DRAIN ROCK, SHALL BE OBSERVED BY THE ON-SITE INSPECTOR TO CONFIRM THAT THEY MEET THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS/GALLERIES NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL-SCALE DRYWELL TEST.

SHEET INDEX



SITE PLAN
SCALE: 1" = 100'

PERMIT SPECIALIST
CITY OF SPOKANE VALLEY
PERMIT CENTER
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720–5240

SEWER
SPOKANE COUNTY UTILITIES
1026 W BROADWAY AVE
SPOKANE, WA 99260
PHONE: 477–7180
CONTACT: CHRIS KNUDSON

WATER
SPOKANE COUNTY WATER DISTRICT #3
1225 N YARDLEY ST
SPOKANE, WA 99212
PHONE: 536–0121
CONTACT: TY WICK

FIRE
SPOKANE VALLEY FIRE DEPT.
2120 N WILBUR RD
SPOKANE VALLEY, WA 99206
PHONE: 928–1700
CONTACT: TRACI HARVEY

ROADWAYS
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE VALLEY, WA 99206
PHONE: 688–0228
CONTACT: M. ALLEN

DEV. CONST. INSP.
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720–5324
CONTACT: JOHN JOHNSON

HEALTH
SPOKANE REGIONAL HEALTH
1101 W COLLEGE AVE
SPOKANE, WA 99260
PHONE: 324–1578
CONTACT: PAUL SAVAGE

GAS
AVISTA UTILITIES
1411 E MISSION AVE
SPOKANE, WA 99220
PHONE: 495–8610
CONTACT: KEN CARLSON

TELEPHONE
CENTURY LINK
904 N COLUMBUS ST
SPOKANE, WA 99202
PHONE: 623–0305
CONTACT: DEBORAH GEIST

POWER
INLAND POWER & LIGHT CO.
10110 W HALLETT RD
SPOKANE, WA 99224
PHONE: 509–789–4291
CONTACT: CONNIE NELSON

CABLE
COMCAST BROADBAND
1717 E BUCKEYE AVE
SPOKANE, WA 99207
PHONE: 755–4717
CONTACT: BRYAN RICHARDSON

SOLID WASTE
WASTE MANAGEMENT
PHONE:
1–866–909–4458

INSPECTION
I.P.E.C.
P. O. BOX 1566
VERADALE, WA 99037
PHONE: 209–6262
CONTACT: PAUL T. NELSON, P.E.

SURVEYOR
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893–2617
CONTACT: JON GORDON, P.L.S.

ENGINEERING
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893–2617
CONTACT: TODD WHIPPLE, P.E.

OWNER
BRYAN WALKER
C/O NAI BLACK
107 S HOWARD ST
SPOKANE, WA 99201
PHONE: 623–1000
CONTACT: BRYAN WALKER

DEVELOPER APPROVAL ____________ DATE

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

TODD R. WHIPPLE
25462
10/13/16

PLANS
NOT APPROVED
BY AGENCY

NO.	DATE	BY	REVISIONS
A	**08/03/16**	**RMA**	**ORIGINAL PREPARATION**

SCALE:
HORIZONTAL:
1" = 100'
VERTICAL:
N/A

PROJ #: **13-1166**
DATE: **08/03/16**
DRAWN: **RMA**
REVIEWED: **TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

GUSTIN DITCH IMPROVEMENT PLANS
COVER SHEET
40TH AVENUE
SPOKANE COUNTY, WA

SHEET
C0.0

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\GUSTIN-C0.0 COVER.dwg, 10/13/2016 1:42:08 PM

SE$\frac{1}{4}$, SEC.33, T.25N., R.44E., W.M.
SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
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811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

WCE GENERAL NOTES

1. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION OF SITE IMPROVEMENTS SHALL MEET OR EXCEED SITE WORK STANDARDS AND THE STANDARDS AND SPECIFICATIONS SET FORTH IN THE SPOKANE COUNTY REGULATIONS AND APPLICABLE STATE AND FEDERAL REGULATIONS. WHERE THERE IS CONFLICT BETWEEN THESE PLANS AND THE SPECIFICATIONS, OR ANY APPLICABLE STANDARDS, THE HIGHER QUALITY STANDARD SHALL APPLY. ALL WORK WITHIN PUBLIC R.O.W. OR EASEMENTS SHALL BE INSPECTED AND APPROVED BY THE SPOKANE COUNTY INSPECTOR. INSPECTION SERVICES AND CONSTRUCTION CERTIFICATION TO BE PROVIDED BY DESIGNEE OF PROJECT SPONSOR/OWNER.

2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES, AS SHOWN ON THESE PLANS, IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY PERTINENT LOCATIONS AND ELEVATIONS, ESPECIALLY AT THE CONNECTION POINTS AND AT POTENTIAL UTILITY CONFLICTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES THAT CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM ALL APPLICABLE AGENCIES. THE CONTRACTOR SHALL NOTIFY THE SPOKANE COUNTY INSPECTOR AT LEAST 48 HOURS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITY OR CONSTRUCTION ON ANY AND ALL PUBLIC IMPROVEMENTS.

4. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH THE SPOKANE COUNTY AND ALL UTILITY COMPANIES WITH REGARD TO RELOCATIONS OR ADJUSTMENTS OF EXISTING UTILITIES DURING CONSTRUCTION, TO ASSURE THAT THE WORK IS ACCOMPLISHED IN A TIMELY FASHION, AND WITH A MINIMUM DISRUPTION OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL PARTIES AFFECTED BY ANY DISRUPTION OF ANY UTILITY SERVICE.

5. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE APPROVED PLANS, ONE (1) COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS, AND ONE (1) COPY OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED FOR THE JOB ON-SITE AT ALL TIMES.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO: EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND SECURITY.

7. IF, DURING THE CONSTRUCTION PROCESS, CONDITIONS ARE ENCOUNTERED BY THE CONTRACTOR, HIS SUBCONTRACTORS, OR OTHER AFFECTED PARTIES WHICH COULD INDICATE A SITUATION THAT IS NOT IDENTIFIED IN THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY.

8. ALL REFERENCES TO ANY PUBLISHED STANDARDS SHALL REFER TO THE LATEST REVISION OF SAID STANDARD, UNLESS SPECIFICALLY STATED OTHERWISE.

9. FOR WORK AFFECTING PUBLIC ROADWAYS OR IF REQUIRED BY THE SPOKANE COUNTY, THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL AND PHASING PLAN IN ACCORDANCE WITH M.U.T.C.D. FOR APPROVAL. PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN OR AFFECTING THE RIGHT-OF-WAY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY AND ALL TRAFFIC CONTROL DEVICES AS MAY BE REQUIRED BY SAID PLANS. PRIOR TO INSTALLATION.
A PRECONSTRUCTION CONFERENCE SHALL BE HELD WITH THE SPOKANE COUNTY.

10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETION OF THE INTENDED IMPROVEMENTS SHOWN ON THESE DRAWINGS OR DESIGNATED TO BE PROVIDED, INSTALLED, CONSTRUCTED, REMOVED OR RELOCATED UNLESS SPECIFICALLY NOTED OTHERWISE.

11. PER AGENCY STANDARDS THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING ROADWAYS FREE AND CLEAR OF ALL CONSTRUCTION DEBRIS AND DIRT TRACKED FROM THE SITE.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING RECORD INFORMATION ON A SET OF RECORD DRAWINGS KEPT AT THE CONSTRUCTION SITE AND AVAILABLE TO THE SPOKANE COUNTY INSPECTOR AT ALL TIMES.

13. DIMENSIONS FOR LAYOUT AND CONSTRUCTION ARE NOT TO BE SCALED FROM ANY DRAWING. FOR ADDITIONAL INFORMATION CONTACT THE ENGINEER FOR CLARIFICATION AND NOTE ON THE RECORD DRAWINGS.

14. ALL EROSION AND SEDIMENT CONTROL (E.S.C.) MEASURES SHALL BE INSTALLED AT THE LIMITS OF CONSTRUCTION PRIOR TO GROUND DISTURBING ACTIVITY. ALL E.S.C. MEASURES SHALL BE MAINTAINED IN GOOD REPAIR BY THE CONTRACTOR UNTIL SUCH TIME AS THE ENTIRE DISTURBED AREAS ARE STABILIZED WITH HARD SURFACE OR LANDSCAPING.

15. THE CONTRACTOR SHALL SEQUENCE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO MINIMIZE POTENTIAL UTILITY CONFLICTS. IN GENERAL, STORM SEWER AND SANITARY SEWER SHOULD BE CONSTRUCTED PRIOR TO INSTALLATION OF WATER LINES AND DRY UTILITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL UTILITY RELOCATIONS CONSISTENT WITH THE CONTRACTORS SCHEDULE FOR THIS PROJECT, WHETHER SHOWN OR NOT SHOWN, AS IT RELATES TO THE CONSTRUCTION ACTIVITIES CONTEMPLATED IN THESE PLANS.

16. ALL WORK WITHIN THE PUBLIC RIGHT-OF-WAY IS SUBJECT TO THE JURISDICTION OF THE SPOKANE COUNTY ENGINEERING DEPARTMENT STANDARD DETAILS AND SPECIFICATIONS.

17. ALL CONSTRUCTION OPERATIONS, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTH MOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED EQUIPMENT SHALL GENERALLY BE LIMITED TO THE TIME PERIOD APPROVED BY THE SPOKANE COUNTY.

18. BASED ON REQUIREMENTS FROM SPOKANE COUNTY, THE ENGINEER OR HIS DESIGNEE SHALL PERFORM MATERIALS TESTING AND QUALITY CONTROL ON THE PROJECT AND SHALL SUBMIT COPIES OF DAILY REPORTS, TEST REPORTS, PROJECT CERTIFICATION AND RECORD DRAWINGS TO SPOKANE COUNTY ENGINEER.

19. NO REVISIONS SHALL BE MADE TO THESE PLANS WITHOUT APPROVAL OF THE SPOKANE COUNTY ENGINEERS AND NOTIFICATION OF THE ENGINEER OF RECORD.

20. ON-SITE GRADING SHALL BE IN ACCORDANCE WITH THE APPROVED GRADING PLAN AND E.S.C. PLAN. ANY IMPORT OR EXPORT OF MATERIAL SHALL BE FROM A PREAPPROVED SOURCE/DESTINATION AND COORDINATED WITH THE SPOKANE COUNTY DEPARTMENT OF BUILDING AND PLANNING AT 509-477-3675. GRADING ON THIS SITE OR ANY OTHER SITE MUST COMPLY WITH ALL DEVELOPMENT REGULATIONS INCLUDING, BUT NOT LIMITED TO , GRADING PERMITS, S.E.P.A. REVIEW, TIMBER HARVEST PERMITS, CRITICAL AREAS, FLOOD PLAINS, DESIGNATED DRAINAGE WAYS, ETC.

21. THE CONTRACTOR IS CAUTIONED THAT IT IS THE UNDERSTANDING OF THE OWNER AND THE ENGINEER THAT SHOULD A CONFLICT OR DISCREPANCY IN THESE PLANS, SPECIFICATIONS, GENERAL NOTES OR PLANS ET.AL. DETERMINED TO BE PART OF THE OVERALL PROJECT, INCLUDING BUT NOT LIMITED TO THE ARCHITECTURAL PLANS, MECHANICAL PLANS, ELECTRICAL PLANS, LANDSCAPE PLANS, GENERAL SPECIAL PROVISIONS, ETC., THAT WITHOUT WRITTEN CLARIFICATION FROM THE ENGINEER, OWNER OR OTHER PROFESSIONAL, DURING THE BIDDING PROCESS, THAT IN ALL INSTANCES THE CONTRACTOR WILL BE REQUIRED TO BID THE HIGHER STANDARD. FAILURE TO DO SO MAY RESULT IN THE HIGHER STANDARD BEING REQUIRED BY THE OWNER, ENGINEER OR OTHER PROFESSIONAL WITH NO CHANGE IN VALUE TO THE CONTRACT VIA CHANGE ORDER OR OTHER MECHANISM.

22. CONSTRUCTION OF EVERY DRYWELL, INCLUDING FABRIC AND DRAINROCK, SHALL BE OBSERVED BY THE ON-SITE INSPECTOR TO CONFIRM THAT IT MEETS THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL-SCALE DRYWELL TEST.

23. DURING CONSTRUCTION THE CONTRACTOR IS RESPONSIBLE TO COORDINATE ANY AND ALL INCONSISTENCIES BETWEEN THESE PLANS AND CONSTRUCTION STAKING. CONTRACTOR ASSUMES RESPONSIBILITY TO CONSTRUCT TO THESE PLANS IN LIEU OF FIELD STAKING. SHOULD INCONSISTENCIES BE APPARENT THE CONTRACTOR SHALL CONTACT THE ENGINEER, OWNER, AND SURVEYOR TO RECTIFY THE DISCREPANCY PRIOR TO CONSTRUCTION EFFORT BEING APPLIED.

24. FAIR HOUSING ACT – SAFE HARBORS FOR COMPLIANCE

WHIPPLE CONSULTING ENGINEERS, INC. FOR THE PROJECT CONTAINED WITHIN THESE PLANS HAS USED THE FOLLOWING SAFE HARBOR FOR ADA ACCESSIBILITY FOR THOSE ISSUES CONSIDERED SITE DEVELOPMENT ISSUES.

ICC/ANSI A117.1 (2003), ALONG WITH THE FAIR HOUSING ACT, HUD'S FAIR HOUSING ACT REGULATIONS, AND GUIDELINES.

25. ALL FIRE LINES MUST BE INSTALLED BY AN APPROVED LEVEL 'U' CONTRACTOR OR A LEVEL 3 FIRE PROTECTION CONTRACTOR.

WCE GRADING NOTES

1. CONTOURS AND / OR ELEVATIONS SHOWN ARE FOR FINISHED PAVING, SIDEWALK, SLAB, OR GROUND. ADJUSTMENT TO SUBGRADE IS THE CONTRACTOR'S RESPONSIBILITY.

2. ALL DISTURBED AREAS THAT ARE SUBSURFACE OR ARE NOT DESIGNATED AS LANDSCAPE AREAS ARE TO BE SEEDED, FERTILIZED, AND WATERED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.

3. IF DURING THE OVERLOT GRADING PROCESS, CONDITIONS ARE ENCOUNTERED WHICH COULD INDICATE AN UNIDENTIFIED SITUATION IS PRESENT, THE SOILS ENGINEER SHALL BE CONTACTED FOR RECOMMENDATIONS.

4. UNLESS OTHERWISE SHOWN, NO PROPOSED SLOPE SHALL EXCEED THREE (3) HORIZONTAL TO ONE (1) VERTICAL. ALL SLOPED AREAS MUST BE PROTECTED FROM EROSION.

5. IF STRIPPED MATERIALS CONSISTING OF VEGETATION AND ORGANIC MATERIALS ARE STOCKPILED ON THE SITE, TOPSOIL MAY BE PLACED TO A HEIGHT OF FIVE FEET. SILT FENCE SHALL BE PLACED AROUND THE BASE OF THE STOCKPILE AND THE STOCKPILE SHALL BE SEEDED WITH NATIVE SEED MIX IMMEDIATELY AFTER STRIPPING OPERATIONS ARE COMPLETE.

6. SPOT ELEVATIONS SHALL TAKE PRECEDENCE OVER CONTOURS AND SLOPES SHOWN. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF SPOT ELEVATIONS THAT DO NOT APPEAR TO BE CONSISTENT WITH THE CONTOURS AND SLOPES. SPOT ELEVATIONS AND SPECIFIC PROFILE DESIGN SHALL BE USED FOR SETTING ELEVATIONS OF CURB, GUTTER, AND UTILITIES.

7. BENCHMARK VERIFICATION: CONTRACTOR SHALL USE BENCHMARKS AND DATUMS SHOWN HEREON TO SET PROJECT BENCH MARK'S, BY RUNNING A LEVEL LOOP BETWEEN AT LEAST TWO BENCHMARKS, AND SHALL PROVIDE SURVEY NOTES OF SUCH TO PROJECT ENGINEER PRIOR TO COMMENCING CONSTRUCTION.

8. ALL UTILITIES (MANHOLES, VALVE COVERS, CLEANOUTS, VAULTS, BOXES, ETC.) SHALL BE ADJUSTED TO FINAL GRADE PRIOR TO THE FINAL LIFT OF ASPHALT.

9. GRADES WITHIN ASPHALT PARKING AREAS SHALL BE CONSTRUCTED TO WITHIN 0.10 FEET OF THE DESIGN GRADE. HOWEVER, THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE IN ALL PAVEMENT AREAS AND ALONG ALL CURBS. ALL CURBS SHALL BE BUILT IN ACCORDANCE TO THE PLAN. CURBS OR PAVEMENT AREAS WHICH DO NOT PROVIDE PROPER DRAINAGE MUST BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.

10. SPOT ELEVATIONS REPRESENT FLOW LINE OR TOP OF ASPHALT UNLESS OTHERWISE NOTED.

11. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING HIS OWN ESTIMATE OF EARTHWORK QUANTITIES.

12. WHERE NEW CURB AND GUTTER IS BEING CONSTRUCTED ADJACENT TO EXISTING ASPHALT OR CONCRETE PAVEMENT, THE FOLLOWING SHALL APPLY: PRIOR TO PLACEMENT OF ANY CONCRETE THE CONTRACTOR SHALL HAVE A LICENSED SURVEYOR VERIFY THE GRADE AND CROSS SLOPE OF THE CURB AND GUTTER FORMS. THE CONTRACTOR SHALL SUBMIT THE SLOPES AND GRADES TO THE ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF CONCRETE. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY OF ANY SECTION WHICH DOES NOT CONFORM TO THE DESIGN OR TYPICAL CROSS SECTION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CURB AND GUTTER POURS WITHOUT THE APPROVAL OF THE ENGINEER.

13. THE EARTHWORK FOR ALL BUILDING FOUNDATIONS AND SLABS SHALL BE IN ACCORDANCE WITH ARCHITECTURAL BUILDING PLANS AND SPECIFICATIONS.

14. PRE CAST STRUCTURES MAY BE USED AT CONTRACTORS OPTION.

15. EXISTING DRAINAGE STRUCTURES TO BE INSPECTED AND REPAIRED AS NEEDED, AND EXISTING PIPES TO BE CLEANED OUT TO REMOVE ALL SILT AND DEBRIS.

16. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT INTERVALS.

17. IF ANY EXISTING STRUCTURES TO REMAIN ARE DAMAGED DURING CONSTRUCTION IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO REPAIR AND/OR REPLACE THE EXISTING STRUCTURE AS NECESSARY TO RETURN IT TO EXISTING CONDITIONS OR BETTER.

18. CONTRACTOR SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.

19. CONTRACTOR SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.

20. TOPOGRAPHIC INFORMATION TAKEN FROM A TOPOGRAPHIC SURVEY PROVIDED BY THE OWNER . IF CONTRACTOR DOES NOT ACCEPT EXISTING TOPOGRAPHY AS SHOWN ON THE PLANS. WITHOUT EXCEPTION, HE SHALL HAVE MADE, AT HIS EXPENSE, A TOPOGRAPHIC SURVEY BY A REGISTERED LAND SURVEYOR AND SUBMIT IT TO THE OWNER FOR REVIEW.

21. ALL SUBSURFACE AREA DISTURBED BY GRADING OPERATION SHALL RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR SHALL APPLY STABILIZATION FABRIC TO ALL SLOPES 3H:1V OR STEEPER. (CONTRACTOR SHALL PLACE SOD OR HYDROSEED DISTURBED AREAS IN ACCORDANCE WITH CITY/COUNTY SPECIFICATIONS AND MAINTAINED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.)

22. CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE GOVERNING CODES AND SITE SHALL BE CONSTRUCTED TO SAME.

23. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL UTILITIES AND NOTIFYING THE APPROPRIATE UTILITY COMPANY PRIOR TO BEGINNING CONSTRUCTION.

24. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.

25. ENGINEER SHALL BE NOTIFIED WHEN 'CURBING STRING LINE' HAS BEEN SET, PRIOR TO CURBING BEING INSTALLED.

26. ALL DRYWELLS TO BE INSTALLED TO HAVE (1') ONE OF VERTICAL ADJUSTMENT.

27. ENGINEERING SHALL BE ON SITE, AND SHALL COLLECT TRUCK TICKETS FOR DRYWELL ROCK, AND SOIL.

STORM DRAINAGE NOTES

1. SEE STREET PLAN AND PROFILE SHEETS FOR DRYWELL AND CATCH BASIN TYPES AND LOCATIONS.

2. SWALE/PONDS SHALL BE CONSTRUCTED PER THE REQUIREMENTS OF THESE DRAWINGS INCLUDING GRADING, SOD, AND DRYWELL INSTALLATION. ALL SWALES/PONDS WITH IN TRACTS SHALL INCLUDE AN IRRIGATION SYSTEM, ALL IRRIGATION SHALL CONFORM TO SPOKANE COUNTY SWALE/POND IRRIGATION SYSTEM GUIDELINES.

3. ALL SWALES/PONDS SHOWN SHALL BE ROUGH GRADED PRIOR TO PAVING OF ADJACENT ROADWAY.

4. CONTRACTOR SHALL PROVIDE SPOKANE COUNTY WITH AS-BUILT IRRIGATION PLANS UPON COMPLETION OF ALL SWALE/POND CONSTRUCTION.

5. INSTALL "AMOCO" #4545 FILTER FABRIC (OR APPROVED EQUAL) BETWEEN THE NATIVE SOIL AND WASHED DRAIN ROCK, FOR ALL DRYWELLS. SEE SPOKANE COUNTY STANDARDS SHEET B-1a FOR INSTALLATION LOCATIONS.

6. ALL SWALES/PONDS WITHIN THE RIGHT-OF-WAY, IN THE AREA ASSOCIATED WITH THIS PROJECT, SHALL BE COMPLETED DURING THE CONSTRUCTION OF THE ROADWAY. THE CONTRACTOR SHALL PERFORM THE SWALE/POND GRADE WORK, INSTALL THE IRRIGATION SYSTEM, AND PLACE THE SOD WITHIN THE SWALES/PONDS FOLLOWING THE ROAD PAVING WORK.

7. THE CONTRACTOR SHALL MAKE AN EFFORT TO PROTECT ALL DRAINAGE STRUCTURES FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC UNDER THE LID FOR AT LEAST 6 WEEKS, OR UNTIL THE ESTABLISHMENT OF GRASS AND/OR OTHER SITE CONSTRUCTION WORK HAS ENDED. IN THE EVENT THAT SILT OR OTHER DELETERIOUS MATERIAL IS ALLOWED TO ENTER THE DRYWELL OR CATCH BASIN THE CONTRACTOR WILL BE REQUIRED TO CLEAN THE DRYWELL OR CATCH BASIN OUT TO THE SATISFACTION OF THE CERTIFYING ENGINEER,

8. ALL LANDSCAPE AREAS (INCLUDING SWALES/PONDS) ARE TO BE IRRIGATED BY AN AUTOMATIC IRRIGATION SYSTEM SHALL BE INSTALLED BY OR UNDER THE DIRECTION OF THE LANDSCAPE CONTRACTOR. THE IRRIGATION SYSTEM SHALL COMPLY WITH ALL LOCAL CODES AND ORDINANCES (90 DAY GUARANTEE). AN APPROVED BACKFLOW DEVICE SHALL BE INSTALLED TO PREVENT WATER FOR GOING BACK INTO THE WATER SUPPLY.

9. THE FLOOR OF ALL GRASSED PERCOLATION AREAS (GPA) (SWALES/PONDS) INCLUDES THE LEVEL PORTION OF THE FLOOR OF THE SWALES, AND THE SIDE SLOPES OF THE SWALE UP TO THE GPA OVERFLOW ELEVATION OR TOP OF DRYWELL. THE SOIL LOCATED IN THE FLOOR OF THE THE GPA SWALE SHALL BE A MEDIUM TO WELL-DRAINING MATERIAL, WITH A MINIMUM INFILTRATION RATE OF 0.5 INCHES PER HOUR. THE ENGINEER SHALL PROVIDE A WRITTEN STATEMENT WHICH VERIFIES THAT ALL GPA SWALES CONFORM TO THIS REQUIREMENT. THIS WRITTEN STATEMENT SHALL BE SUBMITTED TO THE SPOKANE COUNTY ENGINEER'S OFFICE PRIOR TO INSTALLING FINISHED LANDSCPING/SOD AND PRIOR TO FINAL ACCEPTANCE. THE SWALE FLOOR MATERIAL SHALL BE INSTALLED TO A NATIVE SOIL STRATUM WHICH ALSO MEETS OR EXCEEDS THIS MINIMUM PERCOLATION RATE OF 0.5 INCHES PER HOUR, OR AS APPROVED BY SITE GEOTECHNICAL ENGINEER.

10. WHEN TWO OR MORE CURB INLETS ARE USED, SET POND BOTTOM WITH RESPECT TO THE LOWEST CURB INLET GUTTER FLOWLINE ELEVATION.

11. THE TOP 12" OF SOIL FOR ALL SWALE/POND BOTTOMS SHALL CONSIST OF THOROUGHLY BLENDED MIX OF 50% COMPOST WITH 50% NATIVE SOILS, OR AS APPROVED BY SITE GEOTECHNICAL ENGINEER.

12. PER THE S.R.S.M. ALL SWALES/PONDS SHALL HAVE 12" OF TREATMENT SOIL WITH AN INFILTRATION RATE OF 0.5 INCHES/HOUR AND AVERAGE CATION EXCHANGE CAPACITY OF AT LEAST 15 MILLIQUIVELENTS/100 GRAMS OR AT LEAST 2% OF ORGANIC MATER BY WEIGHT. SEE TABLE 6-1, PG. 6-16 OF THE SPOKANE REGIONAL STORMWATER MANUAL, OR AS APPROVED BY SITE GEOTECHNICAL ENGINEER.

13. WARNING: THE USE OF SILTY LOAM IS PROHIBITED AS SWALE/PONDS BOTTOM MATERIAL.

14. ALL DRYWELLS TO HAVE 1' ONE VERTICAL FOOT OF ADJUSTMENT

15. THE ENGINEER SHALL BE ON SITE, AND SHALL COLLECT TRUCK TICKETS FOR THE DRYWELL ROCK AND SOIL.

SLEEVING: PROVIDE SLEEVING AS REQUIRED UNDER SIDEWALKS, PATHS, CURBING, PAVING, ETC. AS NEEDED FOR IRRIGATION ACCESS. ALL SLEEVING TO BE 4" PVC WITH AT LEAST 12" OF COVER (1) FOOT BELOW FINISH GRADE. THE OWNER/GENERAL CONTRACTOR IS RESPONSIBLE FOR INSTALLING SLEEVING BEFORE CURBING, SIDEWALKS, PAVING, ETC. IS INSTALLED. PATCH ASPHALT AS NEEDED.

LAWN AREAS: LAWN AREAS ARE TO BE IRRIGATED WITH TORO POP-UP HEADS OR EQUIVALENT. (TEST SYSTEM BEFORE BACKFILLING).

ADJUSTMENT: AFTER INSTALLATION, ADJUST VALVES, HEADS, EMITTERS, ETC. TO PROVIDE UNIFORM COVERAGE AND TO MINIMIZE OVER SPRAY ON WALLS, FENCES, WALKS, DRIVES, ETC.

WATER POWER SUPPLY: THE OWNER/GENERAL CONTRACTOR IS TO SUPPLY WATER TAPS FOR HOOK-UP AND SUPPLY POWER FOR CONTROLLER.

SPOKANE COUNTY STREET NOTES

THE CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT TO CONSTRUCT AND INSTALL TO PROPER WORKING ORDER. ALL IMPROVEMENTS AS DETAILED OR CALLED OUT ON THESE PLANS.

1. ALL WORK AND MATERIALS SHALL BE IN CONFORMANCE WITH THE "SPOKANE COUNTY STANDARDS FOR ROAD AND SEWER CONSTRUCTION, CURRENT EDITION", AND AS AMENDED.

2. THE CONTRACTOR IS REQUIRED TO HAVE A VALID CONSTRUCTION PERMIT ON SITE AT ALL TIMES. THE ABSENCE OF THE PERMIT WILL RESULT IN AN IMMEDIATE SHUTDOWN OF WORK AND THE POSSIBLE REMOVAL OF THOSE ITEMS CONSTRUCTED WITHOUT THE PERMIT.

3. LOCATIONS OF EXISTING UTILITIES SHOWN IN THE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. ANY CONFLICTING UTILITIES SHALL BE RELOCATED PRIOR TO CONSTRUCTION OF ROAD AND DRAINAGE FACILITIES.

4. THE CONTRACTOR IS REQUIRED TO HAVE A COMPLETE SET OF THE APPROVED ROAD AND DRAINAGE PLANS ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.

5. IF THE CONTRACTOR DISCOVERS ANY DISCREPANCIES BETWEEN THE PLANS AND EXISTING CONDITIONS ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DESIGN ENGINEER, TODD R WHIPPLE, P.E., @ 893-2617, THE SITE/PROJECT INSPECTING ENGINEER OR HIS REPRESENTATIVE, IPEC, PAUL T. NELSON, P.E., @ 509-290-5179 AND THE SPOKANE COUNTY ENGINEER'S OFFICE, CONSTRUCTION ENGINEER, @ 477-3600.

6. FOR CONSTRUCTION OF DRYWELLS, INSTALL FILTER FABRIC, "AMOCO" 4545 OR APPROVED EQUAL, BETWEEN THE DRYWELL BARREL AND THE WASHED DRAINROCK AND BETWEEN THE WASHED DRAINROCK AND NATIVE SOILS PER SPOKANE COUNTY STANDARD DETAIL B-1a.

7. PRIOR TO SITE CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES. CALL THE UNDERGROUND UTILITY LOCATION SERVICE AT 456-8000 BEFORE YOU DIG.

8. THE CONTRACTOR SHALL MAKE AN EFFORT TO PROTECT ALL CATCH BASINS AND DRYWELLS FROM BEING CONTAMINATED WITH SILT BY INSTALLING FILTER FABRIC UNDER THE LID FOR AT LEAST 6 WEEKS, OR UNTIL THE ESTABLISHMENT OF GRASS AND/OR OTHER SITE CONSTRUCTION WORK HAS ENDED.

9. IN THE EVENT THAT SILT OR OTHER DELETERIOUS MATERIAL IS ALLOWED TO ENTER THE DRYWELLS OR CATCH BASINS THE CONTRACTOR WILL BE REQUIRED TO CLEAN OUT THE DRYWELL OR CATCH BASIN TO THE SATISFACTION OF THE CERTIFYING ENGINEER.

10. THE CONTRACTOR SHALL EMPLOY A LICENSED SURVEYOR TO VERIFY THAT THE CROSS- GUTTER FORMS ARE THE CORRECT PLANE GRADE PRIOR TO CONCRETE PLACEMENT. THE CROSS-GUTTERS SHALL BE CONSTRUCTED PRIOR TO PAVING, AND THE PAVEMENT SHALL THEN MATCH THE EDGE OF CONCRETE GUTTER.

11. ALL DRYWELL CONNECTION PIPES SHALL BE PLACED BELOW THE DRYWELL CONE AND SHALL FLOW AS DIRECTED IN THE PLANS.

12. FOR ANY CURB GRADES LESS THAN 0.8 % (0.008 FT./FT.), A WASHINGTON STATE LICENSED PROFESSIONAL LAND SURVEYOR SHALL VERIFY THAT THE CURB FORMS ARE AT THE GRADES NOTED ON THE APPROVED PLANS, PRIOR TO PLACEMENT OF CURB MATERIAL. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING AND COORDINATING WORK WITH THE PROFESSIONAL LAND SURVEYOR.

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE
25462
10/13/16

NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
A	08/03/16	RMA	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: N/A
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/03/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

GUSTIN DITCH IMPROVEMENT PLANS
GENERAL NOTES
40TH AVENUE
SPOKANE COUNTY, WA

SHEET
C0.1

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\GUSTIN-C0.1 GENERAL NOTES.dwg, 10/13/2016 1:42:29 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW½, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

LEGEND

BURIED TELEPHONE
OVERHEAD POWER
EXISTING WATER PIPE
EXISTING SEWER PIPE
EXISTING GAS LINE
EXISTING SIDEWALK
PAVEMENT LINE
EXISTING CURB
PROPERTY LINE
EXISTING FENCE
TELEPHONE MANHOLE
WATER MANHOLE
SEWER MANHOLE
SIGN
LIGHT POLE
TREE (DECIDUOUS)
TREE (CONIFER)
BOLLARD
WATER VALVE
FIRE HYDRANT
WATER METER
GUY ANCHOR
IRRIGATION BOX
POWER POLE

TOPOGRAPHIC SURVEY

SCALE: 1" = 60'

SURVEYORS NOTE:
1. UTILITIES SHOWN HEREON ARE FROM VISIBLE SURFACE EVIDENCE COLLECTED BY SURVEY. INVESTIGATION INTO RECORDS HELD BY UTILITY PURVEYORS HAS NOT BEEN PERFORMED. LOCATES FOR UNDERGROUND UTILITIES WERE ORDERED AND ARE SHOWN ON THIS MAP.
2. SOME ITEMS MIGHT BE MISSING ON THIS MAP AND NOT LOCATED DUE TO THE FACT THAT IT WAS AN ACTIVE PARKING LOT.

THIS MAP CORRECTLY REPRESENTS A TOPOGRAPHIC SURVEY PERFORMED BY ME, OR UNDER MY DIRECTION, IN AUGUST OF 2014 AT THE REQUEST OF BRIAN WALKER.
JON A. GORDON, P.L.S.
CERTIFICATE NO. 43610

08/03/16

ABBREVIATIONS

ACT. LEN.	ACTUAL LENGTH	GB	GRADE BREAK	PRC	POINT OF REVERSE CURVE
BCR	BEGINNING OF CURVE RADIUS	FT./FT.	FEET PER FOOT	PT	POINT OF TANGENCY
BDRY.	BOUNDARY	HYD.	HYDRANT	RIM EL.	RIM ELEVATION
CO.	SEWER CLEANOUT	I.E.	INVERT ELEVATION	RD	ROAD
CSTC	CRUSHED SURFACE TOP COURSE	LN.	LANE	RT.	RIGHT
CT.	COURT	LT.	LEFT	SI	STREET INTERSECTION
DIA.	DIAMETER	MH	MANHOLE	SS	SANITARY SEWER
ECR	END OF CURVE RADIUS	MCR	MIDDLE OF CURVE RADIUS	STA.	STATION
EXIST.	EXISTING	PC	POINT OF CURVATURE	STA. LEN.	STATION LENGTH
G	GRADE	PET.	PETROLEUM	TG	TOP OF GRATE
		PI	POINT OF INTERSECTION	TC	TOP OF CURB

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

JON A. GORDON
43610

FOR REFERENCE ONLY

PLANS NOT APPROVED BY AGENCY

NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
A	08/03/16	RMA	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1" = 60'
VERTICAL: N/A

PROJ #: 13-1166
DATE: 08/03/16
DRAWN: RMA
REVIEWED: TRW

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

GUSTIN DITCH IMPROVEMENT PLANS
TOPOGRAPHIC SURVEY (REF. ONLY)
40TH AVENUE
SPOKANE COUNTY, WA

SHEET
C1.0

JOB NUMBER
13-1166

P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\GUSTIN-C1.0 TOPO.dwg, 10/13/2016 1:43:00 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

LEVEE DETAIL (A)

GUSTIN DITCH ACCESS DETAIL (1)

SCALE: 1"=10'

NOTE:
1. FG = TOP OF LEVEE
REQUIRED FREEBOARD = BFE+3'
RAS STATION = RIVER ANALYSIS SYSTEM STATION

2. NORTHING AND EASTING IS BASED ON THE NORTHEAST PROPERTY CORNER. SEE SHEET C5.0 FOR CORNER LOCATION. COORDINATES 0,0.

CONSTRUCTION NOTES

① CONSTRUCT DRAINAGE POND, SEE SHEET C5.0 FOR DETAILS.

② PROVIDE AND INSTALL LEVEE AT SPECIFIED ELEVATION PER DETAIL 1, THIS SHEET.

③ REMOVE EXISTING CROSSING.

④ PROVIDE AND INSTALL 8' WIDE 6" CSTC ACCESS TURNAROUND ON TOP OF LEVEE.

⑤ PROVIDE AND INSTALL 36" CMP PIPE PER SPOKANE STANDARDS AND SPECIFICATIONS. SEE PLAN FOR DETAILS.

LEVEE CONSTRUCTION NOTES:

1. REMOVE EXISTING TOP SOIL, ORGANICS, AND FILL FROM DITCH AND LEVEE FOOTPRINT. SCARIFY AND RECOMPACT A MINIMUM OF ONE FOOT BELOW LEVEE AND DITCH.
2. CONSTRUCT LEVEE WITH GRANULAR SOIL WITH 10−30% PASSING 200 SIEVE, COMPACTED TO 92% PER ASTM D 1557. SEE GEOTECH REPORT TITLED GUSTIN LEVEE EVALUATION PROJECT NO.14−037B BY IPEC ON DATED JULY 23, 2015.
3. REVEGETATE LEVEE AND DITCH WITH DRYLAND GRASS AND IRRIGATE UNTIL ESTABLISHED. SEE SEED MIX DETAIL A ON SHEET C5.0.
4. SEE OPERATING & MAINTENANCE MANUAL FOR CARE.

FOR FULL LEGEND
SEE SHEET CO.O

NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

TODD R. WHIPPLE
25462
REGISTERED PROFESSIONAL ENGINEER
10/13/16

PLANS
NOT APPROVED
BY AGENCY

NO.	DATE	BY	REVISIONS
A	08/03/16	RMA	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1" = 30'
VERTICAL: N/A

PROJ #:	**13-1166**
DATE:	**08/03/16**
DRAWN:	**RMA**
REVIEWED:	**TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

GUSTIN DITCH IMPROVEMENT PLANS
LEVEE GRADING PLAN
40TH AVENUE
SPOKANE COUNTY, WA

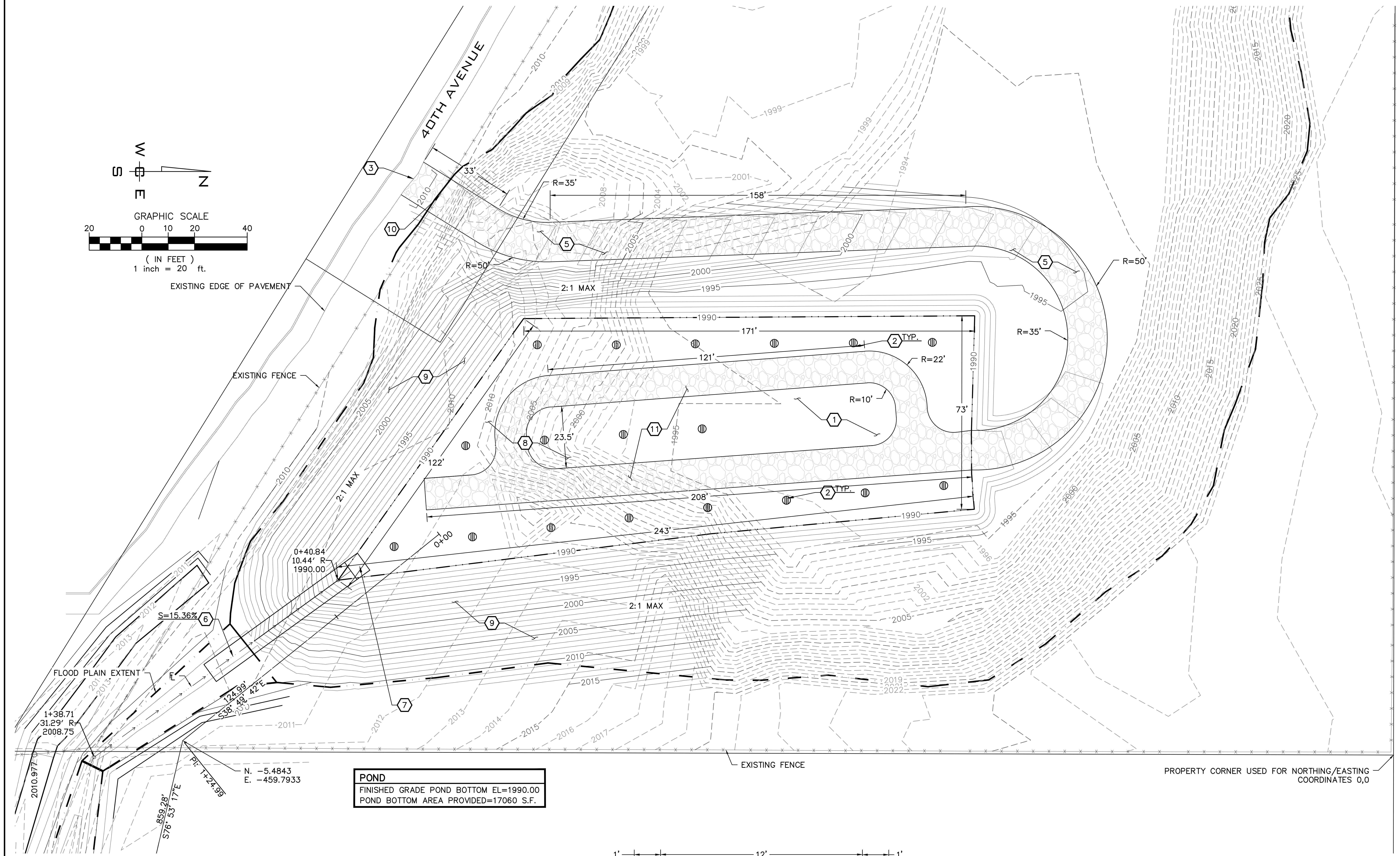
SHEET
C4.0

JOB NUMBER
13-1166

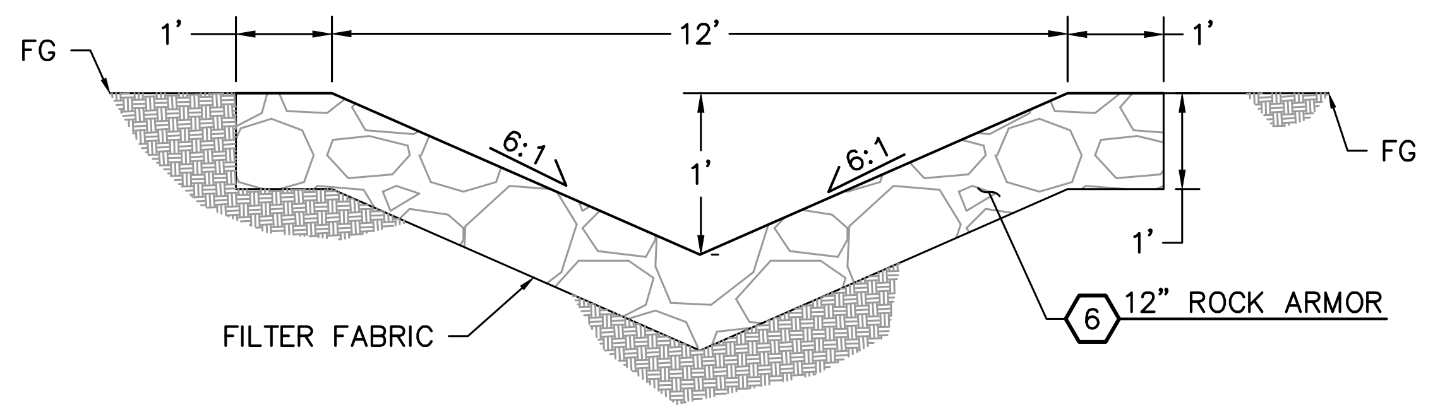
P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\GUSTIN-C4.0 GRADING.dwg, 10/13/2016 1:43:46 PM

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG



POND
FINISHED GRADE POND BOTTOM EL=1990.00
POND BOTTOM AREA PROVIDED=17060 S.F.



V-DITCH DETAIL

C

CONSTRUCTION NOTES

1. CONSTRUCT DETENTION POND PER DETAILS, THIS SHEET.
2. PROVIDE AND INSTALL TYPE B DRYWELL PER CITY OF SPOKANE VALLEY STANDARD PLAN S-101. SET RIM ELEVATION 2 FEET ABOVE POND BOTTOM ELEVATION.
3. MATCH ACCESS ROAD TO EXISTING EDGE OF ASPHALT.
4. RESERVED
5. PROVIDE AND INSTALL 15' WIDE MAINTENANCE ACCESS ROAD. 6" CSTC ON 95% COMPACTED SUBGRADE.
6. PROVIDE AND INSTALL 6"-12", D_{50} 12" DIAMETER ROCK ARMOR IN 12' WIDE V-DITCH WITH 6:1 SLOPE. SEE DETAIL C, THIS SHEET.
7. PROVIDE AND INSTALL 12"-24", D_{50} 18" ROCK RIP-RAP WITH A 6' X 12' PAD 2 FT THICK. PLACE GEOTEXTILE UNDER ROCK.
8. SEED DRYLAND GRASS MIX. SEE NOTE A BELOW. IRRIGATE UNTIL ESTABLISHED.
9. SEED SWORD HARD FESCUE GRASS MIX. SEE NOTE B BELOW. IRRIGATE UNTIL ESTABLISHED.
10. INSTALL 12' DOUBLE SWING CHAINLINK GATE IN EXISTING FENCE.
11. PROVIDE AND INSTALL 12' WIDE MAINTENANCE ACCESS ROAD. 6" CSTC ON COMPACTED SUBGRADE.

SEEDING NOTE:

A

GRASS SEED: PROVIDE FRESH, CLEAN, NEW-CROP SEED COMPLYING WITH TOLERANCE OF PURITY AND GERMINATION ESTABLISHED BY THE OFFICIAL SEED ANALYSIS OF NORTH AMERICAN. PROVIDE SEED MIXTURE COMPOSED OF GRASS SPECIES AND PERCENTAGES AS FOLLOWS:

10 PER CENT	ELKA PERRENIAL RYE
20 PERCENT	DURAR HARD FESCUE
45 PERCENT	COVAR SHEEP/FESCUE
15 PERCENT	REUBENS CANADIAN BLUEGRASS

PROVIDE MIXTURE COMPOSED OF GRASS SEED AND FERTILIZER IN PERCENTAGES AS FOLLOWS:

GRASS SEED:	90 LBS. PER ACRE
FERTILIZER:	16-16-16 TIMED RELEASE COMPOSITION, 300 LBS. PER ACRE

ALL SEEDING OF SLOPES SHALL SHALL BE DONE IN ACCORDANCE WITH THE W.S.D.O.T. STANDARD SPECIFICATIONS, SECTION 8-01.

SEEDING NOTE:

B

GRASS SEED: PROVIDE FRESH, CLEAN, NEW-CROP SEED COMPLYING WITH TOLERANCE OF PURITY AND GERMINATION ESTABLISHED BY THE OFFICIAL SEED ANALYSIS OF NORTH AMERICAN. PROVIDE SEED MIXTURE COMPOSED OF GRASS SPECIES AND PERCENTAGES AS FOLLOWS:

GRASS SEED MIX:	SWORD HARD FESCUE (FESTUCA LONGIFOLIA)
NEW SEEDING RATE:	2-4 LBS/1,000 SQ FT
PROVIDER:	LANDMARK TURF & NATIVE SEED PH: (509) 835-4967

Spokane County Permit No.:

Floodplain-
Grading-

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GUSTIN DITCH IMPROVEMENT PLANS
TRIANGLE POND DETAIL
40TH AVENUE
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GENERAL NOTES

1. ALL MATERIALS, WORKMANSHIP, AND CONSTRUCTION OF SITE IMPROVEMENTS SHALL MEET OR EXCEED SITE WORK STANDARDS AND THE STANDARDS AND SPECIFICATIONS SET FORTH IN SPOKANE COUNTY REGULATIONS AND APPLICABLE STATE AND FEDERAL REGULATIONS. WHERE THERE IS CONFLICT BETWEEN THESE PLANS AND THE SPECIFICATIONS, OR ANY APPLICABLE STANDARDS, THE HIGHER QUALITY STANDARD SHALL APPLY. ALL WORK WITHIN PUBLIC R.O.W. OR EASEMENTS SHALL BE INSPECTED AND APPROVED BY SPOKANE COUNTY INSPECTOR. INSPECTION SERVICES AND CONSTRUCTION CERTIFICATION TO BE PROVIDED BY DESIGNEE OF PROJECT SPONSOR/OWNER.

2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES, AS SHOWN ON THESE PLANS, IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY PERTINENT LOCATIONS AND ELEVATIONS, ESPECIALLY AT THE CONNECTION POINTS AND AT POTENTIAL UTILITY CONFLICTS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES THAT CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FROM ALL APPLICABLE AGENCIES. THE CONTRACTOR SHALL NOTIFY SPOKANE COUNTY INSPECTOR AT LEAST 48 HOURS PRIOR TO THE START OF ANY EARTH DISTURBING ACTIVITY OR CONSTRUCTION ON ANY AND ALL PUBLIC IMPROVEMENTS.

4. THE CONTRACTOR SHALL COORDINATE AND COOPERATE WITH SPOKANE COUNTY AND ALL UTILITY COMPANIES WITH REGARD TO RELOCATIONS OR ADJUSTMENTS OF EXISTING UTILITIES DURING CONSTRUCTION, TO ASSURE THAT THE WORK IS ACCOMPLISHED IN A TIMELY FASHION, AND WITH A MINIMUM DISRUPTION OF SERVICE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL PARTIES AFFECTED BY ANY DISRUPTION OF ANY UTILITY SERVICE.

5. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE APPROVED PLANS, ONE (1) COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS, AND ONE (1) COPY OF ANY PERMITS AND EXTENSION AGREEMENTS NEEDED FOR THE JOB ON–SITE AT ALL TIMES.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO: EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND SECURITY.

7. IF, DURING THE CONSTRUCTION PROCESS, CONDITIONS ARE ENCOUNTERED BY THE CONTRACTOR, HIS SUBCONTRACTORS, OR OTHER AFFECTED PARTIES WHICH COULD INDICATE A SITUATION THAT IS NOT IDENTIFIED IN THE PLANS OR SPECIFICATIONS, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY.

8. ALL REFERENCES TO ANY PUBLISHED STANDARDS SHALL REFER TO THE LATEST REVISION OF SAID STANDARD, UNLESS SPECIFICALLY STATED OTHERWISE.

9. FOR WORK AFFECTING PUBLIC ROADWAYS OR IF REQUIRED BY SPOKANE COUNTY, THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL AND PHASING PLAN IN ACCORDANCE WITH M.U.T.C.D. FOR APPROVAL. PRIOR TO ANY CONSTRUCTION ACTIVITIES WITHIN OR AFFECTING THE RIGHT–OF–WAY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ANY AND ALL TRAFFIC CONTROL DEVICES AS MAY BE REQUIRED BY SAID PLANS. PRIOR TO INSTALLATION.
A RECONSTRUCTION CONFERENCE SHALL BE HELD WITH SPOKANE COUNTY.

10. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL LABOR AND MATERIALS NECESSARY FOR THE COMPLETION OF THE INTENDED IMPROVEMENTS SHOWN ON THESE DRAWINGS OR DESIGNATED TO BE PROVIDED, INSTALLED, CONSTRUCTED, REMOVED OR RELOCATED UNLESS SPECIFICALLY NOTED OTHERWISE.

11. PER AGENCY STANDARDS THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING ROADWAYS FREE AND CLEAR OF ALL CONSTRUCTION DEBRIS AND DIRT TRACKED FROM THE SITE.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECORDING RECORD INFORMATION ON A SET OF RECORD DRAWINGS KEPT AT THE CONSTRUCTION SITE AND AVAILABLE TO SPOKANE COUNTY INSPECTOR AT ALL TIMES.

13. DIMENSIONS FOR LAYOUT AND CONSTRUCTION ARE NOT TO BE SCALED FROM ANY DRAWING. FOR ADDITIONAL INFORMATION CONTACT THE ENGINEER FOR CLARIFICATION AND NOTE ON THE RECORD DRAWINGS.

14. ALL EROSION AND SEDIMENT CONTROL (E.S.C.) MEASURES SHALL BE INSTALLED AT THE LIMITS OF CONSTRUCTION PRIOR TO GROUND DISTURBING ACTIVITY. ALL E.S.C. MEASURES SHALL BE MAINTAINED IN GOOD REPAIR BY THE CONTRACTOR UNTIL SUCH TIME AS THE ENTIRE DISTURBED AREAS ARE STABILIZED WITH HARD SURFACE OR LANDSCAPING.

15. THE CONTRACTOR SHALL SEQUENCE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO MINIMIZE POTENTIAL UTILITY CONFLICTS. IN GENERAL, STORM SEWER AND SANITARY SEWER SHOULD BE CONSTRUCTED PRIOR TO INSTALLATION OF WATER LINES AND DRY UTILITIES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE ALL UTILITY RELOCATIONS CONSISTENT WITH THE CONTRACTORS SCHEDULE FOR THIS PROJECT, WHETHER SHOWN OR NOT SHOWN, AS IT RELATES TO THE CONSTRUCTION ACTIVITIES CONTEMPLATED IN THESE PLANS.

16. ALL WORK WITHIN THE PUBLIC RIGHT–OF–WAY IS SUBJECT TO THE JURISDICTION OF SPOKANE COUNTY ENGINEERING DEPARTMENT STANDARD DETAILS AND SPECIFICATIONS.

17. ALL CONSTRUCTION OPERATIONS, INCLUDING THE WARMING UP, REPAIR, ARRIVAL, DEPARTURE OR RUNNING OF TRUCKS, EARTH MOVING EQUIPMENT, CONSTRUCTION EQUIPMENT AND ANY OTHER ASSOCIATED EQUIPMENT SHALL GENERALLY BE LIMITED TO THE TIME PERIOD APPROVED BY SPOKANE COUNTY.

18. BASED ON REQUIREMENTS FROM SPOKANE COUNTY, THE ENGINEER OR HIS DESIGNEE SHALL PERFORM MATERIALS TESTING AND QUALITY CONTROL ON THE PROJECT AND SHALL SUBMIT COPIES OF DAILY REPORTS, TEST REPORTS, PROJECT CERTIFICATION AND RECORD DRAWINGS TO THE CITY OF
SPOKANE VALLEY/SPOKANE COUNTY ENGINEER.

19. NO REVISIONS SHALL BE MADE TO THESE PLANS WITHOUT APPROVAL OF SPOKANE COUNTY ENGINEERS AND NOTIFICATION OF THE ENGINEER OF RECORD.

20. ON–SITE GRADING SHALL BE IN ACCORDANCE WITH THE APPROVED GRADING PLAN AND E.S.C. PLAN. ANY IMPORT OR EXPORT OF MATERIAL SHALL BE FROM AN REPROVED SOURCE/DESTINATION AND COORDINATED WITH SPOKANE COUNTY DEPARTMENT OF BUILDING AND PLANNING 509–477–3675. GRADING ON THIS SITE OR ANY OTHER SITE MUST COMPLY WITH ALL DEVELOPMENT REGULATIONS INCLUDING, BUT NOT LIMITED TO , GRADING PERMITS, S.E.P.A. REVIEW, TIMBER HARVEST PERMITS, CRITICAL AREAS, FLOOD PLAINS, DESIGNATED DRAINAGE WAYS, ETC.

21. THE CONTRACTOR IS CAUTIONED THAT IT IS THE UNDERSTANDING OF THE OWNER AND THE ENGINEER THAT SHOULD A CONFLICT OR DISCREPANCY IN THESE PLANS, SPECIFICATIONS, GENERAL NOTES OR PLANS ET.AL. DETERMINED TO BE PART OF THE OVERALL PROJECT, INCLUDING BUT NOT LIMITED TO THE ARCHITECTURAL PLANS, MECHANICAL PLANS, ELECTRICAL PLANS, LANDSCAPE PLANS, GENERAL SPECIAL PROVISIONS, ETC., THAT WITHOUT WRITTEN CLARIFICATION FROM THE ENGINEER, OWNER OR OTHER PROFESSIONAL, DURING THE BIDDING PROCESS, THAT IN ALL INSTANCES THE CONTRACTOR WILL BE REQUIRED TO BID THE HIGHER STANDARD. FAILURE TO DO SO MAY RESULT IN THE HIGHER STANDARD BEING REQUIRED BY THE OWNER, ENGINEER OR OTHER PROFESSIONAL WITH NO CHANGE IN VALUE TO THE CONTRACT VIA CHANGE ORDER OR OTHER MECHANISM.

22. CONSTRUCTION OF EVERY DRYWELL, INCLUDING FABRIC AND DRAINROCK, SHALL BE OBSERVED BY THE ON–SITE INSPECTOR TO CONFIRM THAT IT MEETS THE DESIGN DETAILS AND SPECIFICATIONS. DRYWELLS NOT OBSERVED SHALL HAVE THEIR PERFORMANCE VERIFIED BY A FULL–SCALE DRYWELL TEST.

⊕ NAVD - 88

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NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

SWPPP/EROSION CONTROL PLAN

PAINTED HILLS - GUSTIN DITCH

40TH AVENUE

SPOKANE COUNTY, WASHINGTON

SE 1/4 OF SEC. 33, T. 25 N., R. 44 E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
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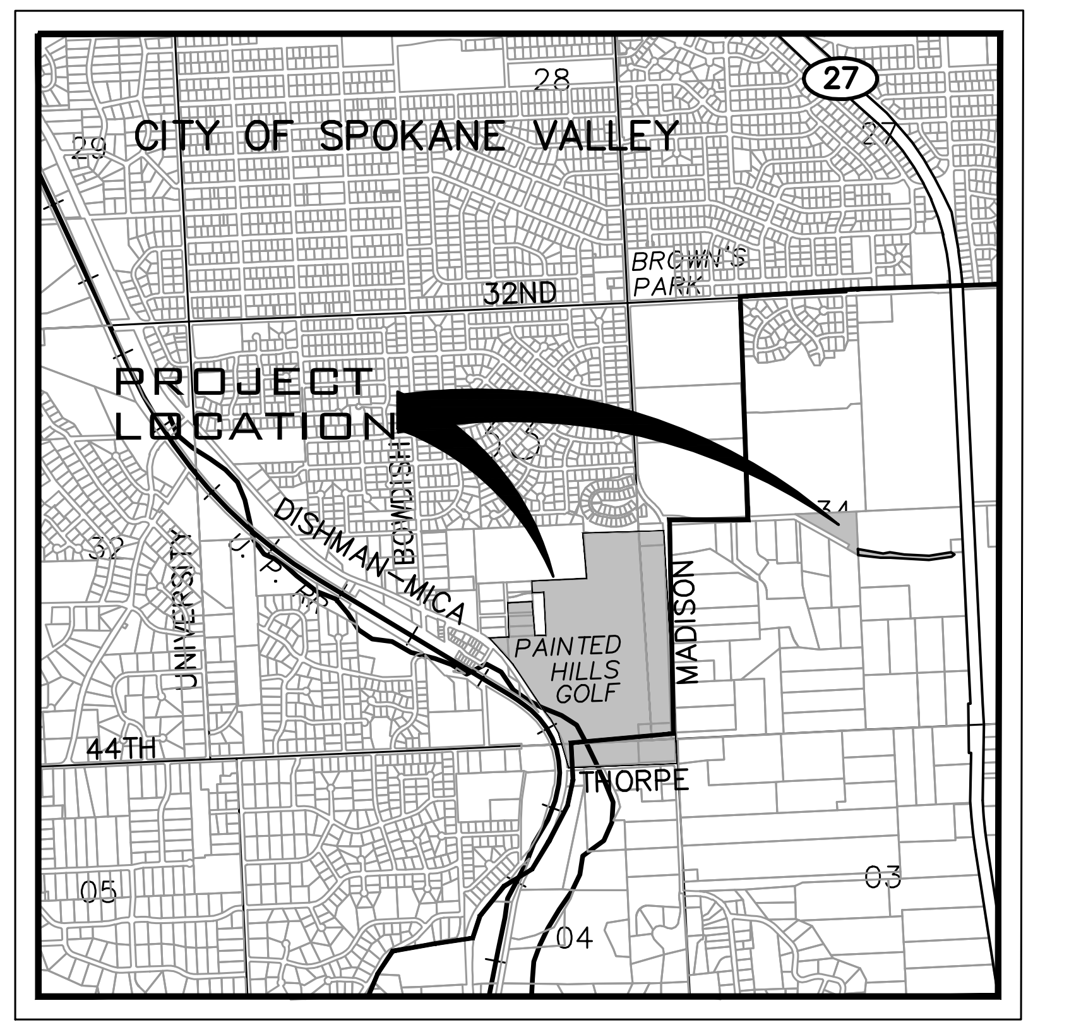
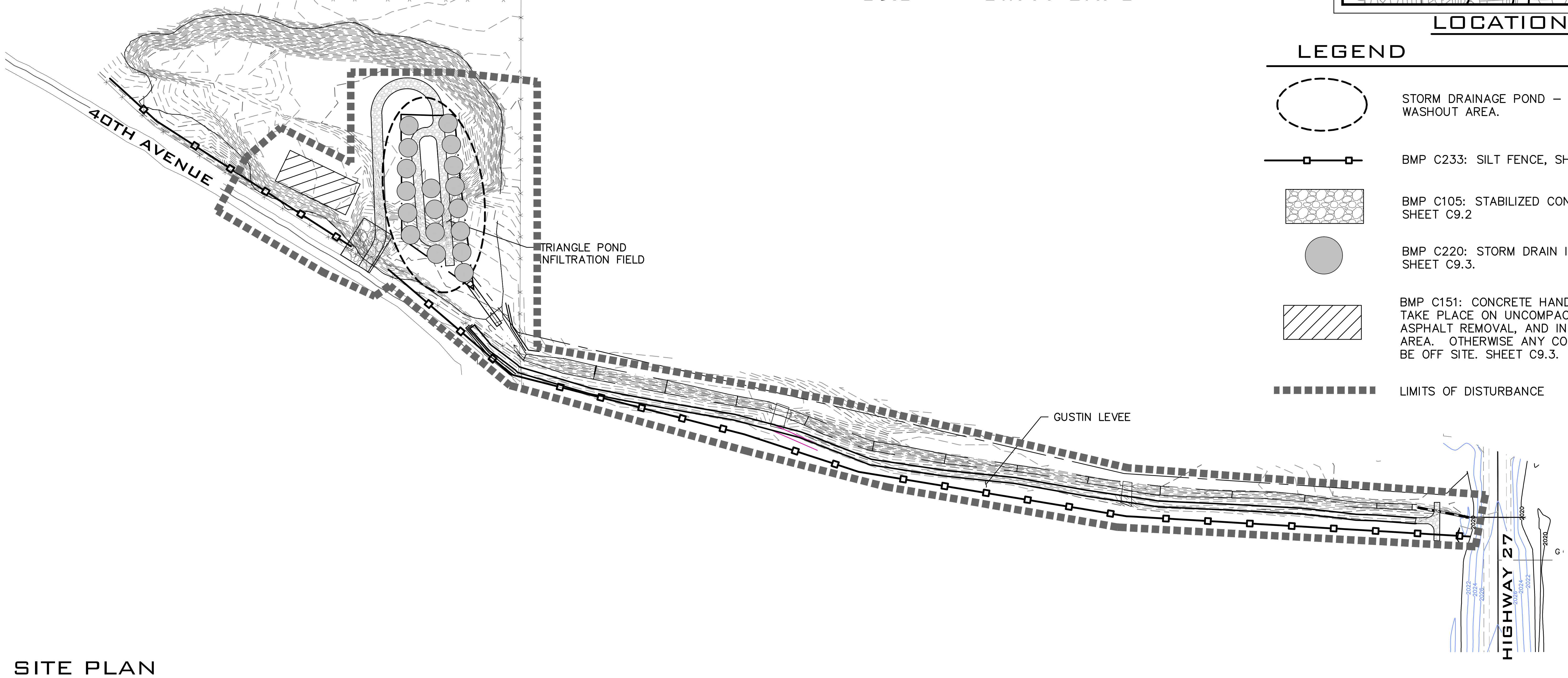


LOCATION MAP

INDEX TO PLAN SHEETS

LEGEND

◌	STORM DRAINAGE POND – NO CONCRETE TRUCK WASHOUT AREA.
—□—□—	BMP C233: SILT FENCE, SHEET C9.2.
▦	BMP C105: STABILIZED CONSTRUCTION ENTRY, SHEET C9.2
●	BMP C220: STORM DRAIN INLET PROTECTION, SHEET C9.3.
▨	BMP C151: CONCRETE HANDLING – MAY ONLY TAKE PLACE ON UNCOMPACTED SUBGRADE AFTER ASPHALT REMOVAL, AND IN A NON–LANDSCAPED AREA. OTHERWISE ANY CONCRETE WASHOUT MUST BE OFF SITE. SHEET C9.3.
■■■■■	LIMITS OF DISTURBANCE



SITE PLAN

SCALE: 1" = 100'

PERMIT SPECIALIST
CITY OF SPOKANE VALLEY
PERMIT CENTER
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720–5240

DEV. CONST. INSP.
CITY OF SPOKANE VALLEY
11707 E SPRAGUE AVE
SPOKANE, WA 99206
PHONE: 720–5324
CONTACT: JOHN JOHNSON

SOLID WASTE
WASTE MANAGEMENT
PHONE: 1–866–909–4458

SEWER
SPOKANE COUNTY UTILITIES
1026 W BROADWAY AVE
SPOKANE, WA 99260
PHONE: 477–7180
CONTACT: CHRIS KNUDSON

HEALTH
SPOKANE REGIONAL HEALTH
1101 W COLLEGE AVE
SPOKANE, WA 99260
PHONE: 324–1578
CONTACT: PAUL SAVAGE

INSPECTION
I.P.E.C.
P. O. BOX 1566
VERADALE, WA 99037
PHONE: 209–6262
CONTACT: PAUL T. NELSON, P.E.

WATER
SPOKANE COUNTY WATER DISTRICT #3
1225 N YARDLEY ST
SPOKANE, WA 99212
PHONE: 536–0121
CONTACT: TY WICK

GAS
AVISTA UTILITIES
1411 E MISSION AVE
SPOKANE, WA 99220
PHONE: 495–8610
CONTACT: KEN CARLSON

SURVEYOR
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893–2617
CONTACT: JON GORDON, P.L.S.

FIRE
SPOKANE VALLEY FIRE DEPT.
2120 N WILBUR RD
SPOKANE VALLEY, WA 99206
PHONE: 928–1700
CONTACT: TRACI HARVEY

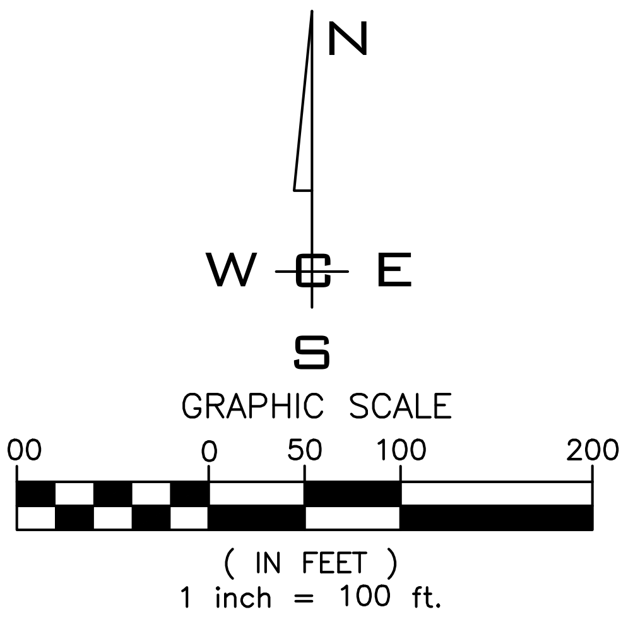
TELEPHONE
CENTURY LINK
904 N COLUMBUS ST
SPOKANE, WA 99202
PHONE: 623–0305
CONTACT: DEBORAH GEIST

ENGINEERING
WHIPPLE CONSULTING ENGINEERS
2528 N SULLIVAN RD
SPOKANE VALLEY, WA 99216
PHONE: 893–2617
CONTACT: TODD WHIPPLE, P.E.

POWER
INLAND POWER & LIGHT
OPERATIONS DEPARTMENT
P.O. BOX A
SPOKANE, WASHINGTON 99219
PHONE: 789–4291
CONTACT: CONNIE NELSON

CABLE
COMCAST BROADBAND
1717 E BUCKEYE AVE
SPOKANE, WA 99207
PHONE: 755–4717
CONTACT: BRYAN RICHARDSON

OWNER
BRYAN WALKER
C/O NAI BLACK
107 S HOWARD ST
SPOKANE, WA 99201
PHONE: 623–1000
CONTACT: BRYAN WALKER



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SWPPP COVER
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SPOKANE COUNTY, WA

SHEET
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P:\WCE_WORK\2013 WCE PROJECTS\2013-1166 Walker - Painted Hills GC\DWG\GUSTIN-C9.0 EROSION CONTROL.dwg, 10/13/2016 1:45:19 PM

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EROSION & SEDIMENT CONTROL

GENERAL NOTES AND INFORMATION

1. AN EROSION/SEDIMENT CONTROL **(E.S.C.)** PLAN IS REQUIRED FOR THIS PROJECT. IMPLEMENTATION OF THE **E.S.C. PLAN,** AND CONSTRUCTION, MAINTENANCE, AND UPGRADING OF THE **E.S.C.** FACILITIES ARE THE RESPONSIBILITY OF THE DEVELOPER UNTIL ALL CONSTRUCTION IS COMPLETED AND ACCEPTED BY **SPOKANE COUNTY,** OR UNTIL VEGETATION IS ESTABLISHED THROUGHOUT THE SITE, AND ACCEPTED BY **SPOKANE COUNTY,** WHICHEVER IS LATER.
2. APPROVAL OF THE **E.S.C. PLAN** DOES NOT CONSTITUTE APPROVAL OF ANY OF THE PROPOSED ROAD, STORM DRAINAGE, GRADING OR UTILITY DESIGN ELEMENTS SHOWN ON THE **E.S.C. PLAN.**
3. THE EROSION/SEDIMENT CONTROL MEASURES SHOWN ARE THE MINIMUM REQUIREMENTS FOR THE ANTICIPATED SITE CONDITIONS. THE CONTRACTOR SHALL INSPECT AND MAINTAIN THESE **E.S.C.** MEASURES DAILY, AND SHALL MAINTAIN AND UPGRADE THESE MEASURES AS NECESSARY TO PREVENT SEDIMENT–LADEN WATER FROM EITHER FLOWING OFF SITE, OR INTO NEW/EXISTING STORM DRAINAGE FACILITIES, SUCH AS DRYWELLS, CULVERTS, OR GRAVEL GALLERIES.
4. GEOTEXTILE FABRIC IS TO BE PLACED ON THE RIMS, CATCH BASINS AND INLETS UNTIL SUCH TIME THAT THE VEGETATION ON THE SITE IS ESTABLISHED AND THE THREAT OF SEDIMENT DEPOSITION INTO THE DRAINAGE SYSTEM IS MITIGATED.
5. THE SILT FENCES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO OTHER SITE WORK, AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION.
6. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING ROCK CONSTRUCTION ENTRIES AT ANY AND ALL LOCATIONS USED TO ENTER OR EXIT THE PROJECT SITE. SEE DETAIL,
7. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNATING A LOCATION WHERE CONCRETE TRUCKS AND EQUIPMENT CAN BE WASHED OUT, NOT LOCATED NEAR OR DRAINING INTO A STORM DRAINAGE AREA.
8. PROPERTY OWNER: **NAI BLACK – BRYAN WALKER**
   PERMIT APPLICANT: **WHIPPLE CONSULTING ENGINEERS, INC. 509–893–2617**
   CONTACT PERSON ON SITE: **TBD**
9. PROJECT LOCATION: **NORTH OF 40TH AVENUE, IN SPOKANE COUNTY, WASHINGTON, IN SECTION 33, TOWNSHIP 25 N., RANGE 44 E. W.M.**
10. PROJECT DESCRIPTION: **IMPROVEMENT OF 5 ACRES +/– OF AN EXISTING POND & DRAINAGE DITCH.**
11. DESCRIPTION OF **E.S.C.** MEASURES: USE OF SILT FENCES AND SEDIMENTATION FILTERS. ALL **E.S.C.** MEASURES MENTIONED ABOVE ARE TEMPORARY AND WILL BE REMOVED AFTER SITE IS LANDSCAPED.
12. EXISTING VEGETATION: **VACANT LAND WITH GRASS AND WEED COVER.**
13. PLAN PREPARATION DATE: **AUGUST 2016**
14. SOILS: **ALLUVIAL LEAN CLAY, SILT, OR SILTY SAND.**
15. **STABILIZATION OF DENUDED AREAS:**
    ANY DISTURBED AREAS, WHICH WOULD BE LEFT BARE FOR MORE THAN 7 DAYS AND ARE NOT INTENDED TO BE REWORKED WITHIN 30–45 DAYS SHALL BE SEEDED WITH A FAST STARTING NATIVE DRYLAND GRASS SUCH AS ANNUAL RYE, OR APPROVED EQUAL, AT A RATE OF 60 lbs/ACRE.
16. **CONTROL OF POLLUTANTS:**
    ANY SPILLS WILL BE HANDLED ACCORDING TO **D.O.E. AND D.O.H.** GUIDELINES.
17. **LIMITS OF GRADING:**
    DURING THE COURSE OF CONSTRUCTION, THE AMOUNT OF DISTURBED AREA SHALL BE KEPT TO A MINIMUM AND SHALL BE LIMITED TO THE AREA SHOWN AS "LIMITS OF GRADING" ON THIS SHEET OF THE EROSION CONTROL PLANS.

MAINTENANCE

1. **THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF THE TEMPORARY E.S.C.** MEASURES.
2. SEDIMENT BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RUNOFF–PRODUCING RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL.
3. NECESSARY REPAIRS TO BARRIERS OR REPLACEMENT OF FILTER FABRIC SHALL BE ACCOMPLISHED PROMPTLY.
4. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH RUNOFF–PRODUCING RAINFALL. DEPOSITS MUST BE REMOVED WHEN THE LEVEL OF DEPOSITION REACHES APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
5. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THE **E.S.C.** STRUCTURE IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM TO THE EXISTING GRADE, PREPARED AND SEEDED.
6. ALL TEMPORARY AND PERMANENT **E.S.C.** PRACTICES SHALL BE MAINTAINED AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.
7. ALL TEMPORARY **E.S.C.** MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING DIRT, MUD AND OTHER CONSTRUCTION DEBRIS WHICH MAY ACCUMULATE ON PAVED STREETS ADJACENT TO THE SITE AS A RESULT OF CONSTRUCTION ACTIVITY. CLEANING SHALL BE ON AN "AS NEEDED" BASIS USING SWEEPING AND WATER TO WASH THE CONSTRUCTION DEBRIS FROM THE STREET.
9. ON–SITE DUST CONTROL SHALL BE ACCOMPLISHED BY USING WATER. APPLICATIONS OF WATER MAY BE REQUIRED SEVERAL TIMES PER DAY DURING CONSTRUCTION ACTIVITY.

E.S.C. STANDARD PLAN NOTES FROM APPENDIX 9A OF THE

SPOKANE REGIONAL STORMWATER MANUAL

1. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE FOLLOWED IN ORDER TO BEST MINIMIZE THE POTENTIAL FOR EROSION AND SEDIMENTATION CONTROL PROBLEMS.

(A) CLEAR AND GRUB SUFFICIENTLY FOR INSTALL OF TEMPORARY **E.S.C.** BMP'S;

(B) INSTALL TEMPORARY **E.S.C.** BMPs, CONSTRUCTING SEDIMENT TRAPPING BMP'S AS ONE OF THE FIRST STEPS PRIOR TO GRADING;

(C) CLEAR, GRUB AND ROUGH GRADE FOR ROADS, TEMPORARY ACCESS POINTS AND UTILITY LOCATIONS;

(D) STABILIZE ROADWAY APPROACHES AND TEMPORARY ACCESS POINTS WITH THE APPROPRIATE CONSTRUCTION ENTRY BMP;

(E) CLEAR, GRUB AND GRADE INDIVIDUAL LOTS OR GROUPS OF LOTS;

(F) TEMPORARILY STABILIZE, THROUGH RE–VEGETATION OR OTHER APPROPRIATE BMP'S, LOTS OR GROUPS OF LOTS IN SITUATIONS WHERE SUBSTANTIAL CUT OR FILL SLOPES ARE A RESULT OF THE SITE GRADING;

(G) CONSTRUCT ROADS, BUILDINGS, PERMANENT STORMWATER FACILITIES. (I.E. INLETS, PONDS, U.I.C.FACILITIES, ETC.);

(H) PROTECT ALL PERMANENT STORMWATER FACILITIES UTILIZING THE APPROPRIATE BMP'S;

(I) INSTALL PERMANENT **E.S.C.** CONTROLS, WHEN APPLICABLE; AND,

(J) REMOVE TEMPORARY **E.S.C.** CONTROLS WHEN;

2. PERMANENT **E.S.C.** CONTROLS. WHEN APPLICABLE, HAVE BEEN COMPLETELY INSTALLED;
3. ALL LAND–DISTURBING ACTIVITIES THAT HAVE THE POTENTIAL TO CAUSE EROSION AND SEDIMENTATION PROBLEMS HAVE CEASED; AND,
4. VEGETATION HAD BEEN ESTABLISHED IN THE AREAS NOTED AS REQUIRING VEGETATION ON THE ACCEPTED **E.S.C.** PLAN ON FILE WITH THE LOCAL JURISDICTION.
5. INSPECT ALL ROADWAYS, AT THE END OF EACH DAY, ADJACENT TO THE CONSTRUCTION ACCESS ROUTE. IF IT IS EVIDENT THAT SEDIMENT HAS BEEN TRACKED OFF SITE AND/OR BEYOND THE ROADWAY APPROACH, CLEANING IS REQUIRED.
6. IF SEDIMENT REMOVAL IS NECESSARY PRIOR TO STREET WASHING, IT SHALL BE REMOVED BY SHOVELING OR PICKUP SWEEPING AND TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
7. IF STREET WASHING IS REQUIRED TO CLEAN SEDIMENT TRACKED OFF SITE, ONCE SEDIMENT HAS BEEN REMOVED, STREET WASH WASTEWATER SHALL BE CONTROLLED BY PUMPING BACK ON–SITE OR OTHERWISE PREVENTED FROM DISCHARGING INTO SYSTEMS TRIBUTARY TO WATERS OF THE STATE.
8. RESTORE CONSTRUCTION ACCESS ROUTE EQUAL TO OR BETTER THAN THE PRE–CONSTRUCTION CONDITION.
9. RETAIN THE DUFF LAYER, NATIVE TOPSOIL, AND NATURAL VEGETATION IN AND UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICAL.
10. INSPECT SEDIMENT CONTROL BMP'S WEEKLY AT A MINIMUM, DAILY DURING A STORM EVENT,'AND AFTER ANY DISCHARGE FROM THE SITE (STORMWATER OR NON–STORMWATER). THE INSPECTION FREQUENCY MAY BE REDUCED TO ONCE A MONTH IF THE SITE IS STABILIZED AND INACTIVE.
11. CONTROL FUGITIVE DUST FROM CONSTRUCTION ACTIVITY IN ACCORDANCE WITH THE STATE AND/OR LOCAL AIR QUALITY CONTROL AUTHORITIES WITH JURISDICTION OVER THE PROJECT AREA.
12. STABILIZE EXPOSED UNWORKED SOILS (INCLUDING STOCKPILES), WHETHER AT FINAL GRADE OR NOT WITHIN 10 DAYS DURING THE REGIONAL DRY SEASON (JULY 1 TO SEPTEMBER 30) AND WITHIN 5 DAYS DURING THE REGIONAL WET SEASON (OCTOBER 1 THRU JUNE 30). SOILS MUST BE STABILIZED AT THE END OF A SHIFT BEFORE A HOLIDAY WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. THE TIME LIMIT MAY ONLY BE ADJUSTED BY A LOCAL JURISDICTION WITH A "QUALIFIED LOCAL PROGRAM," IF IT CAN BE DEMONSTRATED THAT THE RECENT PRECIPITATION JUSTIFIES A DIFFERENT STANDARD AND MEETS THE REQUIREMENTS SET FORTH IN THE CONSTRUCTION STORMWATER GENERAL PERMIT.
13. PROTECT INLETS, DRYWELLS, CATCH BASINS AND OTHER STORMWATER MANAGEMENT FACILITIES FROM SEDIMENT, WHETHER OR NOT FACILITIES ARE OPERABLE,
14. KEEP ROADS ADJACENT TO INLETS CLEAN.
15. INSPECT INLETS WEEKLY AT A MINIMUM AND DAILY FOR STORM EVENTS.
16. CONSTRUCT STORMWATER CONTROL FACILITIES (DETENTION/RETENTION STORAGE POND OR SWALES) BEFORE GRADING BEGINS. THESE FACILITIES SHALL BE OPERABLE BEFORE THE CONSTRUCTION OF IMPERVIOUS SITE IMPROVEMENTS.
17. STOCKPILE MATERIALS (SUCH AS TOPSOIL) ON SITE, KEEPING OFF OF ROADWAY AND SIDEWALKS.
18. COVER, CONTAIN AND PROTECT ALL CHEMICALS, LIQUID PRODUCTS, PETROLEUM PRODUCT, AND NON–INERT WASTES PRESENT ON SITE FROM VANDALISM (SEE CHAPTER 173–304 W.A.C. FOR THE DEFINITION OF INERT WASTE), USE SECONDARY CONTAINMENT FOR ON–SITE FUELING TANKS.
19. CONDUCT MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES INVOLVING OIL CHANGES, HYDRAULIC SYSTEMS REPAIRS, SOLVENT AND DEGREASING OPERATIONS, FUEL TANK DRAIN DOWN AND REMOVAL, AND OTHER ACTIVITIES THAT MAY RESULT IN DISCHARGE OR SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF USING SPILL RECONVENTION MEASURES, SUCH AS DRIP PANS. CLEAN ALL CONTAMINATED SURFACES IMMEDIATELY FOLLOWING ANY DISCHARGE OR SPILL INCIDENT. IF RAINING OVER EQUIPMENT OR VEHICLE, PERFORM EMERGENCY REPAIRS ON SITE USING TEMPORARY PLASTIC BENEATH THE VEHICLE.
20. CONDUCT APPLICATION OF AGRICULTURAL CHEMICALS, INCLUDING FERTILIZERS AND PESTICIDES, IN SUCH A MANNER, AND AT APPLICATION RATES, THAT INHIBITS THE LOSS OF CHEMICALS INTO STORMWATER RUNOFF FACILITIES. AMEND MANUFACTURER'S RECOMMENDED APPLICATION RATES AND PROCEDURES TO MEET THIS REQUIREMENT, IF NECESSARY.
21. INSPECT ON A REGULAR BASIS (AT A MINIMUM WEEKLY, AND DAILY DURING/AFTER A RUNOFF PRODUCING EVENT) AND MAINTAIN ALL **EROSION AND SEDIMENT CONTROL** BMP'S TO ENSURE SUCCESSFUL PERFORMANCE OF THE BMP'S. NOTE THAT INLET PROTECTIONS DEVICES SHALL BE CLEANED OR REMOVED AND REPLACE BEFORE SIX INCHES OF SEDIMENT CAN ACCUMULATE.
22. REMOVE TEMPORARY **E.SC.** BMP'S WITHIN 30 DAYS AFTER THE TEMPORARY BMP'S ARE NO LONGER NEEDED. PERMANENTLY STABILIZE AREA THAT ARE DISTURBED DURING REMOVAL PROCESS.

SRCAA GENERAL NOTES

1. DUST EMISSIONS DURING DEMOLITION, CONSTRUCTION, AND EXCAVATION PROJECTS MUST BE CONTROLLED. THIS MAY REQUIRE THE USE OF WATER SPRAYS, TARPS, SPRINKLERS, OR SUSPENSION OF ACTIVITY DURING CERTAIN WEATHER CONDITIONS.
2. MEASURES MUST BE TAKEN TO AVOID THE DEPOSITION OF DIRT AND MUD FROM UNPAVED SURFACES ONTO PAVED SURFACES. IF TRACKING OR SPILLS OCCUR ON PAVED SURFACES, MEASURES MUST BE TAKEN IMMEDIATELY TO CLEAN THESE SURFACES.
3. DEBRIS GENERATED, AS A RESULT OF THIS PROJECT, MUST BE DISPOSED OF BY MEANS OTHER THAN BURNING (I.E., CONSTRUCTION WASTE, VEGETATIVE WASTE, ECT.).
4. SPOKANE CLEAN AIR (SRCAA) STRONGLY RECOMMENDS THAT ALL TRAVELED SURFACES (I.E., INGRESS, EGRESS, PARKING AREAS, ACCESS ROADS, ECT.) BE PAVED AND KEPT CLEAN TO MINIMIZE DUST EMISSIONS.
5. IF OBJECTIONABLE ODORS RESULT FROM THIS PROJECT, EFFECTIVE CONTROL APPARATUS AND MEASURES MUST BE TAKEN TO REDUCE ODORS TO A MINIMUM.
6. SPECIAL ATTENTION SHOULD BE GIVEN TO PROPER MAINTENANCE OF DIESEL POWERED CONSTRUCTION EQUIPMENT TO REDUCE THE IMPACT OF DIESEL EXHAUST, A SUSPECTED CARCINOGEN.
7. A NOTICE OF CONSTRUCTION AND APPLICATION FOR APPROVAL IS REQUIRED TO BE SUBMITTED AND APPROVED BY SRCAA PRIOR TO THE CONSTRUCTION, INSTALLATION, OR ESTABLISHMENT OF AN AIR POLLUTION SOURCE. THIS INCLUDES EMERGENCY GENERATORS RATED AT 500 HP(375 KW) OR HIGHER, NATURAL GAS HEATING EQUIPMENT UNITS RATED AT FOUR MMBTU/HOUR OR HIGHER (INPUT), AND HEATING EQUIPMENT UNITS FIRED WITH OTHER FUELS (E.G., DIESEL) RATED AT ONE MMBTU/HOUR (INPUT) OR HIGHER. CONTACT SPOKANE CLEAN AIR (SRCAA) FOR A NOTICE OF CONSTRUCTION APPLICATION.
8. NOTICE OF INTENT MUST BE SUBMITTED TO SRCAA PRIOR TO ANY DEMOLITION PROJECT OR ASBESTOS PROJECT. AN ASBESTOS SURVEY MUST BE DONE BY AN HERA–ACCREDITED BUILDING INSPECTOR PRIOR TO THE DEMOLITION OR RENOVATION OF BUILDINGS TO DETERMINE IF ASBESTOS–CONTAINING MATERIAL IS PRESENT AT THE SITE. CONTACT SPOKANE CLEAN AIR (SRCAA) FOR A NOTICE OF INTENT APPLICATION.

Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

TODD R. WHIPPLE
25462
10/13/16

PLANS
NOT APPROVED
BY AGENCY

◆ NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT
WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67
(NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS
MAP.

NO.	DATE	BY	REVISIONS
A	08/03/16	RMA	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: **N/A**
VERTICAL: **N/A**

PROJ #: **13-1166**
DATE: **08/03/16**
DRAWN: **RMA**
REVIEWED: **TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WA 99216
PH: 509-893-2617 FAX: 509-926-0227

GUSTIN DITCH IMPROVEMENT PLANS
SWPPP NOTES
40TH AVENUE
SPOKANE COUNTY, WA

SHEET
C9.1

JOB NUMBER
13-1166

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SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

BMP C233: SILT FENCE

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

USE OF SILT FENCE REDUCES THE TRANSPORT OF COARSE SEDIMENT FROM A CONSTRUCTION SITE BY PROVIDING A TEMPORARY PHYSICAL BARRIER TO SEDIMENT AND REDUCING THE RUNOFF VELOCITIES OF OVERLAND FLOW. SEE FIGURE 7.3.20 OF THE EASTERN WASHINGTON STORMWATER MANUAL OR DETAIL BELOW FOR DETAILS ON SILT FENCE CONSTRUCTION.

CONDITIONS OF USE:

SILT FENCE MAY BE USED DOWNSLOPE OF ALL DISTURBED AREAS. SILT FENCE IS NOT INTENDED TO TREAT CONCENTRATED FLOWS, NOR IS IT INTENDED TO TREAT SUBSTANTIAL AMOUNTS OF OVERLAND FLOW. ANY CONCENTRATED FLOWS MUST BE CONVEYED THROUGH THE DRAINAGE SYSTEM TO A SEDIMENT POND. THE ONLY CIRCUMSTANCE IN WHICH OVERLAND FLOW CAN BE TREATED SOLELY BY A SILT FENCE, RATHER THAT BY A SEDIMENT POND, IS WHEN THE AREA DRAINING TO THE FENCE IS ONE ACRE OR LESS AND FLOW RATES ARE LESS THAN 0.5 CFS.

SILT FENCES SHOULD NOT BE CONSTRUCTED IN STREAMS OR USED IN V-SHAPED DITCHES. THEY ARE NOT AN ADEQUATE METHOD OF SILT CONTROL FOR ANYTHING DEEPER THAT SHEET OR OVERLAND FLOW.

DESIGN AND INSTALLATION:

DRAINAGE AREA OF 1 ACRE OR LESS OR IN COMBINATION WITH SEDIMENT BASIN IN A LARGER SITE.

MAXIMUM SLOPE STEEPNESS (NORMAL OR PERPENDICULAR TO FENCE LINE) 1:1.

MAXIMUM SHEET OR OVERLAND FLOW PATH LENGTH TO THE FENCE OF 100 FEET.

NO FLOWS GREATER THAN 0.5 CFS.

THE GEOTEXTILE USED SHALL MEET THE FOLLOWING STANDARDS. ALL GEOTEXTILE PROPERTIES LISTED BELOW ARE MINIMUM AVERAGE ROLL VALUES.

POLYMETRIC MESH AOS (ASTM D4751)	0.60MM MAX. FOR SLIT WOVENS (#30 SIEVE). 0.30MM MAX. FOR ALL OTHER GEOTEXTILE TYPES (#50 SIEVE). 0.15MM MAX. FOR ALL FABRIC TYPES (#100 SIEVE).
WATER PERMITTIVITY (ASTM D4491)	0.02/SEC MIN.
GRAB TENSILE STRENGTH (ASTM D4632)	180 LBS. MIN. FOR EXTRA STRENGTH FABRIC. 100 LBS. MIN. FOR STANDARD STRENGTH FABRIC
GRAB TENSILE ELONGATION (ASTM D4632)	30% MAX,
ULTRAVIOLET RESISTANCE (ASTM D4335)	70% MIN.

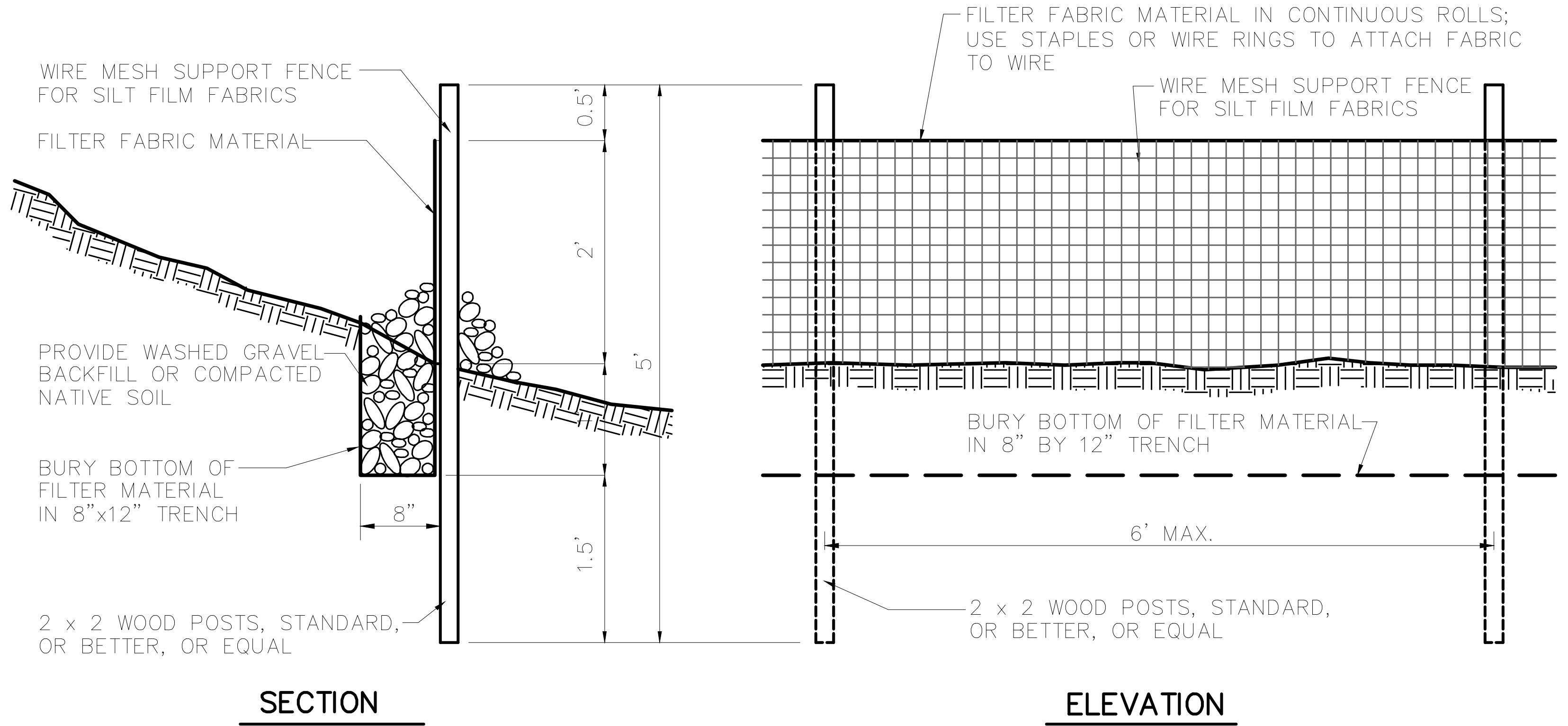
STANDARD STRENGTH FABRICS SHALL BE SUPPORTED WITH WIRE MESH, CHICKEN WIRE, 2-INCH X 2-INCH, SAFETY FENCE, OR JUST MESH TO INCREASE THE STRENGTH OF FABRIC. SILT FENCE MATERIALS ARE AVAILABLE THAT HAVE SYNTHETIC MESH BACKING ATTACHED.

FILTER FABRIC MATERIAL SHALL CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF SIX MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0°F. TO 120°F.

100 PERCENT BIODEGRADABLE SILT FENCE IS AVAILABLE THAT IS STRONG, LONG LASTING, AND CAN BE LEFT IN PLACE AFTER THE PROJECT IS COMPLETED, IF PERMITTED BY LOCAL REGULATIONS.

CONTRACTOR SHALL INSTALL AND MAINTAIN TEMPORARY SILT FENCES AT THE LOCATIONS SHOWN IN THE PLANS. THE SILT FENCE SHALL BE CONSTRUCTED IN THE AREAS OF CLEARING, GRADING, OR DRAINAGE PRIOR TO STARTING THOSE ACTIVITIES. A SILT FENCE SHALL NOT BE CONSIDERED TEMPORARY IF THE SILT FENCE MUST OPERATE BEYOND THE LENGTH OF THE CONTRACT. THE SILT FENCE SHALL PREVENT SOIL CARRIED BY RUNOFF WATER FROM GOING BENEATH, THROUGH, OR OVER THE TOP OF THE SILT FENCE, BUT SHALL ALLOW WATER TO PASS THROUGH THE FENCE.

THE MINIMUM HEIGHT OF THE TOP OF SILT FENCE SHALL BE 2 FEET AND THE MAXIMUM SHALL BE 2.5 FEET ABOVE THE ORIGINAL GROUND SURFACE.



SECTION

ELEVATION

SILT FENCE DETAIL

NOT TO SCALE

$\frac{1}{-}$

DESIGN AND INSTALLATION: (CONTINUED)

THE GEOTEXTILE SHALL BE SEWN TOGETHER AT THE POINT OF MANUFACTURE, OR AT AN APPROVED LOCATION AS DETERMINED BY THE ENGINEER, TO FORM GEOTEXTILE LENGTHS AS REQUIRED. ALL SEWN SEAMS SHALL BE LOCATED AT A SUPPORT POST. ALTERNATIVELY, TWO SECTIONS OF SILT FENCE CAN BE OVERLAPPED, PROVIDED THE CONTRACTOR CAN DEMONSTRATE, TO THE SATISFACTION OF THE ENGINEER, THAT THE OVERLAP IS LONG ENOUGH AND THAT THE ADJACENT FENCE SECTIONS ARE CLOSE ENOUGH TOGETHER TO PREVENT SILT LADEN WATER FROM ESCAPING THROUGH THE FENCE AT THE OVERLAP.

THE GEOTEXTILE SHALL BE ATTACHED ON THE UP-SLOPE SIDE OF THE POSTS AND SUPPORT SYSTEM WITH STAPLES, WIRE, OR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE GEOTEXTILE SHALL BE ATTACHED IN A MANNER THAT REDUCES THE POTENTIAL FOR GEOTEXTILE TEARING AT THE STAPLES, WIRE, OR OTHER CONNECTION DEVICE. SILT FENCE BACKUP SUPPORT FOR THE GEOTEXTILE IN THE FORM OF A WIRE OF PLASTIC MESH IS DEPENDENT ON THE PROPERTIES OF THE GEOTEXTILE SELECTED FOR SUE. IF WIRE OR PLASTIC BACK-UP MESH IS USED, THE MESH SHALL BE FASTENED SECURELY TO THE UP-SLOPE OF THE POSTS WITH THE GEOTEXTILE BEING UP-SLOPE OF THE MESH BACK SUPPORT.

THE GEOTEXTILE AT THE BOTTOM OF THE FENCE HALL BE BURIED IN A TRENCH TO A MINIMUM DEPTH OF 4" BELOW THE GROUND SURFACE. THE TRENCH SHALL BE BACKFILLED AND THE SOIL TAMPED IN PLACE OVER THE BURIED PORTION OF THE GEOTEXTILE, SUCH THAT NO FLOW CAN PASS BENEATH THE FENCE AND SCOURING CAN NOT OCCUR. WHEN WIRE OR POLYMETRIC BACK-UP SUPPORT MESH IS USED, THE WIRE OR POLYMERIC MESH SHALL EXTEND INTO THE TRENCH A MINIMUM OF 3".

THE FENCE POSTS SHALL BE PLACED OR DRIVEN A MIN. OF 18'. A MIN. DEPTH OF 12" IS ALLOWED IF TOPSOIL OR OTHER SOFT SUBGRADE SOIL IS NOT PRESENT AND A MIN. DEPTH OF 18' CANNOT BE REACHED. FENCE POST DEPTHS SHALL BE INCREASED 6' IF THE FENCE IS LOCATED ON SLOPES PF 3;1 OR STEEPER AND THE SLOPE IS PERPENDICULAR TO THE FENCE. IF REQUIRED POST DEPTHS CANNOT BE OBTAINED, THE POSTS SHALL BE ADEQUATELY SECURED BY BRACING OR GUYING TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT LOADING.

SILT FENCES SHALL BE LOCATED ON CONTOUR AS MUCH AS POSSIBLE, EXCEPT AT THE ENDS OF THE FENCE, WHERE THE FENCE SHALL BE TURNED UPHILL SUCH THAT THE SILF FENCE CAPTURES THE RUNOFF WATER AND PREVENTS WATER FROM FLOWING AROUND THE END OF THE FENCE.

IF THE FENCE MUST CROSS CONTOURS, WITH THE EXCEPTION OF THE END OF THE FENCE. GRAVEL CHECK DAMS PLACED PERPENDICULAR TO THE BACK OF THE FENCE SHALL BE USED TO MINIMIZE CONCENTRATED FLOW AND EROSION ALONG THE BACK OF THE FENCE. THE GRAVEL CHECK DAMS SHALL BE APPROXIMATELY 1' DEEP AT THE BACK OF THE FENCE. IT SHALL BE CONTINUED PERPENDICULAR TO THE FENCE AT THE SAME ELEVATION UNTIL THE TOP OF THE CHECK DAM INTERCEPTS THE THE GROUND SURFACE BEHIND THE FENCE. THE GRAVEL CHECK DAMS SHALL CONSIST OF CRUSHED SURFACING TOP COURSE, GRAVEL BACKFILL FOR WALLS, OR SHOULDER BALLAST. THE GRAVEL CHECK DAMS SHALL BE LOCATED EVERY 10' ALONG THE FENCE WHERE THE FENCE MUST CROSS THE CONTOURS. THE SLOPE OF THE FENCE LINE WHERE THE CONTOURS MUST BE CROSSED SHALL NOT BE STEEPER THAN 3:1

WOOD, STEEL OR EQUIVALENT POSTS SHALL BE USED. WOOD POSTS SHALL HAVE MINIMUM DIMENSIONS OF 2"X2"X3' MIN. LENGTH, AND SHALL BE FREE OF DEFECTS SUCH AS KNOTS, SPLITS, OR GOUGES. STEEL POSTS SHALL CONSIST OF EITHER SIZE NO. 6 REBAR OR LARGER, ASTM A 120 STEEL PIPE WITH A MIN. DIAMETER. OR 1-INCH, U, T, L, OR C SHAPE STEEL POSTS WITH A MIN. WEIGHT OF 1.35 LBS./FT. OR OTHER STEEL POSTS HAVING EQUIVALENT STRENGTH AND BENDING RESISTANCE TO THE POST SIZES LISTED. THE SPACING OF THE SUPPORTS POSTS SHALL BE A MAXIMUM OR 6'.

FENCE BACK-UP SUPPORT, IF USED, SHALL CONSIST OF STEEL WIRE WITH A MAX. MESH SPACING OF 2', OR A PREFABRICATED POLYMERIC MESH. THE STRENGTH OF WIRE ON POLYMERIC MESH SHALL BE EQUIVALENT TO OR GREATER THAT 180 LBS. GRAB TENSILE STRENGTH. THE POLYMERIC MESH MUST BE AS RESISTANT TO ULTRAVIOLET. RADIATION AS THE GEOTEXTILE IT SUPPORTS.

SILT FENCE INSTALLATION USING THE SLICING METHOD SPECIFICATION DETAILS FOLLOW.

THE BASE OF BOTH END POSTS MUST BE AT LEAST 2-4"ABOVE THE TOP OF THE SILT FENCE FABRIC ON THE MIDDLE POSTS FOR DITCH CHECKS TO DRAIN PROPERLY. USE A HAND LEVEL OR STRING LEVEL, IF NECESSARY, TO MARK BASE POINTS BEFORE INSTALLATION.

INSTALL POSTS 3-4' APART IN CRITICAL RETENTION AREAS. AND 6-7' APART IN STANDARD APPLICATIONS.

INSTALL POSTS 24" DEEP ON THE DOWNSTREAM SIDE OF THE SILT FENCE, AND AS CLOSE AS POSSIBLE TO THE FABRIC. ENABLING POSTS TO SUPPORT THE FABRIC FROM THE UPSTREAM WATER PRESSURE.

INSTALL POSTS WITH NIPPLES FACING AWAY FROM THE SILT FENCE FABRIC.

ATTACH THE FABRIC TO EACH POST WITH THREE TIES, ALL SPACED WITH THE TOP 8" OF THE FABRIC. ATTACH EACH TIE DIAGONALLY 45 DEGREES THROUGH THE FABRIC, WITH EACH PUNCTURE AT LEAST 1 INCH VERTICALLY APART, IN ADDITION, EACH TIE SHOULD BE POSITIONED TO HANG ON A POST NIPPLE WHEN TIGHTENING TO PREVENT SAGGING.

WRAP APPROXIMATELY 6 INCHES OF FABRIC AROUND THE END POSTS AND SECURE WITH 3 TIES.

NO MORE THEN 24" OF A 36" FABRIC IS ALLOWED ABOVE GROUND LEVEL.

THE ROPE LOCK SYSTEM MUST BE USED IN ALL DITCH CHECK APPLICATIONS.

THE INSTALLATION SHOULD BE CHECKED AND CORRECTED FOR ANY DEVIATION BEFORE COMPACTION. USE A FLAT-BLADED SHOVEL TO TUCK FABRIC DEEPER INTO THE GROUND IF NECESSARY.

COMPACTION IS VITALLY IMPORTANT FOR EFFECTIVE RESULTS. COMPACT THE SOIL IMMEDIATELY NEXT TO THE SILT FENCE WITH THE FRONT WHEEL OF A TRACTOR, SKID STEER, OR ROLLER EXERTING 60 PSI, COMPACT THE UPSTREAM SIDE FIRST AND THEN EACH SIDE TWICE FOR A TOTAL OF FOUR TRIPS

MAINTENANCE STANDARDS:

ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.

IF CONCENTRATED FLOWS ARE EVIDENT UPHILL OF THE FENCE, THEY MUST BE INTERCEPTED AND CONVEYED TO A SEDIMENT POND.

IT IS IMPORTANT TO CHECK THE UPHILL SIDE OF THE FENCE FOR SIGNS OF THE FENCE CLOGGING AND ACTING AS A BARRIER TO FLOW AND THEN CAUSING CHANNELIZATION OF THE FLOWS PARALLEL TO THE FENCE, IF THIS OCCURS, REPLACE THE FENCE OR REMOVE THE TRAPPED SEDIMENT.

SEDIMENT DEPOSITS SHALL EITHER BE REMOVED WHEN THE DEPOSIT REACHES APPROXIMATELY ONE-THIRD THE HEIGHT OF THE SILT FENCE, OR A SECOND SILT FENCE INSTALLED.

IF THE FILTER FABRIC OR GEOTEXTILE HAS DETERIORATED DUE TO ULTRAVIOLENT BREAKDOWN, IT SHALL BE REPLACED.

BMP C105: STABILIZED CONSTRUCTION ENTRANCE

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

CONSTRUCTION ENTRANCES ARE STABILIZED TO REDUCE THE AMOUNT OF SEDIMENT TRANSPORTED ONTO PAVED ROADS BY VEHICLES OR EQUIPMENT BY CONSTRUCTING A STABILIZED PAD OF QUARRY SPALLS AT ENTRANCES TO CONSTRUCTION SITES.

CONDITIONS OF USE:

CONSTRUCTION ENTRANCES SHALL BE STABILIZED WHEREVER TRAFFIC WILL BE LEAVING A CONSTRUCTION SITE AND TRAVELING ON PAVED ROADS OR OTHER PAVED AREAS WITHIN 1,000 FEET OF THE SITE.

ON LARGE COMMERCIAL, HIGHWAY, AND ROAD PROJECTS, THE DESIGNER AND OR CONTRACTOR SHOULD INCLUDE ENOUGH MATERIALS IN THE CONTRACT TO ALLOW FOR ADDITIONAL STABILIZED ENTRANCES NOT SHOWN IN THE INITIAL CONSTRUCTION SWPPP. IT IS DIFFICULT TO DETERMINE EXACTLY WHERE ACCESS TO THESE PROJECTS WILL TAKE PLACE; ADDITIONAL MATERIALS WILL ENABLE THE CONTRACTOR TO INSTALL THEM WHERE NEEDED.

DESIGN AND INSTALLATION:

SEE FIGURE 7.3.2 OF THE EASTERN WATER STORMWATER MANAGEMENT MANUAL OR DETAIL BELOW.

THE SURFACE MATERIAL SHALL BE 4"-8" QUARRY SPALLS. SMALLER CRUSHED ROCK SUCH AS BASE COURSE MAY BE APPROPRIATE IN SOME SITUATIONS BUT, SINCE IT IS MORE LIKELY TO BE TRACKED OFF-SITE, MUST BE APPROVED BY THE LOCAL JURISDICTION.

A SEPARATION GEOTEXTILE SHALL BE PLACED UNDER THE SPALLS TO PREVENT FINE SEDIMENT FROM PUMPING UP INTO THE ROCK PAD. THE GEOTEXTILE SHALL MEET THE FOLLOWING STANDARDS:

GRAB TENSILE STRENGTH (ASTM D4751)	200 PSI MIN.
GRAB TENSILE ELONGATION (ASTM D4632)	30% MAX.
MULLEN BURST STRENGTH (ASTM D3786-80A)	400 PSI MIN.
AOS (ASTM D4751)	20-45 (U.S. STANDARD SIEVE SIZE)

IF SITE CONDITIONS DO NOT WARRANT THE USE OF GEOTEXTILE, IT IS NOT REQUIRED.

MAINTENANCE STANDARDS:

IF QUARRY SPALLS (OR HOG FUEL) SHALL BE ADDED IF THE PAD IS NO LONGER IN ACCORDANCE WITH THE SPECIFICATIONS.

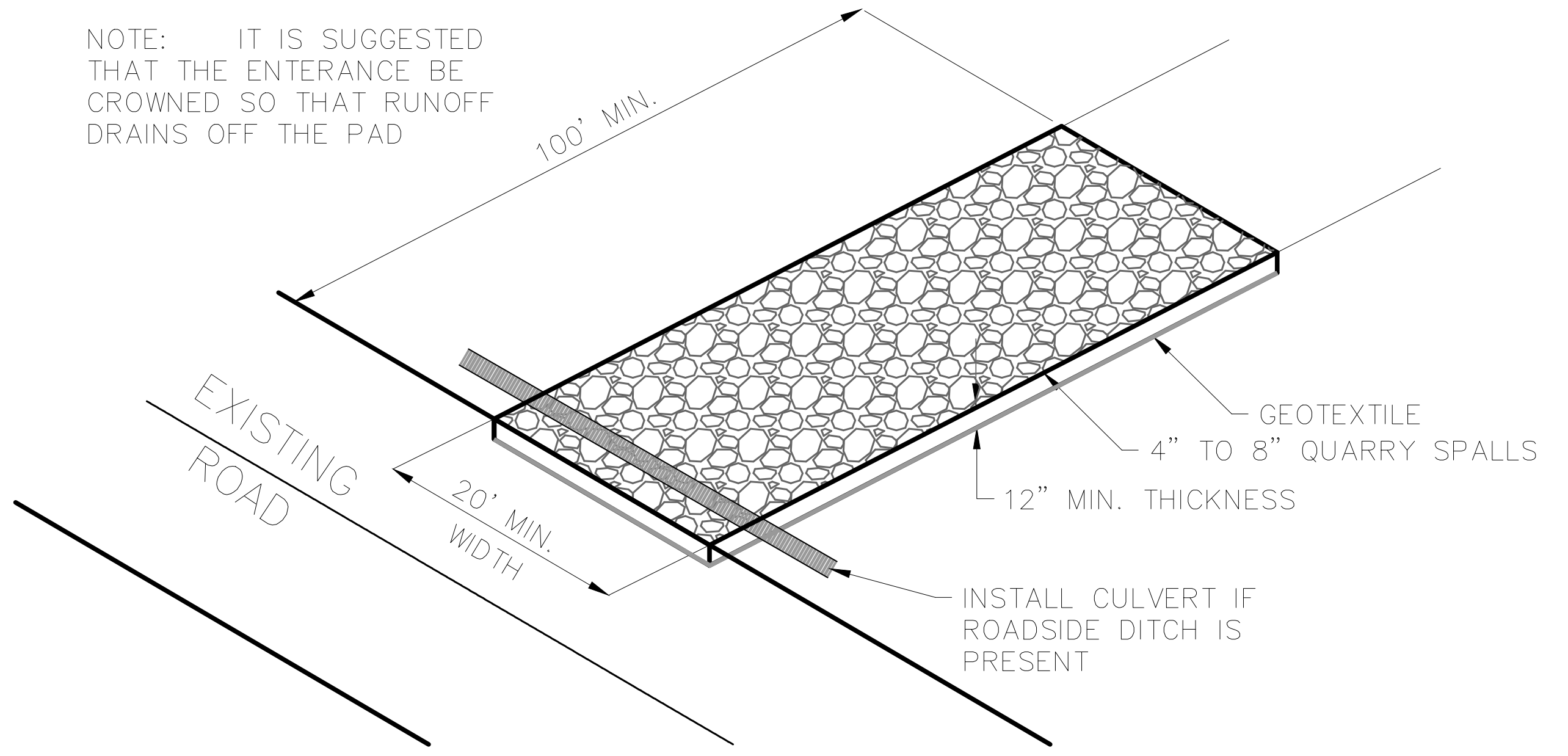
IF THE ENTRANCE IS NOT PREVENTING SEDIMENT FROM BEING TRACKED ONTO PAVEMENT, THEN ALTERNATIVE MEASURES TO KEEP THE STREETS FREE OF SEDIMENT SHALL BE USED. THIS MAY INCLUDE STREET SWEEPING, AN INCREASE IN THE DIMENSIONS OF THE ENTRANCE, OR THE INSTALLATION OF A WHEEL WASH.

ANY SEDIMENT THAT IS TRACKED ONTO PAVEMENT SHALL BE REMOVED BY SHOVELING OR STREET SWEEPING. THE SEDIMENT COLLECTED BY SWEEPING SHALL BE REMOVED RO STABILIZED ON SITE. THE PAVEMENT SHALL NOT BE CLEANED BY WASHING DOWN THE STREET, EXCEPT WHEN SWEEPING IS INEFFECTIVE AND THERE IS A THREAT TO PUBLIC SAFETY. IF IT IS NECESSARY TO WASH THE STREETS. THE CONSTRUCTION OF A SMALL SUMP SHALL BE CONSIDERED. THE SEDIMENT WOULD THEN BE WASHED INTO THE SUMP WHERE IT CAN BE CONTROLLED.

ANY QUARRY SPALLS THAT ARE LOOSENED FROM THE PAD, WHICH END UP ON THE ROADWAY SHALL BE REMOVED IMMEDIATELY.

IF VEHICLES ARE ENTERING OR EXITING THE SITE AT POINTS OTHER THAN THE CONSTRUCTION ENTERANCE(S), FENCING (SEE BMPS C103 AND C104) SHALL BE INSTALLED TO CONTROL TRAFFIC.

UPON PROJECT COMPLETION AND SITE STABILIZATION, ALL CONSTRUCTION ACCESSES INTENDED AS PERMANENT ACCESS FOR MAINTENANCE SHALL BE PERMANENTLY STABILIZED.



ROCK CONSTRUCTION ENTRY

NOT TO SCALE

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Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

TODD R. WHIPPLE
25462
10/13/16

PLANS
NOT APPROVED
BY AGENCY

NAVD - 88

TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

A	**08/03/16**	**RMA**	**ORIGINAL PREPARATION**
NO.	DATE	BY	REVISIONS

SCALE:
HORIZONTAL: **N/A**
VERTICAL: **N/A**

PROJ #: **13-1166**
DATE: **08/03/16**
DRAWN: **RMA**
REVIEWED: **TRW**

☒ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☐ PLANNING
☐ LANDSCAPE
☐ OTHER

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GUSTIN DITCH IMPROVEMENT PLANS
SWPPP BMPs
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SPOKANE COUNTY, WA

SHEET
C9.2

JOB NUMBER
13-1166

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SW$\frac{1}{2}$, SEC.34, T.25N., R.44E., W.M.
NE$\frac{1}{4}$, SEC. 4, T.24N., R.44E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

BMP C220: STORM DRAIN INLET PROTECTION

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

TO PREVENT COARSE SEDIMENT FROM ENTERING DRAINAGE SYSTEMS PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED AREA

CONDITIONS OF USE:

WHERE STORM DRAIN INLETS ARE TO BE MADE OPERATIONAL BEFORE PERMANENT STABILIZATION OF THE DISTURBED DRAINAGE AREA. PROTECTION SHOULD BE PROVIDED FOR ALL STORM DRAIN INLETS DOWNSLOPE AND WITHIN 500 FEET OF A DISTURBED OR CONSTRUCTION AREA, UNLESS THE RUNOFF THAT ENTERS THE CATCH BASIN WILL BE CONVEYED TO A SEDIMENT POND OR TRAP. INLET PROTECTION MAY BE USED ANYWHERE TO PROTECT THE DRAINAGE SYSTEM. IT IS LIKELY THAT THE DRAINAGE SYSTEM WILL REQUIRE CLEANING.

TABLE 7.3.9 (IN THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL) LISTS SEVERAL OPTIONS FOR INLET PROTECTION. ALL OF THE METHODS FOR STORM DRAIN INLET PROTECTION ARE PRONE TO PLUGGING AND REQUIRE A HIGH FREQUENCY OF MAINTENANCE. DRAINAGE AREAS SHOULD BE LIMITED TO 1 ACRE OR LESS. EMERGENCY OVERFLOWS MAY BE REQUIRED WHERE STORMWATER PONDING WOULD CAUSE A HAZARD. IF AN EMERGENCY OVERFLOW IS PROVIDED, ADDITIONAL END-OF-PIPE TREATMENT MAY BE REQUIRED.

DESIGN AND INSTALLATION:

EXCAVATED DROP INLET PROTECTION – AN EXCAVATED IMPOUNDMENT AROUND THE STORM DRAIN. SEDIMENT SETTLES OUT OF THE STORMWATER PRIOR TO ENTERING THE STORM DRAIN.

DEPTH 1–2 FT AS MEASURED FROM THE CREST OF THE INLET STRUCTURE.

SIDE SLOPES OF EXCAVATION NO STEEPER THAT 2:1

MINIMUM VOLUME OF EXCAVATION 35 CUBIC YARDS

SHAPE THE BASIN TO FIT THE SITE WITH THE LONGEST DIMENSION ORIENTED TOWARD THE LONGEST INFLOW AREA.

INSTALL PROVISIONS FOR DRAINING TO PREVENT STANDING WATER PROBLEMS.

CLEAR THE AREA OF ALL DEBRIS.

GRADE THE APPROACH TO THE INLET UNIFORMLY.

DRILL WEEP HOLES INTO THE SIDES OF THE INLET.

PROTECT WEEP HOLES WITH SCREEN WIRE AND WASHED AGGREGATE.

SEAL WEEP HOLES WHEN REMOVING STRUCTURE AND STABILIZING AREA.

IT MAY BE NECESSARY TO BUILD A TEMPORARY DIKE TO THE DOWN SLOPE STRUCTURE TO PREVENT BYPASS FLOW.

BLOCK AND GRAVEL FILTER – A BARRIER FORMED AROUND THE STORM DRAIN INLET WITH STANDARD CONCRETE BLOCKS AND GRAVEL. SEE FIGURE 4.15 IN THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

HEIGHT 1–2 FT ABOVE THE INLET.

RECESS THE FIRST ROW 2" INTO THE GROUND FOR STABILITY.

SUPPORT SUBSEQUENT COURSES BY PLACING A 2X4 THROUGH THE BLOCK OPENING.

DO NOT USE MORTAR.

LAY SOME BLOCKS IN THE BOTTOM ROW ON THEIR SIDE FOR DEWATERING THE POOL.

PLACE HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2" OPENINGS OVER ALL BLOCK OPENINGS.

PLACE GRAVEL JUST BELOW THE TOP OF BLOCKS ON SLOPES 2:1 OR FLATTER.

AN ALTERNATIVE DESIGN IN A GRAVEL DONUT.

INLET SLOPE OF 3:1.

OUTLET SLOPE OF 2:1.

1–FOOT WIDE LEVEL STONE AREA BETWEEN THE STRUCTURE AND THE INLET.

INLET SLOPES STONES 3" IN DIAMETER OR LARGER.

OUTLET SLOPE USE GRAVEL 1/2" TO 3/4" AT A MINIMUM THICKNESS OF 1 FOOT.

GRAVEL AND WIRE MESH INLET – A GRAVEL BARRIER PLACED OVER TOP OF THE INLET. THIS STRUCTURE DOES NOT PROVIDE AND OVERFLOW

HARDWARE CLOTH OR COMPARABLE WIRE MESH WITH 1/2" OPENINGS.

COARSE AGGREGATE.

HEIGHT 1–FOOT OR MORE, 18" WIDER THAN INLET ON ALL SIDES.

PLACE WIRE MESS OVER THE DROP INLET SO THAT THE WIRE EXTENDS A MINIMUM OF 1–FOOT BEYOND EACH SIDE OF THE INLET STRUCTURE,

IF MORE THAN ONE STRIP OF MESH IN NECESSARY, OVERLAP THE STRIPS.

PLACE COARSE AGGREGATE OVER THE WIRE MESH.

THE DEPTH OF THE GRAVEL SHOULD BE AT LEAST 12" OVER THE ENTIRE INLET OPENING AND EXTEND AT LEAST 18" ON ALL SIDES.

DESIGN AND INSTALLATION CONTINUED:

CATCH BASIN FILTERS – INSERTS SHOULD BE DESIGNED BY THE MANUFACTURER FOR USE AT CONSTRUCTION SITES. THE LIMITED SEDIMENT STORAGE CAPACITY INCREASES THE AMOUNT OF INSPECTION AND MAINTENANCE REQUIRED, WHICH MAY BE DAILY FOR HEAVY SEDIMENT LOADS, THE MAINTENANCE REQUIREMENTS CAB BE REDUCED BY COMBINING A CATCH BASIN FILTER WITH ANOTHER TYPE OF INLET PROTECTION. THIS TYPE OF INLET PROTECTION PROVIDES FLOW BYPASS WITHOUT OVERFLOW AND THEREFORE MAY BE A BETTER METHOD FOR INLETS LOCATED ALONG ACTIVE RIGHTS–OF–WAY.

5 CUBIC FEET OF STORAGE

DEWATERING PROVISIONS

HIGH–FLOW BYPASS THAT WILL NOT CLOG UNDER NORMAL USE AT A CONSTRUCTION SITE.

THE CATCH BASIN FILTER IS INSERTED IN THE CATCH BASIN JUST BELOW THE GRATING.

CURB INLET PROTECTION WITH WOODED WEIR – BARRIER FORMED AROUND CURB INLET WITH A WOODEN FRAME AND GRAVEL.

WIRE MESH WITH 1/2" OPENINGS.

EXTRA STRENGTH FILTER FABRIC TO THE FRAME.

PILE COARSE WASHED AGGREGATE AGAINST THE WIRE/FABRIC.

PLACE WEIGHT ON FRAME ANCHORS.

BLOCK AND GRAVEL CURB INLET PROTECTION – BARRIER FORMED AROUND AN INLET WITH CONCRETE BLOCKS AND GRAVEL. SEE FIGURE 7.3.16 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

WIRE MESH WITH 1/2" OPENINGS.

PLACE 2 CONCRETE BLOCKS ON THEIR SIDES ABUTTING THE CURB AT EITHER SIDE OF THE INLET OPENING. THESE ARE SPACER BLOCKS.

PLACE A 2X4 STUD THROUGH THE OUT HOLES OF EACH SPACER BLOCK TO ALIGN THE FRONT BLOCKS.

PLACE BLOCKS ON THEIR SIDES ACROSS THE FRONT OF THE INLET AND ABUTTING THE SPACER BLOCKS.

PLACE WIRE MESH OVER THE OUTSIDE VERTICAL FACE.

PILE COARSE AGGREGATE AGAINST THE WIRE TO THE TOP OF THE BARRIER.

CURB AND GUTTER SEDIMENT BARRIER – SANDBAG OR ROCK BERM (RIPRAP AND AGGREGATE) 3 FEET HIGH AND 3 FEET WIDE IN A HORSESHOE SHAPE. SEE FIGURE 7.3.17 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL.

CONSTRUCT HORSESHOE SHAPED BERM, FACED WITH COARSE AGGREGATE IF USING RIPRAP, 3 FEET HIGH AND 3 FEET WIDE, AT LEAST 2 FEET FROM THE INLET.

CONSTRUCT A HORSESHOE SHAPED SEDIMENTATION TRAP ON THE OUTSIDE OF THE BERM SIZED TO SEDIMENT TRAP STANDARDS FOR PROTECTING A CULVERT INLET.

MAINTENANCE STANDARDS:

CATCH BASIN FILTERS SHOULD BE INSPECTED FREQUENTLY, ESPECIALLY AFTER STORM EVENTS. IF THE INSERT BECOMES CLOGGED, IT SHOULD BE CLEANED OR REPLACED.

FOR SYSTEMS USING STONE FILTERS: IF THE STONE FILTER BECOMES CLOGGED WITH SEDIMENT, THE STONES MUST BE PULLED AWAY FROM THE INLET AND CLEANED OR REPLACED. SINCE CLEANING OF GRAVEL AT A CONSTRUCTION SITE MAY BE DIFFICULT, AN ALTERNATIVE APPROACH WOULD BE USED TO USE THE CLOGGED STONE AS FILL AND PUT FRESH STONE AROUND THE INLET.

DO NOT WASH SEDIMENT INTO STORM DRAINS WHILE CLEANING. SPREAD ALL EXCAVATED MATERIAL EVENLY OVER THE SURROUNDING LAND AREA OR STOCKPILE AND STABILIZE AS APPROPRIATE.

BMP C151: CONCRETE HANDLING

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

CONCRETE WORK CAN GENERATE PROCESS WATER AND SLURRY THAT CONTAIN FINE PARTICLES AND HIGH PH, BOTH OF WHICH CAN VIOLATE WATER QUALITY STANDARDS IN THE RECEIVING WATER. THIS BMP IS INTENDED TO MINIMIZE AND ELIMINATE CONCRETE PROCESS WATER AND SLURRY FROM ENTERING WATERS OF THE STATE.

CONDITIONS OF USE:

ANY TIME CONCRETE IS USED, THESE MANAGEMENT PRACTICES SHALL BE UTILIZED. CONCRETE CONSTRUCTION PROJECTS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:

- CURBS
- SIDEWALKS
- ROADS
- BRIDGES
- FOUNDATIONS
- FLOORS
- RUNWAYS

DESIGN AND INSTALLATION:

CONCRETE TRUCK CHUTES, PUMPS, AND INTERNALS SHALL BE WASHED OUT ONLY INTO FORMED AREAS AWAITING INSTALLATION OF CONCRETE OR ASPHALT.

UNUSED CONCRETE REMAINING IN THE TRUCK AND PUMP SHALL BE RETURNED TO THE ORIGINATING BATCH PLANT FOR RECYCLING.

HAND TOOLS INCLUDING, BUT NOT LIMITED TO, SCREEDS, SHOVELS, RAKES, FLOATS, AND TROWELS SHALL BE WASHED OFF ONLY INTO FORMED AREAS AWAITING INSTALLATION OF CONCRETE OR ASPHALT.

EQUIPMENT THAT CANNOT BE EASILY MOVED, SUCH AS CONCRETE PAVERS, SHALL ONLY BE WASHED IN AREAS THAT DO NOT DIRECTLY DRAIN TO NATURAL OR CONSTRUCTED STORMWATER CONVEYANCES.

WASHDOWN FROM AREAS SUCH AS CONCRETE AGGREGATE DRIVEWAYS SHALL NOT DRAIN DIRECTLY TO NATURAL OR CONSTRUCTED STORMWATER CONVEYANCES.

WHEN NO FORMED AREAS ARE AVAILABLE, WASHWATER AND LEFTOVER PRODUCT SHALL BE CONTAINED IN A LINED CONTAINER. CONTAINED CONCRETE SHALL BE DISPOSED OF IN A MANNER THAT DOES NOT VIOLATE GROUNDWATER OR SURFACE WATER QUALITY STANDARDS.

MAINTENANCE STANDARDS:

CONTAINERS SHALL BE CHECKED FOR HOLES IN THE LINER DAILY DURING CONCRETE POURS AND REPAIRED THE SAME DAY.

CONCRETE TRUCK WASHOUT STANDARDS

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NOT TO SCALE

BMP C140: DUST CONTROL

INFORMATION TAKEN FROM CHAPTER 7 OF THE EASTERN WASHINGTON STORMWATER MANAGEMENT MANUAL 2004 EDITION

PURPOSE:

DUST CONTROL PREVENTS WIND TRANSPORT OF DUST FROM DISTURBED SOIL SURFACES ONTO ROADWAYS, DRAINAGE WAYS, AND SURFACE WATERS. WIND EROSION IS A SIGNIFICANT CAUSE OF SOIL MOVEMENT FROM CONSTRUCTION SITES IN EASTERN WASHINGTON. ALTHOUGH WIND EROSION CAN CONTRIBUTE TO WATER QUALITY IMPACTS, DUST CONTROL IS REGULATED IN SOME AREAS OF EASTERN WASHINGTON PRIMARILY THROUGH LOCAL AIR QUALITY AUTHORITIES. WHERE SUCH AN ENTITY EXISTS, CONTACT THE LOCAL AIR QUALITY AUTHORITY FOR APPROPRIATE AND REQUIRED BMPS FOR DUST CONTROL TO IMPLEMENT AT YOUR PROJECT SITE.

CONDITIONS OF USE:

IN AREAS (INCLUDING ROADWAYS) SUBJECT TO SURFACE AND AIR MOVEMENT OF DUST WHERE ON–SITE AND OFF–SITE IMPACTS TO ROADWAYS, DRAINAGE WAYS, OR SURFACE WATERS ARE LIKELY.

DESIGN AND INSTALLATION:

CONTACT YOUR LOCAL AIR POLLUTION CONTROL AUTHORITY FOR GUIDANCE AND TRAINING ON OTHER DUST CONTROL MEASURES. COMPLIANCE WITH THE LOCAL AIR POLLUTION CONTROL AUTHORITY CONSTITUTES COMPLIANCE WITH THIS BMP.

WATER APPLIED TO CONSTRUCTION SITES FOR DUST CONTROL MUST NOT LEAVE THE SITE AS SURFACE RUNOFF.

SEE ALSO "TECHNIQUES FOR DUST PREVENTION AND SUPPRESSION," ECOLOGY PUBLICATION NUMBER 96–433, REVISED APRIL 2002.

TECHNIQUES THAT CAN BE USED FOR CONSTRUCTION PROJECTS INCLUDE:

VEGETATE OR MULCH AREAS THAT WILL NOT RECEIVE VEHICLE TRAFFIC. IN AREAS WHERE PLANTING, MULCHING, OR PAVING IS IMPRACTICAL, APPLY GRAVEL OR LANDSCAPING ROCK.

LIMIT DUST GENERATION BY CLEARING ONLY THOSE AREAS WHERE IMMEDIATE ACTIVITY WILL TAKE PLACE, LEAVING THE REMAINDER AREA(S) IN THE ORIGINAL CONDITION, IF STABLE. MAINTAIN THE ORIGINAL GROUND COVER AS LONG AS PRACTICAL.

CONSTRUCT NATURAL OR ARTIFICIAL WINDBREAKS OR WINDSCREENS. THESE MAY BE DESIGNED AS ENCLOSURES FOR SMALL DUST SOURCES.

SPRINKLE THE SITE WITH WATER UNTIL THE SURFACE IS WET. REPEAT AS NEEDED. TO PREVENT CARRYOUT OF MUD ONTO STREET, REFER TO STABILIZED CONSTRUCTION ENTRANCE (BMP C105).

IRRIGATION WATER CAN BE USED FOR DUST CONTROL. IRRIGATION SYSTEMS SHOULD BE INSTALLED AS A FIRST STEP ON SITES WHERE DUST CONTROL IS A CONCERN.

SPRAY EXPOSED SOIL AREAS WITH A DUST PALLIATIVE, FOLLOWING THE MANUFACTURER'S INSTRUCTIONS AND CAUTIONS REGARDING ANDLING AND APPLICATION. USED OIL IS PROHIBITED FROM USE AS A DUST SUPPRESSANT. LOCAL GOVERNMENTS MAY APPROVE OTHER DUST PALLIATIVES SUCH AS CALCIUM CHLORIDE OR PAM.

PAM (BMPC126) ADDED TO WATER AT A RATE OF 0.5LBS PER 1,000 GALLONS OF WATER PER ACRE AND APPLIED FROM A WATER TRUCK IS MORE EFFECTIVE THAT WATER ALONE. THE IS DUE TO THE INCREASED INFILTRATION OF WATER INTO THE SOIL AND REDUCED EVAPORATION. IN ADDITION, SMALL SOIL PARTICLES ARE BONDED TOGETHER AND ARE NOT AS EASILY TRANSPORTED BY WIND. ADDING PAM MAY ACTUALLY REDUCE THE QUANTITY OF WATER NEEDED FOR DUST CONTROL, ESPECIALLY IN EASTERN WASHINGTON. SINCE THE WHOLESALE COST OF PAM IS ABOUT $4.00 PER POUND, THIS IS AN EXTREMELY COST–EFFECTIVE DUST CONTROL METHOD.

TECHNIQUES THAT CAN BE USED FOR UNPAVED ROADS AND LOTS INCLUDE:

LOWER SPEED LIMITS. HIGH VEHICLE SPEEDS INCREASES THE AMOUNT OF DUST STIRRED UP FROM UNPAVED ROADS AND LOTS.

UPGRADE ROAD SURFACE STRENGTH BY IMPROVING PARTICLE SIZE, SHAPE, AND MINERAL TYPES THAT MAKE UP THE SURFACE AND BASE MATERIALS.

ADD SURFACE GRAVEL TO REDUCE THE SOURCE OF DUST EMISSION. LIMIT THE AMOUNT OF FINE PARTICLES (THOSE SMALLER THAN .075 MILLIMETERS) 10 TO 20 PERCENT.

USE GEOTEXTILE FABRIC TO INCREASE THE STRENGTH OF NEW ROADS OR ROADS UNDERGOING RECONSTRUCTION.

ENCOURAGE THE USE OF ALTERNATE, PAVED ROUTES, IF AVAILABLE.

RESTRICT USE BY TRACKED VEHICLES AND HEAVY TRUCKS TO PREVENT DAMAGE TO ROAD SURFACE AND BASE.

APPLY CHEMICAL DUST SUPPRESSANTS USING THE ADMIX METHOD, BLENDING THE PRODUCT WITH THE TOP FEW INCHES OF MATERIAL. SUPPRESSANTS MAY ALSO BE APPLIED AS SURFACE TREATMENTS.

PAVE UNPAVED PERMANENT ROADS AND OTHER TRAFFICKED AREAS.

USE VACUUM STREET SWEEPERS.

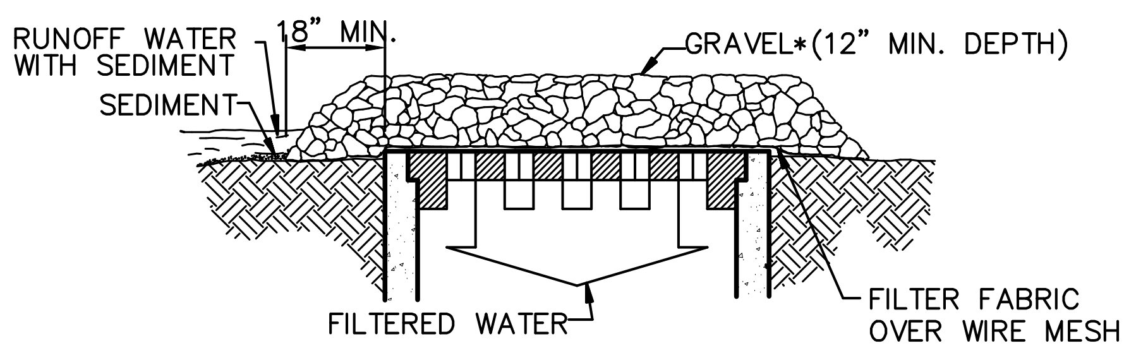
REMOVED MUD AND OTHER DIRT PROMPTLY SO IT DOES NOT DRY AND THEN TURN INTO DUST.

LIMIT DUST–CAUSEING WORK ON WINDY DAYS.

MAINTENANCE STANDARDS:

REPAY AREA AS NECESSARY TO KEEP DUST TO A MINIMUM. WATER APPLIED TO CONSTRUCTION SITES FOR DUST CONTROL MUST NOT LEAVE THE SITE AS SURFACE RUNOFF.

* GRAVEL SHALL BE 2"–3" CLEAN STONE



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY CONCENTRATED FLOWS ARE EXPECTED, BUT NOT WHERE PONDING AROUND THE STRUCTURE MIGHT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT STRUCTURES AND UNPROTECTED ACRES.

GRAVEL AND WIRE MESH INLET SEDIMENT FILTER

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NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29)=2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
A	**08/03/16**	**RMA**	**ORIGINAL PREPARATION**

SCALE:
HORIZONTAL: **N/A**
VERTICAL: **N/A**

PROJ #: **13-1166**
DATE: **08/03/16**
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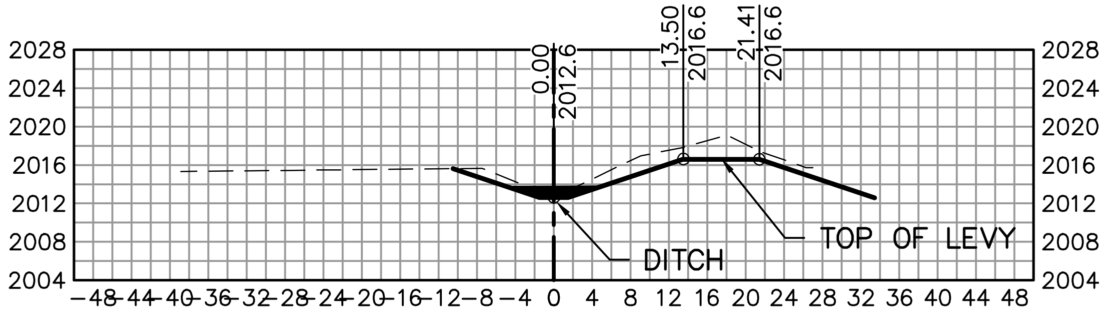

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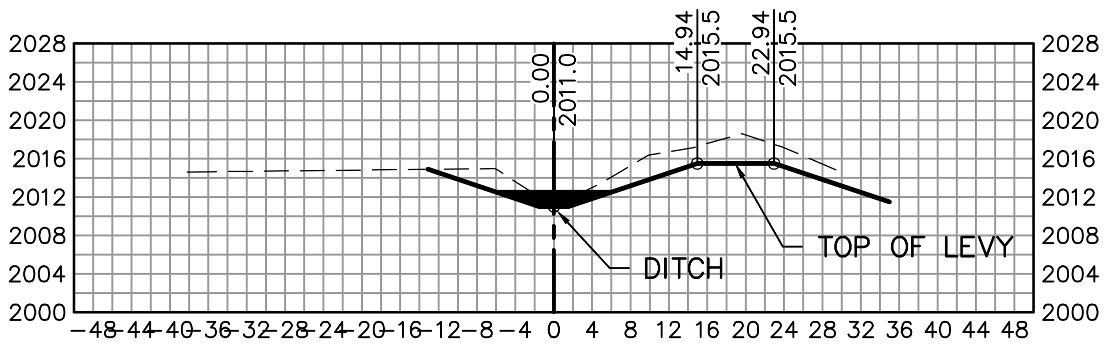

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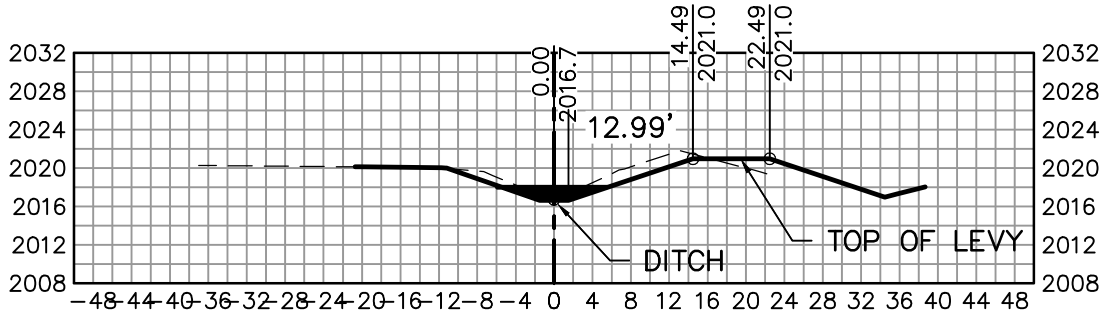

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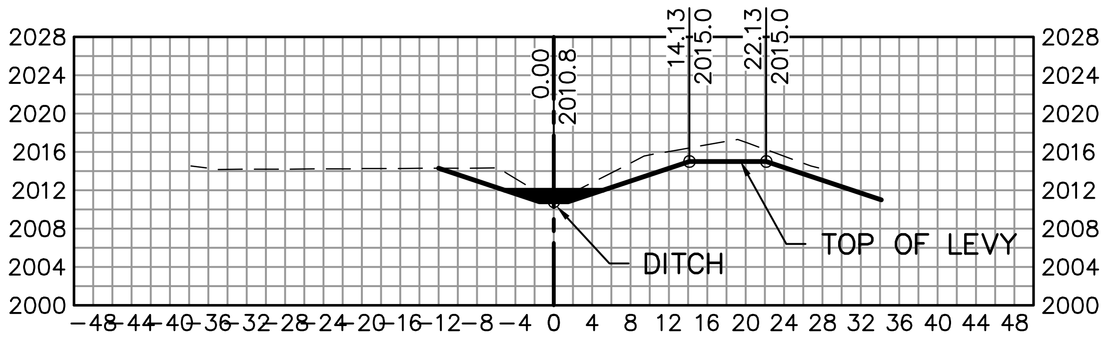

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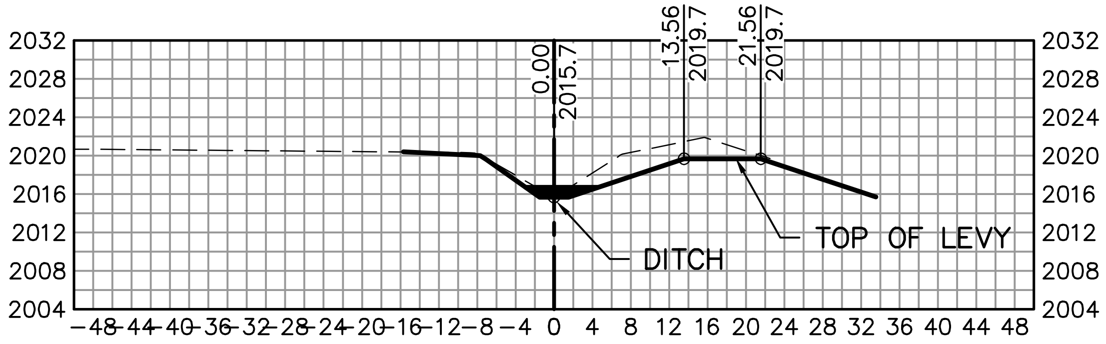

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DATE: 10/13/16
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APPROVED: TRW

GUSTIN DITCH LEVEE CROSS SECTION
PAINTED HILLS PRD
DISHMAN-MICA RD AND THORPE RD
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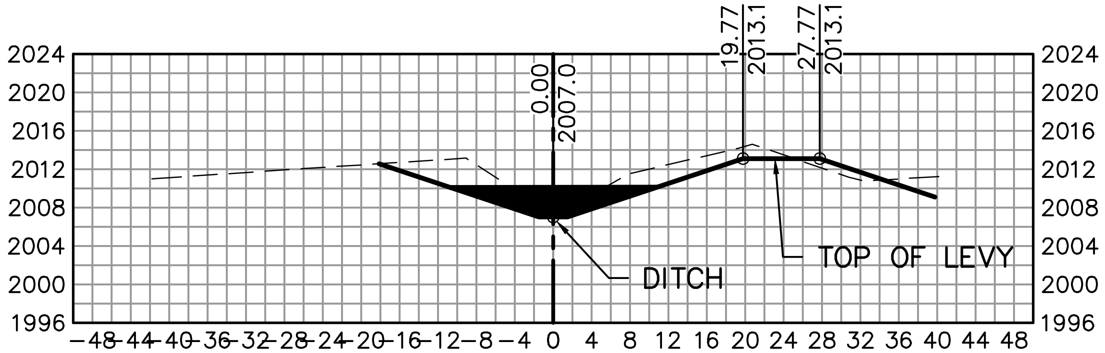

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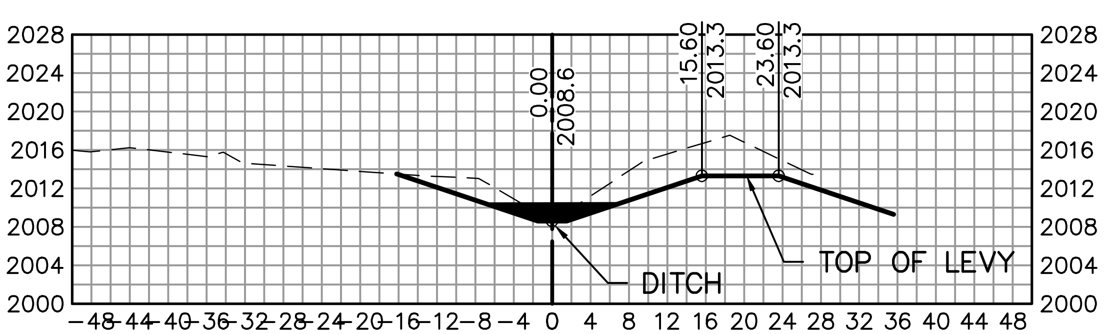

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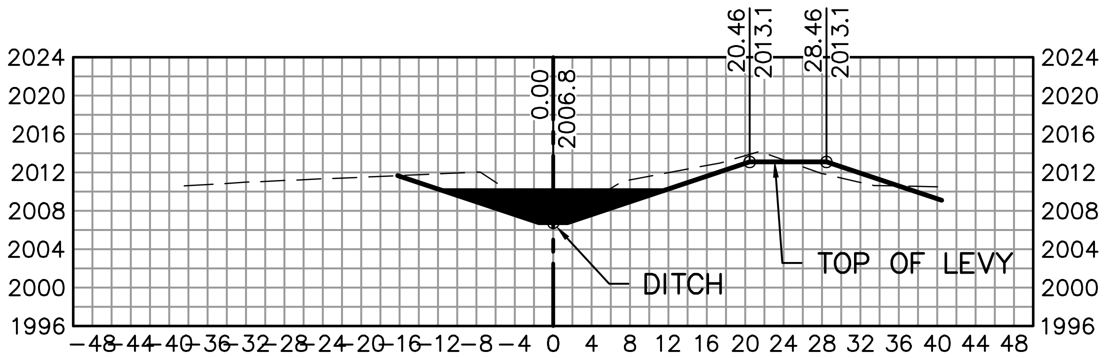

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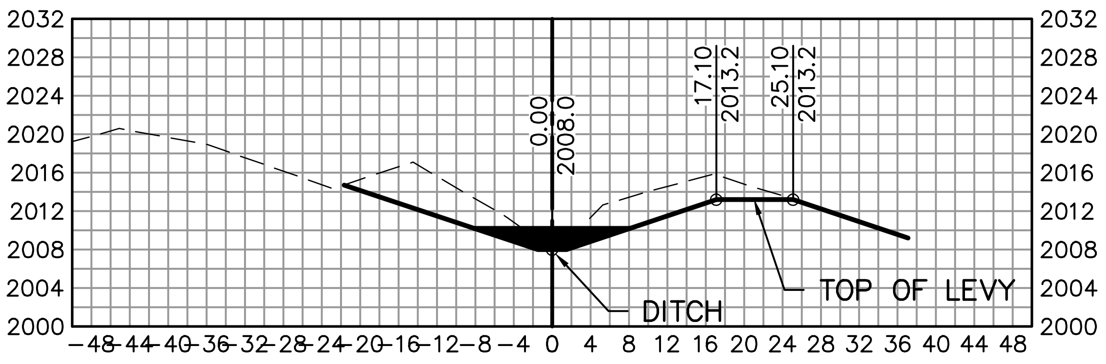

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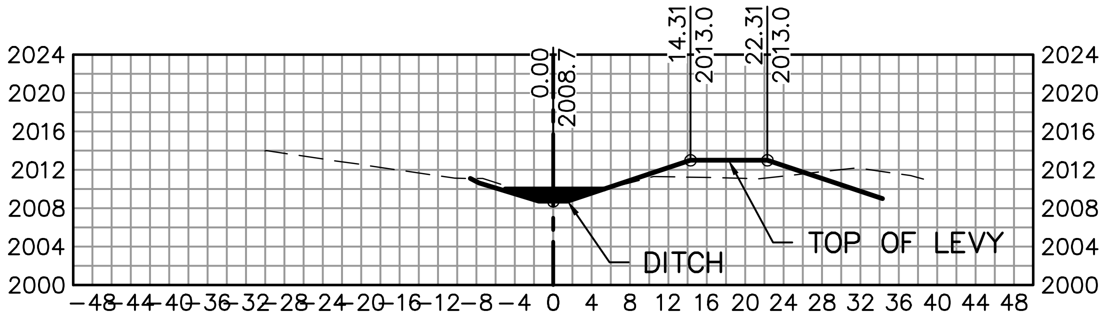

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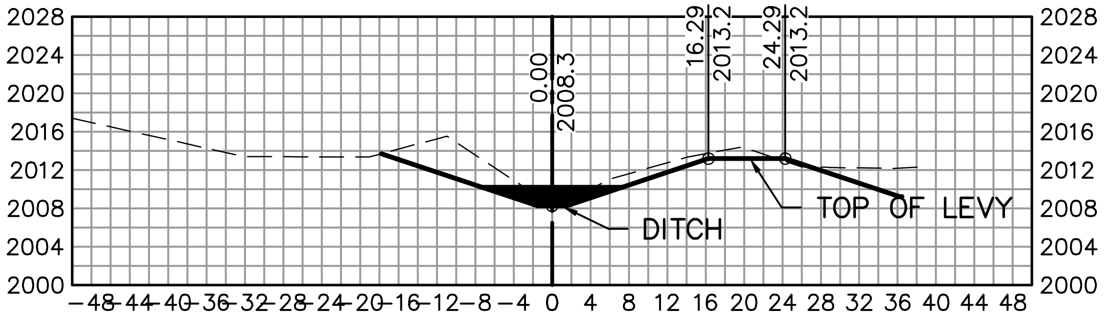

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GUSTIN LEVEE CROSS SECTIONS
PAINTED HILLS PRD
DISHMAN-MICA RD AND THORPE RD
CITY OF SPOKANE VALLEY, WASHINGTON

SHEET
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OF
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Appendix C. Duplicate Effective Models

Duplicate Effective Model Output - Golf Course Overflow Reach

HEC-RAS Plan: DEM River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	20779	10-yr	30.00	2004.98	2007.19	2005.40	2007.19	0.000006	0.06	517.26	1198.11	0.01
Golf Course	20779	50-yr	54.00	2004.98	2007.80	2005.49	2007.80	0.000003	0.05	1164.72	1860.64	0.01
Golf Course	20779	100-yr	64.00	2004.98	2008.05	2005.52	2008.05	0.000002	0.04	1491.37	1985.36	0.01
Golf Course	20779	500-yr	88.00	2004.98	2008.64	2005.58	2008.64	0.000000	0.03	3229.73	2191.83	0.00
Golf Course	21013	10-yr	30.00	2007.36	2007.65	2007.65	2007.74	0.048676	2.02	13.20	348.57	0.86
Golf Course	21013	50-yr	54.00	2007.36	2007.77	2007.77	2007.86	0.043680	2.09	23.46	392.88	0.83
Golf Course	21013	100-yr	64.00	2007.36	2007.79	2007.79	2007.90	0.048191	2.30	25.52	395.42	0.89
Golf Course	21013	500-yr	88.00	2007.36	2008.64	2007.85	2008.64	0.000463	0.44	192.58	634.20	0.10
Golf Course	21128	10-yr	30.00	2007.08	2008.27	2007.75	2008.28	0.000865	0.55	54.77	320.34	0.14
Golf Course	21128	50-yr	54.00	2007.08	2008.53	2007.86	2008.54	0.001133	0.60	89.93	413.16	0.16
Golf Course	21128	100-yr	64.00	2007.08	2008.60	2007.90	2008.61	0.001181	0.62	103.84	442.77	0.16
Golf Course	21128	500-yr	88.00	2007.08	2008.77	2007.98	2008.77	0.001015	0.61	145.13	510.87	0.15
Golf Course	21229	10-yr	30.00	2006.97	2008.63	2008.48	2008.64	0.007738	0.82	36.63	445.79	0.34
Golf Course	21229	50-yr	54.00	2006.97	2008.82	2008.55	2008.83	0.002311	0.62	86.72	540.30	0.20
Golf Course	21229	100-yr	64.00	2006.97	2008.87	2008.57	2008.88	0.001925	0.63	102.09	545.70	0.19
Golf Course	21229	500-yr	88.00	2006.97	2008.98	2008.63	2008.99	0.001412	0.65	136.02	549.37	0.17
Golf Course	21385	10-yr	30.00	2008.16	2008.94	2008.47	2008.94	0.000409	0.31	97.80	268.00	0.09
Golf Course	21385	50-yr	54.00	2008.16	2009.08	2008.53	2009.08	0.000477	0.40	135.88	283.37	0.10
Golf Course	21385	100-yr	64.00	2008.16	2009.12	2008.56	2009.12	0.000512	0.43	147.76	285.92	0.11
Golf Course	21385	500-yr	88.00	2008.16	2009.22	2008.61	2009.22	0.000552	0.50	176.40	291.98	0.11
Golf Course	21409	10-yr	30.00	2008.27	2008.98	2008.68	2008.98	0.001022	0.46	64.91	246.09	0.14
Golf Course	21409	50-yr	54.00	2008.27	2009.12	2008.75	2009.13	0.001113	0.58	93.59	269.70	0.15
Golf Course	21409	100-yr	64.00	2008.27	2009.17	2008.77	2009.17	0.001210	0.62	103.41	283.87	0.16
Golf Course	21409	500-yr	88.00	2008.27	2009.27	2008.81	2009.28	0.001345	0.68	128.93	323.53	0.17
Golf Course	21431	10-yr	30.00	2008.12	2009.03	2008.45	2009.03	0.000564	0.40	74.75	174.33	0.11
Golf Course	21431	50-yr	54.00	2008.12	2009.18	2008.54	2009.18	0.000767	0.52	103.72	206.07	0.13
Golf Course	21431	100-yr	64.00	2008.12	2009.23	2008.59	2009.24	0.000845	0.56	114.48	222.73	0.14
Golf Course	21431	500-yr	88.00	2008.12	2009.34	2008.66	2009.35	0.000870	0.64	138.33	232.31	0.14
Golf Course	21445	10-yr	30.00	2008.44	2009.09	2008.89	2009.12	0.014872	1.32	22.80	104.20	0.50
Golf Course	21445	50-yr	54.00	2008.44	2009.26	2009.06	2009.28	0.007937	1.23	44.01	139.40	0.38
Golf Course	21445	100-yr	64.00	2008.44	2009.31	2009.10	2009.33	0.006788	1.24	51.65	143.41	0.36
Golf Course	21445	500-yr	88.00	2008.44	2009.42	2009.16	2009.44	0.005945	1.31	67.25	155.76	0.35
Golf Course	21456	10-yr	30.00	2012.42	2012.99	2012.99	2013.09	0.062673	2.50	12.01	61.57	1.00
Golf Course	21456	50-yr	54.00	2012.42	2013.11	2013.11	2013.21	0.060991	2.52	21.40	105.91	0.99
Golf Course	21456	100-yr	64.00	2012.42	2013.14	2013.14	2013.24	0.060320	2.61	24.55	114.71	0.99
Golf Course	21456	500-yr	88.00	2012.42	2013.18	2013.18	2013.31	0.066521	2.86	30.76	134.60	1.05
Golf Course	21481	10-yr	30.00	2011.45	2013.10	2011.82	2013.10	0.000004	0.05	549.78	595.32	0.01
Golf Course	21481	50-yr	54.00	2011.45	2013.22	2011.87	2013.22	0.000009	0.09	620.16	630.22	0.02
Golf Course	21481	100-yr	64.00	2011.45	2013.25	2011.90	2013.25	0.000011	0.10	643.07	634.13	0.02
Golf Course	21481	500-yr	88.00	2011.45	2013.33	2011.93	2013.33	0.000017	0.13	690.78	652.52	0.02
Golf Course	21515	10-yr	30.00	2012.10	2013.10	2012.40	2013.10	0.000023	0.09	319.84	606.72	0.02
Golf Course	21515	50-yr	54.00	2012.10	2013.22	2012.45	2013.22	0.000041	0.14	390.15	624.52	0.03
Golf Course	21515	100-yr	64.00	2012.10	2013.25	2012.45	2013.25	0.000048	0.15	412.91	628.83	0.03
Golf Course	21515	500-yr	88.00	2012.10	2013.33	2012.51	2013.33	0.000063	0.19	459.74	631.14	0.04
Golf Course	21548	10-yr	30.00	2012.09	2013.10	2012.31	2013.10	0.000009	0.07	431.64	624.31	0.01
Golf Course	21548	50-yr	54.00	2012.09	2013.22	2012.36	2013.22	0.000017	0.11	503.76	626.72	0.02
Golf Course	21548	100-yr	64.00	2012.09	2013.25	2012.37	2013.26	0.000021	0.12	526.71	630.57	0.02
Golf Course	21548	500-yr	88.00	2012.09	2013.33	2012.40	2013.33	0.000030	0.15	574.26	635.70	0.03
Golf Course	21924	10-yr	30.00	2012.11	2013.11	2012.42	2013.11	0.000094	0.20	148.10	251.16	0.05
Golf Course	21924	50-yr	54.00	2012.11	2013.23	2012.49	2013.23	0.000169	0.30	178.90	258.69	0.06
Golf Course	21924	100-yr	64.00	2012.11	2013.27	2012.52	2013.27	0.000198	0.34	188.99	259.57	0.07
Golf Course	21924	500-yr	88.00	2012.11	2013.35	2012.57	2013.35	0.000270	0.42	210.13	264.29	0.08
Golf Course	22423	10-yr	30.00	2012.71	2013.25	2012.98	2013.26	0.001640	0.59	50.60	146.20	0.18
Golf Course	22423	50-yr	54.00	2012.71	2013.44	2013.05	2013.45	0.001371	0.67	80.89	171.04	0.17
Golf Course	22423	100-yr	64.00	2012.71	2013.51	2013.07	2013.52	0.001404	0.69	93.10	191.81	0.17
Golf Course	22423	500-yr	88.00	2012.71	2013.64	2013.12	2013.65	0.001265	0.74	118.92	202.88	0.17
Golf Course	22972	10-yr	30.00	2013.92	2014.64	2014.45	2014.67	0.008668	1.44	20.79	55.11	0.41
Golf Course	22972	50-yr	54.00	2013.92	2014.75	2014.57	2014.81	0.012175	1.98	27.23	57.83	0.51
Golf Course	22972	100-yr	64.00	2013.92	2014.82	2014.60	2014.88	0.011286	2.05	31.19	59.44	0.50
Golf Course	22972	500-yr	88.00	2013.92	2014.90	2014.69	2014.99	0.014083	2.44	36.12	62.83	0.57
Golf Course	23005	10-yr	30.00	2014.38	2015.02	2014.75	2015.03	0.002403	0.74	40.27	110.11	0.22
Golf Course	23005	50-yr	54.00	2014.38	2015.19	2014.83	2015.21	0.002393	0.89	60.89	127.76	0.23
Golf Course	23005	100-yr	64.00	2014.38	2015.25	2014.86	2015.27	0.002377	0.93	68.85	133.94	0.23
Golf Course	23005	500-yr	88.00	2014.38	2015.39	2014.91	2015.41	0.002414	0.99	89.09	160.09	0.23

HEC-RAS Plan: DEM   River: Chester Creek   Reach: Golf Course (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	23050	10-yr	30.00	2014.61	2015.15	2014.87	2015.16	0.002068	0.66	45.59	134.11	0.20
Golf Course	23050	50-yr	54.00	2014.61	2015.32	2014.95	2015.33	0.001873	0.78	69.54	148.17	0.20
Golf Course	23050	100-yr	64.00	2014.61	2015.38	2014.98	2015.39	0.001824	0.82	78.28	151.35	0.20
Golf Course	23050	500-yr	88.00	2014.61	2015.51	2015.03	2015.53	0.001669	0.89	99.12	158.47	0.20
Golf Course	23090	10-yr	30.00	2014.93	2015.45	2015.26	2015.46	0.004945	0.92	32.71	112.46	0.30
Golf Course	23090	50-yr	54.00	2014.93	2015.60	2015.34	2015.62	0.004846	1.02	52.71	151.19	0.31
Golf Course	23090	100-yr	64.00	2014.93	2015.65	2015.37	2015.66	0.004571	1.07	59.93	154.61	0.30
Golf Course	23090	500-yr	88.00	2014.93	2015.76	2015.42	2015.78	0.003967	1.13	77.59	164.46	0.29
Golf Course	23446	10-yr	30.00	2017.57	2017.97	2017.87	2017.99	0.012985	1.12	26.76	140.46	0.45
Golf Course	23446	50-yr	54.00	2017.57	2018.07	2017.95	2018.10	0.012855	1.25	43.35	192.81	0.46
Golf Course	23446	100-yr	64.00	2017.57	2018.10	2017.97	2018.12	0.013801	1.32	48.44	208.05	0.48
Golf Course	23446	500-yr	88.00	2017.57	2018.13	2018.02	2018.17	0.016731	1.56	56.49	218.88	0.54
Golf Course	23887	10-yr	30.00	2022.25	2022.83	2022.66	2022.85	0.005569	0.88	34.05	135.89	0.31
Golf Course	23887	50-yr	54.00	2022.25	2022.95	2022.74	2022.97	0.005634	1.05	51.30	158.11	0.33
Golf Course	23887	100-yr	64.00	2022.25	2022.99	2022.76	2023.01	0.005408	1.11	57.80	160.17	0.32
Golf Course	23887	500-yr	88.00	2022.25	2023.09	2022.81	2023.11	0.004911	1.20	73.64	169.28	0.32
Golf Course	24430	10-yr	30.00	2028.58	2029.25	2029.25	2029.46	0.048764	3.65	8.29	21.75	1.00
Golf Course	24430	50-yr	54.00	2028.58	2029.47	2029.47	2029.73	0.037372	4.21	13.58	28.66	0.94
Golf Course	24430	100-yr	64.00	2028.58	2029.56	2029.56	2029.82	0.031201	4.22	16.81	37.07	0.88
Golf Course	24430	500-yr	88.00	2028.58	2029.72	2029.72	2029.99	0.026137	4.41	23.23	42.98	0.83

Duplicate Effective Model Output - Golf Course Overflow Reach, Floodway

HEC-RAS Plan: DEM FW   River: Chester Creek   Reach: Golf Course

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Golf Course	20779	Q100 - base	2008.05		2008.05	1327.67		64.00			934.91	2798.66	
Golf Course	20779	Q100 - floodway	2009.05	1.00	2009.05	1178.72		64.00		934.91	934.91	2798.66	2278.72
Golf Course	21013	Q100 - base	2008.05		2008.07	147.76		52.43	11.57		508.09	1602.56	
Golf Course	21013	Q100 - floodway	2009.05	1.00	2009.05	173.18		52.98	11.02	1472.43	508.09	1602.56	1725.00
Golf Course	21128	Q100 - base	2008.53		2008.54	190.90		64.00			409.35	1512.91	
Golf Course	21128	Q100 - floodway	2009.05	0.52	2009.11	25.00		64.00		1045.00	409.35	1512.91	1070.00
Golf Course	21229	Q100 - base	2008.86		2008.87	305.94		64.00			417.95	1452.44	
Golf Course	21229	Q100 - floodway	2009.59	0.72	2009.62	35.00		64.00		985.00	417.95	1452.44	1020.00
Golf Course	21385	Q100 - base	2009.12		2009.12	285.78		64.00			431.52	1001.23	
Golf Course	21385	Q100 - floodway	2010.03	0.91	2010.06	30.00		64.00		785.00	431.52	1001.23	815.00
Golf Course	21409	Q100 - base	2009.17		2009.17	222.73		64.00			426.69	980.16	
Golf Course	21409	Q100 - floodway	2010.12	0.95	2010.16	25.00		64.00		728.00	426.69	980.16	753.00
Golf Course	21431	Q100 - base	2009.23		2009.24	219.68		64.00			440.00	961.58	
Golf Course	21431	Q100 - floodway	2010.23	1.00	2010.26	25.00		64.00		700.00	440.00	961.58	725.00
Golf Course	21445	Q100 - base	2009.31		2009.33	143.36		64.00			440.70	949.64	
Golf Course	21445	Q100 - floodway	2010.29	0.98	2010.37	20.00		64.00		683.00	440.70	949.64	703.00
Golf Course	21456	Q100 - base	2013.14		2013.24	114.71		64.00			0.00	937.26	
Golf Course	21456	Q100 - floodway	2013.79	0.65	2014.05	30.00		64.00		595.00	0.00	937.26	625.00
Golf Course	21481	Q100 - base	2013.25		2013.25	634.13		64.00			494.28	1387.02	
Golf Course	21481	Q100 - floodway	2014.10	0.85	2014.11	37.00		64.00		1073.00	494.28	1387.02	1110.00
Golf Course	21515	Q100 - base	2013.25		2013.25	628.83		64.00			494.23	1385.39	
Golf Course	21515	Q100 - floodway	2014.11	0.86	2014.12	44.00		64.00		1051.00	494.23	1385.39	1095.00
Golf Course	21548	Q100 - base	2013.25		2013.26	630.57		64.00			576.95	1602.20	
Golf Course	21548	Q100 - floodway	2014.13	0.88	2014.14	45.00		64.00		1058.00	576.95	1602.20	1103.00
Golf Course	21924	Q100 - base	2013.27		2013.27	259.57		64.00			791.72	1477.35	
Golf Course	21924	Q100 - floodway	2014.23	0.96	2014.24	43.00		64.00		975.00	791.72	1477.35	1018.00
Golf Course	22423	Q100 - base	2013.51		2013.52	191.81		64.00			843.00	1600.75	
Golf Course	22423	Q100 - floodway	2014.48	0.97	2014.49	40.00		64.00		1140.00	843.00	1600.75	1180.00
Golf Course	22972	Q100 - base	2014.82		2014.88	59.44		64.00			759.64	1718.25	
Golf Course	22972	Q100 - floodway	2015.26	0.45	2015.70	14.13		64.00		1162.20	759.64	1718.25	1176.33
Golf Course	23005	Q100 - base	2015.25		2015.27	133.94		64.00			729.92	1627.92	
Golf Course	23005	Q100 - floodway	2016.10	0.85	2016.14	27.34		64.00		1123.02	729.92	1627.92	1150.36
Golf Course	23050	Q100 - base	2015.38		2015.39	151.35		64.00			763.22	1639.53	
Golf Course	23050	Q100 - floodway	2016.21	0.84	2016.27	22.35		64.00		1126.64	763.22	1639.53	1148.99
Golf Course	23090	Q100 - base	2015.65		2015.66	154.61		64.00			768.88	1659.11	
Golf Course	23090	Q100 - floodway	2016.61	0.96	2016.71	20.00		64.00		1095.00	768.88	1659.11	1115.00
Golf Course	23446	Q100 - base	2018.10		2018.12	208.05		64.00			688.98	1310.47	
Golf Course	23446	Q100 - floodway	2019.02	0.92	2019.14	20.00		64.00		1060.00	688.98	1310.47	1080.00
Golf Course	23887	Q100 - base	2022.99		2023.01	160.17		64.00			604.96	928.61	
Golf Course	23887	Q100 - floodway	2023.79	0.80	2023.91	20.00		64.00		829.00	604.96	928.61	849.00
Golf Course	24430	Q100 - base	2029.56		2029.82	37.07	1.56	60.23	2.21		636.32	656.04	
Golf Course	24430	Q100 - floodway	2029.72	0.16	2029.93	19.72		64.00		636.32	636.32	656.04	656.04

Duplicate Effective Model - Unnamed Tributary

HEC-RAS Plan: (DEM) River: Tributary Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	1.00	2004.70	2007.19	2004.82	2007.19	0.000000	0.01	97.62	92.00	0.00
trib	-1303	Q50	2.00	2004.70	2007.80	2004.86	2007.80	0.000000	0.02	89.00	31.32	0.00
trib	-1303	Q100	4.00	2004.70	2008.05	2004.90	2008.05	0.000000	0.02	181.64	103.69	0.00
trib	-1303	Q500	7.00	2004.70	2008.64	2004.96	2008.64	0.000000	0.03	245.69	113.41	0.00
trib	-1019	Q10	1.00	2007.91	2008.27	2008.27	2008.30	0.103616	1.40	0.72	31.55	1.04
trib	-1019	Q50	2.00	2008.18	2008.31	2008.31	2008.35	0.095084	1.66	1.20	15.60	1.05
trib	-1019	Q100	4.00	2007.91	2008.36	2008.36	2008.41	0.077292	1.83	2.19	47.75	1.00
trib	-1019	Q500	7.00	2007.91	2008.64	2008.41	2008.64	0.002258	0.58	12.11	93.29	0.20
trib	-880	Q10	1.00	2004.89	2008.31		2008.31	0.000000	0.00	721.14	359.15	0.00
trib	-880	Q50	2.00	2006.70	2008.36		2008.36	0.000003	0.05	41.16	40.00	0.01
trib	-880	Q100	4.00	2004.89	2008.42		2008.42	0.000000	0.01	761.51	361.60	0.00
trib	-880	Q500	7.00	2004.89	2008.64		2008.64	0.000000	0.01	843.68	368.58	0.00
trib	-466	Q10	1.00	2006.89	2008.31		2008.31	0.000000	0.00	410.09	380.79	0.00
trib	-466	Q50	2.00	2006.96	2008.36		2008.36	0.000005	0.05	36.54	45.57	0.01
trib	-466	Q100	4.00	2006.89	2008.42		2008.42	0.000000	0.01	453.25	388.60	0.00
trib	-466	Q500	7.00	2006.89	2008.64		2008.64	0.000000	0.01	542.61	403.49	0.00
trib	-89	Q10	1.00	2006.07	2008.31		2008.31	0.000000	0.00	449.29	336.12	0.00
trib	-89	Q50	2.00	2006.83	2008.36		2008.36	0.000002	0.05	40.97	39.70	0.01
trib	-89	Q100	4.00	2006.07	2008.42		2008.42	0.000000	0.01	487.40	345.54	0.00
trib	-89	Q500	7.00	2006.07	2008.64		2008.64	0.000000	0.01	571.23	388.66	0.00
trib	1	Q10	1.00	1998.92	2005.00		2005.00	0.000000	0.00	225.97	48.42	0.00
trib	1	Q50	2.00	1998.92	2009.60		2009.60	0.000000	0.00	540.96	101.33	0.00
trib	1	Q100	4.00	1998.92	2009.70		2009.70	0.000000	0.01	551.13	102.16	0.00
trib	1	Q500	7.00	1998.92	2010.00		2010.00	0.000000	0.01	582.15	104.63	0.00
trib	149	Q10	10.00	1995.82	2005.00	1996.32	2005.00	0.000000	0.01	1141.63	165.71	0.00
trib	149	Q50	14.00	1995.82	2009.60	1996.38	2009.60	0.000000	0.01	1924.52	175.82	0.00
trib	149	Q100	16.00	1995.82	2009.70	1996.41	2009.70	0.000000	0.01	1942.12	176.16	0.00
trib	149	Q500	20.00	1995.82	2010.00	1996.46	2010.00	0.000000	0.01	1995.13	177.19	0.00
trib	343	Q10	10.00	1993.64	2005.00	1993.99	2005.00	0.000000	0.01	1993.17	252.43	0.00
trib	343	Q50	14.00	1993.64	2009.60	1994.05	2009.60	0.000000	0.00	3182.15	266.09	0.00
trib	343	Q100	16.00	1993.64	2009.70	1994.07	2009.70	0.000000	0.00	3208.78	266.57	0.00
trib	343	Q500	20.00	1993.64	2010.00	1994.11	2010.00	0.000000	0.01	3288.97	267.99	0.00
trib	383	Q10	10.00	1994.23	2005.00	1994.67	2005.00	0.000000	0.01	1938.50	222.78	0.00
trib	383	Q50	14.00	1994.23	2009.60	1994.71	2009.60	0.000000	0.00	3052.64	279.70	0.00
trib	383	Q100	16.00	1994.23	2009.70	1994.73	2009.70	0.000000	0.01	3080.61	279.97	0.00
trib	383	Q500	20.00	1994.23	2010.00	1994.75	2010.00	0.000000	0.01	3164.74	280.78	0.00
trib	472	Q10	10.00	2005.65	2005.00	1999.14	2005.00	0.000000		477.69	135.83	0.00
trib	472	Q50	14.00	2005.65	2009.60	2006.76	2009.60	0.000167	0.68	20.58	8.81	0.08
trib	472	Q100	16.00	2005.65	2009.70	1999.22	2009.70	0.000000	0.01	1274.72	193.16	0.00
trib	472	Q500	20.00	2005.65	2010.00	1999.26	2010.00	0.000000	0.01	1334.21	203.55	0.00
trib	576	Q10	10.00	2008.78	2009.74	2009.74	2009.99	0.032554	4.02	2.48	4.97	1.00
trib	576	Q50	14.00	2008.78	2009.88	2009.88	2010.18	0.031239	4.40	3.18	5.26	1.00
trib	576	Q100	16.00	2008.78	2009.95	2009.95	2010.25	0.030780	4.43	3.61	5.98	1.01
trib	576	Q500	20.00	2008.78	2010.20	2010.20	2010.37	0.028407	3.36	6.36	21.88	0.93
trib	651	Q10	10.00	2009.50	2010.74	2010.48	2010.78	0.004980	1.88	7.84	29.35	0.41
trib	651	Q50	14.00	2009.50	2011.08	2010.60	2011.13	0.006522	1.81	7.73	15.72	0.46
trib	651	Q100	16.00	2009.50	2010.95	2010.71	2010.96	0.004364	1.23	16.50	54.47	0.36
trib	651	Q500	20.00	2009.50	2011.00	2010.77	2011.02	0.004026	1.28	19.68	56.58	0.35
trib	918	Q10	10.00	2009.10	2011.17	2009.95	2011.19	0.000735	1.08	9.22	6.85	0.16
trib	918	Q50	14.00	2009.10	2011.55	2010.11	2011.57	0.000714	1.17	11.93	7.51	0.16
trib	918	Q100	16.00	2009.10	2011.45	2010.17	2011.48	0.001099	1.42	11.64	11.27	0.20
trib	918	Q500	20.00	2009.10	2011.57	2010.29	2011.61	0.001361	1.62	13.89	36.25	0.23
trib	1472	Q10	10.00	2011.44	2012.38	2012.38	2012.67	0.032363	4.35	2.30	3.82	0.99
trib	1472	Q50	14.00	2011.44	2012.54	2012.54	2012.89	0.031230	4.71	2.97	4.22	0.99
trib	1472	Q100	16.00	2011.44	2012.83	2012.61	2013.05	0.015065	3.73	4.29	4.89	0.70
trib	1472	Q500	20.00	2011.44	2013.11	2012.75	2013.30	0.010804	3.50	5.72	5.54	0.61
trib	1510	Q10	10.00	2011.15	2012.95	2012.17	2013.00	0.002787	1.77	5.66	5.40	0.30
trib	1510	Q50	14.00	2011.15	2013.19	2012.35	2013.25	0.003111	2.00	6.99	5.98	0.33
trib	1510	Q100	16.00	2011.15	2013.26	2012.43	2013.33	0.003444	2.15	7.44	6.16	0.35
trib	1510	Q500	20.00	2011.15	2013.46	2012.58	2013.55	0.003501	2.29	8.75	6.67	0.35
trib	1520		Culvert									
trib	1528	Q10	10.00	2010.84	2013.36	2011.82	2013.38	0.000963	1.00	9.96	6.88	0.15

HEC-RAS Plan: (DEM) River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2010.84	2013.98	2011.99	2013.99	0.000678	0.95	14.68	8.39	0.13
trib	1528	Q100	16.00	2010.84	2014.30	2012.07	2014.32	0.000575	0.91	17.51	9.51	0.12
trib	1528	Q500	20.00	2010.84	2014.61	2012.23	2014.63	0.000672	0.91	25.24	51.66	0.13
trib	1557	Q10	10.00	2011.79	2013.39	2012.66	2013.44	0.003820	1.69	5.91	5.64	0.29
trib	1557	Q50	14.00	2011.79	2014.00	2012.81	2014.03	0.001952	1.44	9.72	6.93	0.21
trib	1557	Q100	16.00	2011.79	2014.32	2012.88	2014.35	0.001437	1.33	12.04	7.61	0.19
trib	1557	Q500	20.00	2011.79	2014.63	2013.01	2014.66	0.001366	1.38	14.51	8.27	0.18
trib	1963	Q10	10.00	2018.61	2019.48	2019.48	2019.66	0.051975	3.44	2.91	7.79	0.99
trib	1963	Q50	14.00	2018.61	2019.58	2019.58	2019.80	0.049077	3.72	3.76	8.55	0.99
trib	1963	Q100	16.00	2018.61	2019.66	2019.66	2019.85	0.038218	3.52	4.80	15.48	0.89
trib	1963	Q500	20.00	2018.61	2019.75	2019.75	2019.93	0.033517	3.48	6.39	18.55	0.84
trib	1989	Q10	10.00	2017.77	2019.85	2018.80	2019.89	0.002658	1.50	6.69	17.19	0.24
trib	1989	Q50	14.00	2017.77	2020.01	2018.98	2020.07	0.003435	1.85	7.58	8.70	0.28
trib	1989	Q100	16.00	2017.77	2020.06	2019.06	2020.12	0.004030	2.04	7.83	48.44	0.30
trib	1989	Q500	20.00	2017.77	2020.14	2019.22	2020.23	0.005238	2.42	8.27	60.64	0.35
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.19	2019.81	2020.30	0.009432	2.61	3.83	8.68	0.47
trib	2080	Q50	14.00	2018.73	2020.48	2019.95	2020.60	0.007681	2.81	4.98	12.81	0.44
trib	2080	Q100	16.00	2018.73	2020.61	2020.02	2020.74	0.007173	2.90	5.51	14.87	0.44
trib	2080	Q500	20.00	2018.73	2020.86	2020.15	2021.01	0.006452	3.07	6.51	18.47	0.42
trib	2100	Q10	12.00	2018.27	2020.39	2019.40	2020.41	0.002032	1.15	10.46	12.11	0.22
trib	2100	Q50	24.00	2018.27	2020.70	2019.87	2020.74	0.003400	1.65	14.57	14.50	0.29
trib	2100	Q100	30.00	2018.27	2020.83	2020.00	2020.88	0.003580	1.82	16.55	15.31	0.30
trib	2100	Q500	46.00	2018.27	2021.08	2020.26	2021.16	0.004409	2.26	20.54	16.79	0.35
trib	2110	Q10	12.00	2018.27	2020.42	2019.40	2020.43	0.001881	1.11	10.78	12.31	0.21
trib	2110	Q50	24.00	2018.27	2020.74	2019.87	2020.78	0.002992	1.58	15.20	14.62	0.27
trib	2110	Q100	30.00	2018.27	2020.88	2020.00	2020.92	0.003147	1.74	17.27	15.59	0.29
trib	2110	Q500	46.00	2018.27	2021.14	2020.26	2021.21	0.003840	2.17	21.53	17.14	0.32
trib	2120	Q10	12.00	2018.27	2020.44	2019.40	2020.45	0.001769	1.09	11.03	12.47	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.81	0.002715	1.53	15.69	14.67	0.26
trib	2120	Q100	30.00	2018.27	2020.91	2020.00	2020.96	0.002861	1.69	17.82	15.80	0.27
trib	2120	Q500	46.00	2018.27	2021.18	2020.26	2021.25	0.003471	2.10	22.30	17.41	0.31
trib	2651	Q10	12.00	2021.38	2022.48	2022.22	2022.62	0.016295	2.96	4.05	5.21	0.59
trib	2651	Q50	24.00	2021.38	2023.16	2022.58	2023.30	0.009561	2.98	8.05	6.49	0.47
trib	2651	Q100	30.00	2021.38	2023.40	2022.73	2023.55	0.009769	3.10	9.67	7.51	0.48
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008805	3.30	14.05	10.00	0.47
trib	3126	Q10	12.00	2023.82	2025.45	2024.69	2025.49	0.003114	1.53	7.84	7.78	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003754	1.97	12.18	9.47	0.31
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.25	0.003704	2.08	14.43	10.23	0.31
trib	3126	Q500	46.00	2023.82	2026.65	2025.48	2026.74	0.003902	2.35	19.60	12.06	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.50	2030.50	2030.93	0.047487	5.26	4.56	5.39	1.01
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.91	0.003029	1.91	12.59	8.67	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.00	2037.62	0.011204	3.01	7.98	7.52	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.49	2038.49	2039.19	0.037939	6.72	3.57	3.15	0.99
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.36	2039.00	2040.40	0.001542	1.56	15.35	8.39	0.19
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: (DEM)   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.45	2039.50	2040.48	0.001583	1.32	16.67	12.65	0.20
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.28	2043.28	2043.49	0.047742	3.69	5.97	13.81	0.99
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51		2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2048.03	2047.39	2048.07	0.003615	1.50	14.67	18.51	0.30
trib	5676	Q100	28.00	2046.43	2048.08		2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37		2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68		2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.73	2051.73	2052.11	0.046145	4.92	4.47	6.03	1.01
trib	6117	Q100	28.00	2050.75	2052.07		2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49		2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.65	2052.28	2052.71	0.006296	1.87	11.74	16.61	0.39
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.15	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047079	4.04	5.44	10.35	0.98
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.19	2064.53	0.022256	3.32	6.62	9.82	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038367	5.06	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.41	2084.85	0.026361	4.77	2.94	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.32	2090.32	2090.80	0.044776	5.59	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.47	2091.33	0.010658	3.24	4.32	2.79	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031476	4.37	3.21	5.40	1.00
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Duplicate Effective Model - Unnamed Tributary, Floodway

HEC-RAS Plan: DEM FW River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Q100 base	2008.05		2008.05	103.69	0.01	3.90	0.09		70.92	163.31	
trib	-1303	Q100 floodway	2009.05	1.00	2009.05	31.32		4.00		131.99	70.92	163.31	163.31
trib	-1019	Q100 base	2008.36		2008.41	21.08		4.00			152.95	253.19	
trib	-1019	Q100 floodway	2009.05	0.69	2009.05	21.09		4.00		173.33	152.95	253.19	194.42
trib	-880	Q100 base	2008.42		2008.42	361.60	0.08	3.92	0.01		62.73	380.37	
trib	-880	Q100 floodway	2009.05	0.63	2009.05	40.00		4.00		310.00	62.73	380.37	350.00
trib	-466	Q100 base	2008.42		2008.42	388.60		4.00	0.00		129.52	566.57	
trib	-466	Q100 floodway	2009.05	0.64	2009.05	45.57		4.00		521.00	129.52	566.57	566.57
trib	-89	Q100 base	2008.42		2008.42	345.54		4.00			144.89	581.16	
trib	-89	Q100 floodway	2009.05	0.64	2009.05	39.70		4.00		510.00	144.89	581.16	549.70
trib	1	Q100 base	2009.70		2009.70	102.16		4.00			461.25	568.10	
trib	1	Q100 floodway	2010.70	1.00	2010.70	116.77	0.00	4.00			461.25	568.10	
trib	149	Q100 base	2009.70		2009.70	176.16		16.00			421.08	606.95	
trib	149	Q100 floodway	2010.70	1.00	2010.70	179.75		16.00			421.08	606.95	
trib	343	Q100 base	2009.70		2009.70	266.57		16.00			410.55	678.07	
trib	343	Q100 floodway	2010.70	1.00	2010.70	271.14	0.00	16.00	0.00		410.55	678.07	
trib	383	Q100 base	2009.70		2009.70	279.97		16.00	0.00		397.28	677.14	
trib	383	Q100 floodway	2010.70	1.00	2010.70	282.66		16.00	0.00		397.28	677.14	
trib	472	Q100 base	2009.70		2009.70	193.16		0.12	15.88		340.55	365.05	
trib	472	Q100 floodway	2010.70	1.00	2010.70	8.82		16.00		347.00	340.55	365.05	355.82
trib	576	Q100 base	2009.95		2010.25	5.98		16.00			361.81	384.61	
trib	576	Q100 floodway	2010.67	0.73	2010.75	5.41		16.00		368.20	361.81	384.61	373.61
trib	651	Q100 base	2010.95		2010.96	54.47		6.94	9.06		360.31	384.41	
trib	651	Q100 floodway	2011.07	0.12	2011.14	15.66		16.00		367.72	360.31	384.41	384.41
trib	918	Q100 base	2011.45		2011.48	11.27		15.90	0.10		466.95	478.43	
trib	918	Q100 floodway	2011.63	0.18	2011.66	7.59		16.00		468.53	466.95	478.43	478.43
trib	1472	Q100 base	2012.83		2013.05	4.89		16.00			706.41	714.93	
trib	1472	Q100 floodway	2012.71	-0.12	2013.00	4.61		16.00		708.23	706.41	714.93	713.11
trib	1510	Q100 base	2013.26		2013.33	6.16		16.00			711.73	722.04	
trib	1510	Q100 floodway	2013.26	0.00	2013.33	6.16		16.00		714.06	711.73	722.04	720.22
trib	1520		Culvert										
trib	1528	Q100 base	2014.30		2014.32	9.51		16.00			727.15	744.68	
trib	1528	Q100 floodway	2014.31	0.00	2014.32	9.50		16.00		727.56	727.15	744.68	737.06
trib	1557	Q100 base	2014.32		2014.35	7.61		16.00			726.74	740.03	
trib	1557	Q100 floodway	2014.32	0.00	2014.35	7.61		16.00		730.81	726.74	740.03	738.42
trib	1963	Q100 base	2019.66		2019.85	15.48		15.72	0.28		739.45	750.61	
trib	1963	Q100 floodway	2019.63	-0.03	2019.86	8.89		16.00		741.45	739.45	750.61	750.61
trib	1989	Q100 base	2020.06		2020.12	5.50		16.00			762.80	771.50	
trib	1989	Q100 floodway	2020.08	0.02	2020.15	5.50		16.00		762.80	762.80	771.50	771.50
trib	2040		Culvert										
trib	2080	Q100 base	2020.61		2020.74	4.00		16.00			39.42	68.83	
trib	2080	Q100 floodway	2020.61	0.00	2020.74	4.00		16.00		46.05	39.42	68.83	60.92
trib	2100	Q100 base	2020.83		2020.88	15.31	0.01	29.99			44.23	60.09	
trib	2100	Q100 floodway	2020.83	0.00	2020.88	14.75		30.00		44.23	44.23	60.09	58.98
trib	2110	Q100 base	2020.88		2020.92	15.59	0.02	29.98			44.23	60.09	
trib	2110	Q100 floodway	2020.88	0.00	2020.93	14.82		30.00		44.23	44.23	60.09	59.05
trib	2120	Q100 base	2020.91		2020.96	15.80	0.03	29.97			44.23	60.09	
trib	2120	Q100 floodway	2020.92	0.00	2020.96	14.87		30.00		44.23	44.23	60.09	59.10
trib	2651	Q100 base	2023.40		2023.55	7.51		30.00			46.44	55.58	
trib	2651	Q100 floodway	2023.40	0.01	2023.55	7.50		30.00		46.68	46.44	55.58	54.18
trib	3126	Q100 base	2026.19		2026.25	10.23		30.00			72.83	95.75	
trib	3126	Q100 floodway	2026.18	0.00	2026.25	10.22		30.00		75.79	72.83	95.75	86.03
trib	3617	Q100 base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Q100 floodway	2030.66	-0.01	2031.13	5.89		30.00		144.39	139.17	162.30	150.31
trib	4127	Q100 base	2035.09		2035.15	9.22		30.00			251.87	265.32	
trib	4127	Q100 floodway	2035.09	0.00	2035.16	9.22		30.00		253.91	251.87	265.32	263.13

HEC-RAS Plan: DEM FW River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4623	Q100 base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Q100 floodway	2037.69	0.00	2037.84	8.13		30.00		316.70	314.09	329.75	324.83
trib	4665	Q100 base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Q100 floodway	2038.70	0.00	2039.53	2.50		30.00		344.05	340.25	349.22	347.43
trib	4685		Culvert										
trib	4704	Q100 base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Q100 floodway	2040.99	-0.01	2041.03	7.52		30.00		352.15	352.15	360.54	360.54
trib	4750	Q100 base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Q100 floodway	2041.05	0.02	2041.07	12.65		28.00		329.79	329.79	342.44	342.44
trib	5165	Q100 base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Q100 floodway	2043.35	-0.05	2043.61	13.81	0.00	28.00	0.00	212.11	212.11	225.92	225.92
trib	5676	Q100 base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Q100 floodway	2048.17	0.09	2048.21	19.14		28.00		187.85	183.69	226.54	206.99
trib	6117	Q100 base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Q100 floodway	2051.88	-0.20	2052.30	6.34		28.00		217.18	211.57	230.44	223.95
trib	6154	Q100 base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Q100 floodway	2052.80	0.04	2052.86	16.44		28.00		219.96	211.25	246.77	236.94
trib	6200		Culvert										
trib	6239	Q100 base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Q100 floodway	2054.11	0.00	2054.13	18.59		28.00		228.52	221.30	259.22	247.11
trib	6274	Q100 base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Q100 floodway	2055.66	0.01	2055.95	10.56		28.00		216.47	210.49	231.21	227.03
trib	6553	Q100 base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Q100 floodway	2064.48	-0.01	2064.67	10.55		28.00		208.19	197.65	240.39	218.78
trib	7086	Q100 base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Q100 floodway	2083.50	0.00	2083.96	3.68		18.00		153.30	150.93	158.25	156.99
trib	7121	Q100 base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Q100 floodway	2084.64	0.00	2085.08	3.10		18.00		118.45	118.04	121.88	121.62
trib	7130		Culvert										
trib	7143	Q100 base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Q100 floodway	2086.04	0.00	2086.16	3.79		18.00		111.74	111.14	115.72	115.53
trib	7169	Q100 base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Q100 floodway	2090.50	-0.01	2091.06	2.64		18.00		115.24	114.91	118.45	117.88
trib	7175		Culvert										
trib	7186	Q100 base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Q100 floodway	2091.45	0.00	2091.64	2.88		18.00		119.03	119.10	122.49	122.26
trib	7220	Q100 base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Q100 floodway	2092.37	-0.02	2092.72	5.77		18.00		130.02	130.02	136.02	135.83

Duplicate Effective Model - Unnamed Tributary, without DS Levee

HEC-RAS Plan: DEM wo lev   River: Tributary   Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	10.00	2004.70	2007.19	2005.00	2007.19	0.000006	0.13	97.62	92.00	0.02
trib	-1303	Q50	14.00	2004.70	2007.80	2005.05	2007.80	0.000004	0.12	156.26	99.90	0.01
trib	-1303	Q100	16.00	2004.70	2008.05	2005.07	2008.05	0.000003	0.12	181.64	103.69	0.01
trib	-1303	Q500	20.00	2004.70	2008.64	2005.11	2008.64	0.000002	0.11	245.69	113.41	0.01
trib	-1019	Q10	10.00	2008.18	2008.47	2008.47	2008.54	0.040241	2.34	5.15	65.40	0.83
trib	-1019	Q50	14.00	2008.18	2008.51	2008.51	2008.59	0.039441	2.57	6.69	70.95	0.84
trib	-1019	Q100	16.00	2008.18	2008.52	2008.52	2008.62	0.045491	2.81	7.00	71.61	0.91
trib	-1019	Q500	20.00	2008.18	2008.64	2008.56	2008.65	0.003347	0.96	26.15	93.34	0.26
trib	-880	Q10	10.00	2007.31	2008.55	2005.25	2008.55	0.000000	0.01	808.03	365.13	0.00
trib	-880	Q50	14.00	2007.31	2008.60	2005.30	2008.60	0.000000	0.01	828.10	367.06	0.00
trib	-880	Q100	16.00	2007.31	2008.63	2005.32	2008.63	0.000000	0.01	837.43	367.97	0.00
trib	-880	Q500	20.00	2007.31	2008.65	2005.36	2008.65	0.000000	0.01	845.25	368.73	0.00
trib	-466	Q10	10.00	2006.96	2008.55	2007.05	2008.55	0.000000	0.02	503.64	396.88	0.00
trib	-466	Q50	14.00	2006.96	2008.60	2007.08	2008.60	0.000001	0.03	525.58	402.65	0.00
trib	-466	Q100	16.00	2006.96	2008.63	2007.08	2008.63	0.000001	0.03	535.81	403.22	0.00
trib	-466	Q500	20.00	2006.96	2008.65	2007.08	2008.65	0.000001	0.04	544.38	403.56	0.01
trib	-89	Q10	10.00	2007.09	2008.55	2006.35	2008.55	0.000000	0.02	533.76	381.64	0.00
trib	-89	Q50	14.00	2007.09	2008.60	2006.40	2008.60	0.000000	0.02	554.94	387.29	0.00
trib	-89	Q100	16.00	2007.09	2008.63	2006.43	2008.63	0.000001	0.03	564.78	388.12	0.00
trib	-89	Q500	20.00	2007.09	2008.65	2006.47	2008.65	0.000001	0.03	573.08	388.82	0.00
trib	1	Q10	10.00	2008.30	2008.57	2008.57	2008.61	0.049508	2.23	7.05	92.01	0.89
trib	1	Q50	14.00	2008.30	2008.60	2008.60	2008.64	0.049091	2.40	9.47	106.80	0.90
trib	1	Q100	16.00	2008.30	2008.61	2008.61	2008.65	0.045516	2.40	10.81	112.72	0.88
trib	1	Q500	20.00	2008.30	2008.63	2008.63	2008.67	0.043045	2.45	13.02	120.22	0.86
trib	149	Q10	10.00	2007.52	2008.62	2006.65	2008.62	0.000000	0.01	417.66	269.94	0.00
trib	149	Q50	14.00	2007.52	2008.65	2006.70	2008.65	0.000001	0.02	425.25	270.23	0.00
trib	149	Q100	16.00	2007.52	2008.66	2006.72	2008.66	0.000001	0.02	428.28	270.35	0.00
trib	149	Q500	20.00	2007.52	2008.68	2006.80	2008.68	0.000001	0.03	433.86	270.56	0.01
trib	343	Q10	10.00	2008.18	2008.62	2007.06	2008.62	0.000001	0.02	272.09	279.48	0.01
trib	343	Q50	14.00	2008.18	2008.65	2007.13	2008.65	0.000003	0.03	279.96	281.03	0.01
trib	343	Q100	16.00	2008.18	2008.66	2007.16	2008.66	0.000003	0.03	283.12	281.64	0.01
trib	343	Q500	20.00	2008.18	2008.68	2007.19	2008.68	0.000005	0.04	288.94	282.74	0.01
trib	383	Q10	10.00	2008.42	2008.62	2007.33	2008.62	0.000003	0.01	193.97	213.44	0.01
trib	383	Q50	14.00	2008.42	2008.65	2007.36	2008.65	0.000006	0.02	199.96	214.83	0.01
trib	383	Q100	16.00	2008.42	2008.66	2007.37	2008.66	0.000007	0.03	202.37	215.39	0.01
trib	383	Q500	20.00	2008.42	2008.68	2007.40	2008.68	0.000011	0.03	206.88	216.43	0.01
trib	472	Q10	10.00	2008.50	2008.62	2007.46	2008.62	0.000008	0.01	146.81	211.42	0.01
trib	472	Q50	14.00	2008.50	2008.65	2007.50	2008.65	0.000014	0.02	152.88	213.77	0.01
trib	472	Q100	16.00	2008.50	2008.66	2007.52	2008.66	0.000017	0.03	155.34	214.71	0.01
trib	472	Q500	20.00	2008.50	2008.68	2007.55	2008.68	0.000025	0.04	159.92	216.36	0.02
trib	576	Q10	10.00	2008.57	2008.62	2007.79	2008.62	0.000034	0.02	83.84	150.04	0.02
trib	576	Q50	14.00	2008.57	2008.65	2007.83	2008.65	0.000057	0.03	88.33	153.40	0.02
trib	576	Q100	16.00	2008.57	2008.66	2007.84	2008.66	0.000069	0.03	90.17	154.76	0.03
trib	576	Q500	20.00	2008.57	2008.68	2007.88	2008.68	0.000096	0.05	93.67	157.85	0.03
trib	651	Q10	10.00	2011.11	2011.18	2011.18	2011.22	0.097087	0.90	6.25	88.01	0.91
trib	651	Q50	14.00	2011.11	2011.20	2011.20	2011.24	0.084641	1.01	8.16	94.94	0.89
trib	651	Q100	16.00	2011.11	2011.21	2011.21	2011.26	0.076146	1.09	9.16	96.15	0.87
trib	651	Q500	20.00	2011.11	2011.22	2011.22	2011.28	0.078399	1.27	10.44	97.72	0.92
trib	918	Q10	10.00	2009.84	2011.22	2010.09	2011.22	0.000004	0.07	191.15	223.46	0.01
trib	918	Q50	14.00	2009.84	2011.25	2010.13	2011.25	0.000006	0.09	197.86	227.01	0.01
trib	918	Q100	16.00	2009.84	2011.27	2010.15	2011.27	0.000008	0.10	200.97	230.82	0.02
trib	918	Q500	20.00	2009.84	2011.30	2010.16	2011.30	0.000012	0.13	207.29	233.18	0.02
trib	1472	Q10	10.00	2013.44	2013.73	2013.73	2013.78	0.038164	2.06	6.11	55.33	0.79
trib	1472	Q50	14.00	2013.44	2013.76	2013.76	2013.82	0.041668	2.34	7.74	62.95	0.84
trib	1472	Q100	16.00	2013.44	2013.77	2013.77	2013.84	0.039601	2.38	8.80	67.96	0.83
trib	1472	Q500	20.00	2013.44	2013.80	2013.80	2013.87	0.039038	2.52	10.69	77.87	0.84
trib	1510	Q10	10.00	2013.81	2014.06	2013.90	2014.06	0.002778	0.39	19.89	120.64	0.19
trib	1510	Q50	14.00	2013.81	2014.10	2013.94	2014.11	0.002801	0.43	25.50	126.84	0.20
trib	1510	Q100	16.00	2013.81	2014.12	2013.95	2014.13	0.002776	0.45	27.85	129.47	0.20
trib	1510	Q500	20.00	2013.81	2014.15	2013.97	2014.16	0.002826	0.50	31.99	137.40	0.21
trib	1520		Culvert									
trib	1528	Q10	10.00	2013.78	2014.06	2013.93	2014.06	0.005201	0.69	15.56	100.95	0.28

HEC-RAS Plan: DEM wo lev   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2013.78	2014.10	2013.95	2014.11	0.004983	0.76	20.57	116.23	0.29
trib	1528	Q100	16.00	2013.78	2014.12	2013.97	2014.13	0.005184	0.82	22.52	118.90	0.30
trib	1528	Q500	20.00	2013.78	2014.16	2013.99	2014.17	0.004648	0.85	26.76	122.07	0.29
trib	1557	Q10	10.00	2014.07	2014.21	2014.05	2014.21	0.004529	0.32	16.54	122.35	0.22
trib	1557	Q50	14.00	2014.07	2014.25	2014.10	2014.26	0.004585	0.37	22.60	137.57	0.23
trib	1557	Q100	16.00	2014.07	2014.27	2014.12	2014.27	0.004521	0.42	24.77	140.38	0.24
trib	1557	Q500	20.00	2014.07	2014.29	2014.14	2014.30	0.004640	0.50	28.53	145.80	0.25
trib	1963	Q10	10.00	2015.81	2016.24	2016.10	2016.26	0.007062	1.07	10.25	52.15	0.36
trib	1963	Q50	14.00	2015.81	2016.29	2016.15	2016.31	0.007097	1.20	13.09	56.60	0.37
trib	1963	Q100	16.00	2015.81	2016.31	2016.17	2016.33	0.007323	1.27	14.25	57.48	0.38
trib	1963	Q500	20.00	2015.81	2016.35	2016.20	2016.38	0.007236	1.36	16.68	58.71	0.38
trib	1989	Q10	10.00	2017.77	2018.80	2018.80	2019.13	0.055202	4.65	2.15	3.23	1.00
trib	1989	Q50	14.00	2017.77	2018.98	2018.98	2019.38	0.054111	5.05	2.77	3.54	1.01
trib	1989	Q100	16.00	2017.77	2019.07	2019.07	2019.48	0.052722	5.18	3.09	3.69	1.00
trib	1989	Q500	20.00	2017.77	2019.22	2019.22	2019.68	0.051664	5.45	3.67	3.94	0.99
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.21	2019.81	2020.31	0.008855	2.56	3.90	8.86	0.46
trib	2080	Q50	14.00	2018.73	2020.50	2019.96	2020.62	0.007337	2.77	5.05	13.08	0.43
trib	2080	Q100	16.00	2018.73	2020.63	2020.02	2020.76	0.006894	2.87	5.58	15.13	0.43
trib	2080	Q500	20.00	2018.73	2020.87	2020.15	2021.02	0.006295	3.05	6.55	18.57	0.42
trib	2100	Q10	12.00	2018.27	2020.40	2019.40	2020.42	0.001965	1.13	10.60	12.20	0.21
trib	2100	Q50	24.00	2018.27	2020.71	2019.86	2020.75	0.003293	1.63	14.74	14.59	0.29
trib	2100	Q100	30.00	2018.27	2020.84	2020.00	2020.89	0.003479	1.80	16.71	15.37	0.30
trib	2100	Q500	46.00	2018.27	2021.09	2020.26	2021.17	0.004326	2.25	20.67	16.84	0.34
trib	2110	Q10	12.00	2018.27	2020.43	2019.40	2020.44	0.001824	1.10	10.90	12.39	0.21
trib	2110	Q50	24.00	2018.27	2020.75	2019.87	2020.79	0.002895	1.56	15.35	14.83	0.27
trib	2110	Q100	30.00	2018.27	2020.89	2020.00	2020.93	0.003072	1.73	17.40	15.64	0.28
trib	2110	Q500	46.00	2018.27	2021.15	2020.26	2021.22	0.003780	2.15	21.65	17.18	0.32
trib	2120	Q10	12.00	2018.27	2020.45	2019.40	2020.46	0.001720	1.08	11.15	12.55	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.82	0.002629	1.52	15.83	15.03	0.26
trib	2120	Q100	30.00	2018.27	2020.92	2020.00	2020.96	0.002801	1.68	17.94	15.84	0.27
trib	2120	Q500	46.00	2018.27	2021.19	2020.26	2021.26	0.003424	2.09	22.40	17.44	0.31
trib	2651	Q10	12.00	2021.38	2022.47	2022.22	2022.61	0.017129	3.01	3.98	5.18	0.61
trib	2651	Q50	24.00	2021.38	2023.15	2022.58	2023.29	0.009975	3.03	7.93	6.46	0.48
trib	2651	Q100	30.00	2021.38	2023.39	2022.73	2023.54	0.009967	3.13	9.59	7.45	0.49
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008905	3.31	13.99	9.98	0.47
trib	3126	Q10	12.00	2023.82	2025.46	2024.69	2025.50	0.003063	1.52	7.89	7.80	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003719	1.96	12.22	9.48	0.30
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.26	0.003685	2.07	14.46	10.24	0.31
trib	3126	Q500	46.00	2023.82	2026.66	2025.48	2026.74	0.003886	2.34	19.63	12.07	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.90	0.003059	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011028	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: DEM wo lev   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51	2047.12	2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98	2047.39	2048.02	0.004265	1.60	13.77	17.89	0.32
trib	5676	Q100	28.00	2046.43	2048.08	2047.50	2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37	2047.73	2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68	2051.43	2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031946	4.33	5.08	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07	2051.88	2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49	2052.21	2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.007005	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Duplicate Effective Model - Unnamed Tributary, without DS Levee, Floodway

HEC-RAS Plan: wo ds fw (DEM) River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Base	2008.05		2008.05	103.69	5.34	9.25	1.41		134.37	158.76	
trib	-1303	Floodway	2009.05	1.00	2009.05	31.32	0.63	13.98	1.39	131.99	134.37	158.76	163.31
trib	-1019	Base	2008.52		2008.62	38.92	3.31	11.46	1.24		178.65	192.41	
trib	-1019	Floodway	2009.04	0.53	2009.06	21.09	3.29	11.59	1.12	173.33	178.65	192.41	194.42
trib	-880	Base	2008.63		2008.63	367.97	14.91	0.33	0.76		316.80	341.31	
trib	-880	Floodway	2009.07	0.45	2009.07	40.00	2.68	9.02	4.30	310.00	316.80	341.31	350.00
trib	-466	Base	2008.63		2008.63	403.22	15.45	0.52	0.03		552.13	565.20	
trib	-466	Floodway	2009.09	0.46	2009.09	45.57	9.60	6.11	0.28	521.00	552.13	565.20	566.57
trib	-89	Base	2008.63		2008.63	388.12	15.26	0.71	0.03		523.44	545.76	
trib	-89	Floodway	2009.10	0.47	2009.10	39.70	6.49	8.94	0.57	510.00	523.44	545.76	549.70
trib	1	Base	2008.61		2008.65	112.72	11.69	4.27	0.05		423.34	431.01	
trib	1	Floodway	2009.07	0.46	2009.13	15.00	16.00			307.00	423.34	431.01	322.00
trib	149	Base	2008.66		2008.66	270.35	15.86	0.14	0.00		322.78	330.58	
trib	149	Floodway	2009.18	0.53	2009.19	15.00	9.49	6.51		315.58	322.78	330.58	330.58
trib	343	Base	2008.66		2008.66	281.64	15.83	0.12	0.05		326.83	335.39	
trib	343	Floodway	2009.26	0.60	2009.28	15.00	5.98	10.02		320.39	326.83	335.39	335.39
trib	383	Base	2008.66		2008.66	215.39	15.97	0.03	0.00		321.06	327.35	
trib	383	Floodway	2009.30	0.64	2009.32	15.00	10.48	5.52		312.35	321.06	327.35	327.35
trib	472	Base	2008.66		2008.66	214.71	15.97	0.03	0.00		246.06	255.85	
trib	472	Floodway	2009.49	0.84	2009.51	15.00	6.05	9.95		240.85	246.06	255.85	255.85
trib	576	Base	2008.66		2008.66	154.76	15.99	0.01	0.00		247.56	254.23	
trib	576	Floodway	2009.63	0.97	2009.65	15.00	9.60	6.40		239.23	247.56	254.23	254.23
trib	651	Base	2011.21		2011.26	96.15	15.71	0.27	0.02		331.92	337.62	
trib	651	Floodway	2011.47	0.26	2011.63	15.00	16.00			243.59	331.92	337.62	258.59
trib	918	Base	2011.27		2011.27	230.82	7.90	1.56	6.54		290.48	301.36	
trib	918	Floodway	2011.80	0.53	2011.80	15.00	2.00	12.93	1.06	288.00	290.48	301.36	303.00
trib	1472	Base	2013.77		2013.84	67.96	1.43	9.86	4.70		374.56	390.80	
trib	1472	Floodway	2014.15	0.38	2014.31	15.00	16.00			355.00	374.56	390.80	370.00
trib	1510	Base	2014.12		2014.13	129.51	0.02	0.85	15.14		289.44	302.32	
trib	1510	Floodway	2014.63	0.51	2014.66	15.00			16.00	355.00	289.44	302.32	370.00
trib	1520		Culvert										
trib	1528	Base	2014.12		2014.13	119.01	0.00	2.72	13.28		307.04	321.23	
trib	1528	Floodway	2013.79	-0.33	4514.91	2.75			16.00	370.00	307.04	321.23	385.00
trib	1557	Base	2014.27		2014.27	140.34	0.00	0.43	15.57		307.11	317.99	
trib	1557	Floodway	2014.32	0.05	2014.48	15.00			16.00	370.00	307.11	317.99	385.00
trib	1963	Base	2016.31		2016.33	57.50	2.13	13.78	0.09		243.25	273.87	
trib	1963	Floodway	2016.45	0.14	2016.46	66.39	3.52	12.23	0.24		243.25	273.87	
trib	1989	Base	2019.07		2019.48	3.69		16.00			762.80	771.50	
trib	1989	Floodway	2019.07	0.00	2019.48	3.69		16.00			762.80	771.50	
trib	2040		Culvert										
trib	2080	Base	2020.63		2020.76	4.00		16.00			39.42	68.83	
trib	2080	Floodway	2020.63	0.00	2020.76	4.00		16.00			39.42	68.83	
trib	2100	Base	2020.84		2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2100	Floodway	2020.84	0.00	2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2110	Base	2020.89		2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2110	Floodway	2020.89	0.00	2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2120	Base	2020.92		2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2120	Floodway	2020.92	0.00	2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2651	Base	2023.39		2023.54	7.45		30.00			46.44	55.58	
trib	2651	Floodway	2023.39	0.00	2023.54	7.45		30.00			46.44	55.58	
trib	3126	Base	2026.19		2026.26	10.24		30.00			72.83	95.75	
trib	3126	Floodway	2026.19	0.00	2026.26	10.24		30.00			72.83	95.75	
trib	3617	Base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Floodway	2030.67	0.00	2031.13	5.92		30.00			139.17	162.30	
trib	4127	Base	2035.09		2035.15	9.22		30.00			251.87	265.32	

HEC-RAS Plan: wo ds fw (DEM) River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4127	Floodway	2035.09	0.00	2035.15	9.22		30.00			251.87	265.32	
trib	4623	Base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Floodway	2037.69	0.00	2037.84	8.14		30.00			314.09	329.75	
trib	4665	Base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Floodway	2038.70	0.00	2039.53	2.50		30.00			340.25	349.22	
trib	4685		Culvert										
trib	4704	Base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Floodway	2041.00	0.00	2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4750	Base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Floodway	2041.03	0.00	2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	5165	Base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Floodway	2043.40	0.00	2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5676	Base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Floodway	2048.08	0.00	2048.13	19.14		28.00			183.69	226.54	
trib	6117	Base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Floodway	2052.07	0.00	2052.35	6.77		28.00			211.57	230.44	
trib	6154	Base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Floodway	2052.76	0.00	2052.83	16.44		28.00			211.25	246.77	
trib	6200		Culvert										
trib	6239	Base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Floodway	2054.11	0.00	2054.13	18.59		28.00			221.30	259.22	
trib	6274	Base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Floodway	2055.65	0.00	2055.95	10.56		28.00			210.49	231.21	
trib	6553	Base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Floodway	2064.48	0.00	2064.68	10.59		28.00			197.65	240.39	
trib	7086	Base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Floodway	2083.50	0.00	2083.96	3.69		18.00			150.93	158.25	
trib	7121	Base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Floodway	2084.63	0.00	2085.08	3.10		18.00			118.04	121.88	
trib	7130		Culvert										
trib	7143	Base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Floodway	2086.04	0.00	2086.16	3.79		18.00			111.14	115.72	
trib	7169	Base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Floodway	2090.51	0.00	2091.06	2.65		18.00			114.91	118.45	
trib	7175		Culvert										
trib	7186	Base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Floodway	2091.45	0.00	2091.64	2.88		18.00			119.10	122.49	
trib	7220	Base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Floodway	2092.39	0.00	2092.72	7.10	0.01	17.99			130.02	136.02	

Appendix D. Corrective Effective HEC-RAS Models

Corrected Effective Model Output - Golf Course Overflow Reach

HEC-RAS Plan: CEM River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	20779	10-yr	30.00	2004.98	2007.19	2005.40	2007.19	0.000006	0.06	517.26	1198.11	0.01
Golf Course	20779	50-yr	54.00	2004.98	2007.80	2005.49	2007.80	0.000003	0.05	1164.72	1860.64	0.01
Golf Course	20779	100-yr	64.00	2004.98	2008.05	2005.52	2008.05	0.000002	0.04	1491.37	1985.36	0.01
Golf Course	20779	500-yr	88.00	2004.98	2008.64	2005.58	2008.64	0.000000	0.03	3229.73	2191.83	0.00
Golf Course	21013	10-yr	30.00	2007.36	2007.65	2007.65	2007.74	0.048676	2.02	13.20	348.57	0.86
Golf Course	21013	50-yr	54.00	2007.36	2007.77	2007.77	2007.86	0.043680	2.09	23.46	392.88	0.83
Golf Course	21013	100-yr	64.00	2007.36	2007.79	2007.79	2007.90	0.048191	2.30	25.52	395.42	0.89
Golf Course	21013	500-yr	88.00	2007.36	2008.64	2007.85	2008.64	0.000463	0.44	192.58	634.20	0.10
Golf Course	21128	10-yr	30.00	2007.08	2008.28	2007.75	2008.28	0.000847	0.54	55.17	320.85	0.14
Golf Course	21128	50-yr	54.00	2007.08	2008.53	2007.86	2008.54	0.001130	0.60	90.05	413.34	0.15
Golf Course	21128	100-yr	64.00	2007.08	2008.60	2007.90	2008.60	0.001189	0.62	103.55	442.36	0.16
Golf Course	21128	500-yr	88.00	2007.08	2008.77	2007.98	2008.77	0.001006	0.60	145.58	511.28	0.15
Golf Course	21229	10-yr	30.00	2006.97	2008.63	2008.48	2008.64	0.007806	0.82	36.50	445.34	0.35
Golf Course	21229	50-yr	54.00	2006.97	2008.82	2008.55	2008.83	0.002308	0.62	86.76	540.31	0.20
Golf Course	21229	100-yr	64.00	2006.97	2008.87	2008.57	2008.88	0.001927	0.63	102.06	545.69	0.19
Golf Course	21229	500-yr	88.00	2006.97	2008.98	2008.63	2008.99	0.001408	0.65	136.13	549.38	0.17
Golf Course	21385	10-yr	30.00	2008.16	2008.94	2008.47	2008.94	0.000409	0.31	97.80	268.00	0.09
Golf Course	21385	50-yr	54.00	2008.16	2009.08	2008.53	2009.08	0.000477	0.40	135.88	283.37	0.10
Golf Course	21385	100-yr	64.00	2008.16	2009.12	2008.56	2009.12	0.000512	0.43	147.76	285.92	0.11
Golf Course	21385	500-yr	88.00	2008.16	2009.22	2008.61	2009.22	0.000552	0.50	176.40	291.98	0.11
Golf Course	21409	10-yr	30.00	2008.27	2008.98	2008.68	2008.98	0.001022	0.46	64.91	246.09	0.14
Golf Course	21409	50-yr	54.00	2008.27	2009.12	2008.75	2009.13	0.001113	0.58	93.59	269.70	0.15
Golf Course	21409	100-yr	64.00	2008.27	2009.17	2008.77	2009.17	0.001210	0.62	103.41	283.87	0.16
Golf Course	21409	500-yr	88.00	2008.27	2009.27	2008.81	2009.28	0.001345	0.68	128.93	323.53	0.17
Golf Course	21431	10-yr	30.00	2008.12	2009.03	2008.45	2009.03	0.000564	0.40	74.75	174.33	0.11
Golf Course	21431	50-yr	54.00	2008.12	2009.18	2008.54	2009.18	0.000767	0.52	103.72	206.07	0.13
Golf Course	21431	100-yr	64.00	2008.12	2009.23	2008.59	2009.24	0.000845	0.56	114.48	222.73	0.14
Golf Course	21431	500-yr	88.00	2008.12	2009.34	2008.66	2009.35	0.000870	0.64	138.33	232.31	0.14
Golf Course	21445	10-yr	30.00	2008.44	2009.09	2008.89	2009.12	0.014872	1.32	22.80	104.20	0.50
Golf Course	21445	50-yr	54.00	2008.44	2009.26	2009.06	2009.28	0.007937	1.23	44.01	139.40	0.38
Golf Course	21445	100-yr	64.00	2008.44	2009.31	2009.10	2009.33	0.006788	1.24	51.65	143.41	0.36
Golf Course	21445	500-yr	88.00	2008.44	2009.42	2009.16	2009.44	0.005945	1.31	67.25	155.76	0.35
Golf Course	21456	10-yr	30.00	2012.42	2013.00	2013.00	2013.09	0.062594	2.50	12.02	61.61	1.00
Golf Course	21456	50-yr	54.00	2012.42	2013.11	2013.11	2013.21	0.055179	2.43	22.25	108.28	0.94
Golf Course	21456	100-yr	64.00	2012.42	2013.13	2013.13	2013.24	0.063554	2.66	24.03	113.14	1.02
Golf Course	21456	500-yr	88.00	2012.42	2013.19	2013.19	2013.31	0.062355	2.79	31.57	136.85	1.02
Golf Course	21481	10-yr	30.00	2011.45	2013.10	2011.82	2013.10	0.000004	0.05	549.78	595.32	0.01
Golf Course	21481	50-yr	54.00	2011.45	2013.22	2011.87	2013.22	0.000009	0.09	620.01	630.19	0.02
Golf Course	21481	100-yr	64.00	2011.45	2013.25	2011.90	2013.25	0.000011	0.10	643.38	634.26	0.02
Golf Course	21481	500-yr	88.00	2011.45	2013.33	2011.93	2013.33	0.000017	0.13	690.07	652.36	0.02
Golf Course	21485	10-yr	30.00	2012.65	2013.10	2012.84	2013.10	0.000056	0.27	109.69	444.23	0.10
Golf Course	21485	50-yr	54.00	2012.65	2013.22	2012.88	2013.22	0.000054	0.33	162.03	474.28	0.10
Golf Course	21485	100-yr	64.00	2012.65	2013.25	2012.90	2013.25	0.000055	0.36	179.70	484.33	0.10
Golf Course	21485	500-yr	88.00	2012.65	2013.32	2012.93	2013.33	0.000060	0.41	215.41	504.02	0.11
Golf Course	21515	10-yr	30.00	2011.57	2013.10	2011.89	2013.10	0.000029	0.11	275.33	488.03	0.03
Golf Course	21515	50-yr	54.00	2011.57	2013.22	2011.98	2013.22	0.000053	0.16	332.54	510.04	0.04
Golf Course	21515	100-yr	64.00	2011.57	2013.26	2012.01	2013.26	0.000063	0.18	351.59	517.17	0.04
Golf Course	21515	500-yr	88.00	2011.57	2013.33	2012.06	2013.33	0.000087	0.23	389.86	531.18	0.05
Golf Course	21525	10-yr	30.00	2011.57	2013.10	2011.89	2013.10	0.000029	0.11	275.45	488.08	0.03
Golf Course	21525	50-yr	54.00	2011.57	2013.22	2011.98	2013.22	0.000053	0.16	332.78	510.14	0.04
Golf Course	21525	100-yr	64.00	2011.57	2013.26	2012.01	2013.26	0.000063	0.18	351.91	517.28	0.04
Golf Course	21525	500-yr	88.00	2011.57	2013.33	2012.06	2013.33	0.000087	0.23	390.31	531.35	0.05
Golf Course	21609	10-yr	30.00	2011.75	2013.11	2011.93	2013.11	0.000004	0.06	493.87	476.54	0.01
Golf Course	21609	50-yr	54.00	2011.75	2013.22	2011.97	2013.22	0.000009	0.10	549.59	482.19	0.02
Golf Course	21609	100-yr	64.00	2011.75	2013.26	2011.98	2013.26	0.000012	0.11	567.93	483.72	0.02
Golf Course	21609	500-yr	88.00	2011.75	2013.33	2012.02	2013.33	0.000018	0.15	604.24	485.21	0.02
Golf Course	21726	10-yr	30.00	2011.65	2013.11	2012.01	2013.11	0.000024	0.12	247.68	329.28	0.02
Golf Course	21726	50-yr	54.00	2011.65	2013.22	2012.11	2013.22	0.000052	0.19	287.55	351.93	0.04
Golf Course	21726	100-yr	64.00	2011.65	2013.26	2012.14	2013.26	0.000065	0.21	301.18	359.35	0.04
Golf Course	21726	500-yr	88.00	2011.65	2013.34	2012.20	2013.34	0.000095	0.27	329.01	371.15	0.05
Golf Course	21857	10-yr	30.00	2012.03	2013.11	2012.42	2013.11	0.000085	0.20	148.70	235.07	0.04
Golf Course	21857	50-yr	54.00	2012.03	2013.23	2012.48	2013.23	0.000157	0.30	177.59	240.59	0.06
Golf Course	21857	100-yr	64.00	2012.03	2013.27	2012.51	2013.28	0.000193	0.34	187.58	249.08	0.07
Golf Course	21857	500-yr	88.00	2012.03	2013.35	2012.57	2013.36	0.000261	0.42	207.87	251.14	0.08

HEC-RAS Plan: CEM River: Chester Creek Reach: Golf Course (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	21983	10-yr	30.00	2012.09	2013.13	2012.50	2013.13	0.000421	0.40	74.96	140.87	0.10
Golf Course	21983	50-yr	54.00	2012.09	2013.27	2012.61	2013.27	0.000776	0.56	96.14	171.89	0.13
Golf Course	21983	100-yr	64.00	2012.09	2013.31	2012.64	2013.32	0.000867	0.61	104.46	178.27	0.14
Golf Course	21983	500-yr	88.00	2012.09	2013.41	2012.71	2013.42	0.001023	0.73	121.27	181.69	0.16
Golf Course	22423	10-yr	30.00	2012.71	2013.36	2012.98	2013.36	0.000730	0.45	67.26	162.34	0.12
Golf Course	22423	50-yr	54.00	2012.71	2013.58	2013.05	2013.58	0.000673	0.51	106.93	201.47	0.12
Golf Course	22423	100-yr	64.00	2012.71	2013.64	2013.07	2013.65	0.000662	0.54	119.30	202.93	0.12
Golf Course	22423	500-yr	88.00	2012.71	2013.77	2013.12	2013.78	0.000691	0.60	146.81	218.24	0.13
Golf Course	22972	10-yr	30.00	2013.92	2014.45	2014.45	2014.57	0.060255	2.72	11.01	48.22	1.00
Golf Course	22972	50-yr	54.00	2013.92	2014.57	2014.57	2014.72	0.053115	3.18	16.96	53.43	1.00
Golf Course	22972	100-yr	64.00	2013.92	2014.60	2014.60	2014.78	0.054246	3.41	18.77	54.23	1.02
Golf Course	22972	500-yr	88.00	2013.92	2014.69	2014.69	2014.90	0.050317	3.73	23.60	56.31	1.02
Golf Course	23005	10-yr	30.00	2014.38	2015.05	2014.75	2015.05	0.001933	0.69	43.31	112.20	0.20
Golf Course	23005	50-yr	54.00	2014.38	2015.22	2014.83	2015.23	0.002060	0.84	64.21	130.40	0.21
Golf Course	23005	100-yr	64.00	2014.38	2015.28	2014.85	2015.29	0.002060	0.89	72.20	135.50	0.21
Golf Course	23005	500-yr	88.00	2014.38	2015.42	2014.91	2015.43	0.002173	0.95	92.98	164.62	0.22
Golf Course	23050	10-yr	30.00	2014.61	2015.16	2014.87	2015.16	0.001938	0.64	46.54	134.52	0.19
Golf Course	23050	50-yr	54.00	2014.61	2015.33	2014.95	2015.34	0.001742	0.76	71.20	148.90	0.19
Golf Course	23050	100-yr	64.00	2014.61	2015.39	2014.98	2015.40	0.001701	0.80	80.06	151.92	0.19
Golf Course	23050	500-yr	88.00	2014.61	2015.53	2015.03	2015.54	0.001568	0.87	101.32	159.72	0.19
Golf Course	23090	10-yr	30.00	2014.93	2015.45	2015.26	2015.46	0.005092	0.93	32.35	111.85	0.30
Golf Course	23090	50-yr	54.00	2014.93	2015.60	2015.34	2015.61	0.004889	1.03	52.56	151.12	0.31
Golf Course	23090	100-yr	64.00	2014.93	2015.65	2015.37	2015.66	0.004580	1.07	59.89	154.59	0.30
Golf Course	23090	500-yr	88.00	2014.93	2015.76	2015.42	2015.78	0.003922	1.13	77.87	164.55	0.29
Golf Course	23446	10-yr	30.00	2017.57	2017.97	2017.87	2017.99	0.012459	1.10	27.17	141.49	0.44
Golf Course	23446	50-yr	54.00	2017.57	2018.07	2017.95	2018.10	0.012670	1.24	43.59	193.33	0.46
Golf Course	23446	100-yr	64.00	2017.57	2018.10	2017.97	2018.12	0.013760	1.32	48.49	208.12	0.48
Golf Course	23446	500-yr	88.00	2017.57	2018.13	2018.02	2018.17	0.017030	1.57	56.03	217.38	0.55
Golf Course	23887	10-yr	30.00	2022.25	2022.83	2022.66	2022.84	0.005714	0.89	33.70	135.04	0.31
Golf Course	23887	50-yr	54.00	2022.25	2022.95	2022.74	2022.97	0.005672	1.06	51.18	158.01	0.33
Golf Course	23887	100-yr	64.00	2022.25	2022.99	2022.76	2023.01	0.005408	1.11	57.80	160.17	0.32
Golf Course	23887	500-yr	88.00	2022.25	2023.09	2022.81	2023.11	0.004871	1.19	73.82	169.31	0.32
Golf Course	24430	10-yr	30.00	2028.58	2029.25	2029.25	2029.46	0.048764	3.65	8.29	21.75	1.00
Golf Course	24430	50-yr	54.00	2028.58	2029.47	2029.47	2029.73	0.037372	4.21	13.58	28.66	0.94
Golf Course	24430	100-yr	64.00	2028.58	2029.56	2029.56	2029.82	0.031201	4.22	16.81	37.07	0.88
Golf Course	24430	500-yr	88.00	2028.58	2029.72	2029.72	2029.99	0.026137	4.41	23.23	42.98	0.83

Corrected Effective Model Output - Golf Course Overflow Reach, Floodway

HEC-RAS Plan: CEM FW River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Golf Course	20779	Q100 - base	2008.05		2008.05	1327.67		64.00			934.91	2798.66	
Golf Course	20779	Q100 - floodway	2009.05	1.00	2009.05	1178.72		64.00		934.91	934.91	2798.66	2278.72
Golf Course	21013	Q100 - base	2008.05		2008.07	147.76		52.43	11.57		508.09	1602.56	
Golf Course	21013	Q100 - floodway	2009.05	1.00	2009.05	173.18		52.98	11.02	1472.43	508.09	1602.56	1725.00
Golf Course	21128	Q100 - base	2008.53		2008.53	189.79		64.00			409.35	1512.91	
Golf Course	21128	Q100 - floodway	2009.05	0.52	2009.11	25.00		64.00		1045.00	409.35	1512.91	1070.00
Golf Course	21229	Q100 - base	2008.86		2008.87	305.93		64.00			417.95	1452.44	
Golf Course	21229	Q100 - floodway	2009.59	0.72	2009.62	35.00		64.00		985.00	417.95	1452.44	1020.00
Golf Course	21385	Q100 - base	2009.12		2009.12	285.94		64.00			431.52	1001.23	
Golf Course	21385	Q100 - floodway	2010.03	0.91	2010.06	30.00		64.00		785.00	431.52	1001.23	815.00
Golf Course	21409	Q100 - base	2009.17		2009.17	223.27		64.00			426.69	980.16	
Golf Course	21409	Q100 - floodway	2010.12	0.95	2010.16	25.00		64.00		728.00	426.69	980.16	753.00
Golf Course	21431	Q100 - base	2009.23		2009.24	219.82		64.00			440.00	961.58	
Golf Course	21431	Q100 - floodway	2010.23	1.00	2010.26	25.00		64.00		700.00	440.00	961.58	725.00
Golf Course	21445	Q100 - base	2009.31		2009.33	143.43		64.00			440.70	949.64	
Golf Course	21445	Q100 - floodway	2010.29	0.98	2010.37	20.00		64.00		683.00	440.70	949.64	703.00
Golf Course	21456	Q100 - base	2013.13		2013.24	113.14		64.00			0.00	937.26	
Golf Course	21456	Q100 - floodway	2013.79	0.66	2014.05	30.00		64.00		595.00	0.00	937.26	625.00
Golf Course	21481	Q100 - base	2013.25		2013.25	634.26		64.00			494.28	1387.02	
Golf Course	21481	Q100 - floodway	2014.10	0.85	2014.11	37.00		64.00		1073.00	494.28	1387.02	1110.00
Golf Course	21485	Q100 - base	2013.25		2013.25	484.33		64.00			0.00	911.00	
Golf Course	21485	Q100 - floodway	2014.10	0.85	2014.12	45.00		64.00		514.50	0.00	911.00	559.50
Golf Course	21515	Q100 - base	2013.26		2013.26	517.17		64.00			0.00	751.00	
Golf Course	21515	Q100 - floodway	2014.11	0.86	2014.12	45.00		64.00		495.50	0.00	751.00	540.50
Golf Course	21525	Q100 - base	2013.26		2013.26	517.28		64.00			0.00	751.00	
Golf Course	21525	Q100 - floodway	2014.12	0.86	2014.12	45.00		64.00		482.50	0.00	751.00	527.50
Golf Course	21609	Q100 - base	2013.26		2013.26	483.72		64.00			0.00	522.16	
Golf Course	21609	Q100 - floodway	2014.14	0.88	2014.15	44.00		64.00		278.00	0.00	522.16	322.00
Golf Course	21726	Q100 - base	2013.26		2013.26	359.35		64.00			0.00	402.00	
Golf Course	21726	Q100 - floodway	2014.16	0.90	2014.18	44.00		64.00		273.00	0.00	402.00	317.00
Golf Course	21857	Q100 - base	2013.27		2013.28	249.08		64.00			0.00	319.28	
Golf Course	21857	Q100 - floodway	2014.24	0.97	2014.25	43.00		64.00		188.50	0.00	319.28	231.50
Golf Course	21983	Q100 - base	2013.31		2013.32	178.27		64.00			0.00	248.45	
Golf Course	21983	Q100 - floodway	2014.28	0.96	2014.29	43.00		64.00		103.50	0.00	248.45	146.50
Golf Course	22423	Q100 - base	2013.64		2013.65	202.93		64.00			843.00	1600.75	
Golf Course	22423	Q100 - floodway	2014.45	0.81	2014.47	40.00		64.00		1140.00	843.00	1600.75	1180.00
Golf Course	22972	Q100 - base	2014.60		2014.78	54.23		64.00			888.76	1267.01	
Golf Course	22972	Q100 - floodway	2015.26	0.66	2015.70	14.13		64.00		1162.20	888.76	1267.01	1176.33
Golf Course	23005	Q100 - base	2015.28		2015.29	135.50		64.00			896.09	1271.17	
Golf Course	23005	Q100 - floodway	2016.10	0.83	2016.14	27.34		64.00		1123.02	896.09	1271.17	1150.36
Golf Course	23050	Q100 - base	2015.39		2015.40	151.92		64.00			944.30	1324.65	
Golf Course	23050	Q100 - floodway	2016.21	0.82	2016.27	22.35		64.00		1126.64	944.30	1324.65	1148.99
Golf Course	23090	Q100 - base	2015.65		2015.66	154.59		64.00			951.93	1347.53	
Golf Course	23090	Q100 - floodway	2016.61	0.96	2016.71	20.00		64.00		1095.00	951.93	1347.53	1115.00
Golf Course	23446	Q100 - base	2018.10		2018.12	208.12		64.00			688.98	1310.47	
Golf Course	23446	Q100 - floodway	2019.02	0.92	2019.14	20.00		64.00		1060.00	688.98	1310.47	1080.00
Golf Course	23887	Q100 - base	2022.99		2023.01	160.17		64.00			604.96	928.61	
Golf Course	23887	Q100 - floodway	2023.79	0.80	2023.91	20.00		64.00		829.00	604.96	928.61	849.00
Golf Course	24430	Q100 - base	2029.56		2029.82	37.07	1.56	60.23	2.21		636.32	656.04	
Golf Course	24430	Q100 - floodway	2029.72	0.16	2029.93	19.72		64.00		636.32	636.32	656.04	656.04

Corrected Effective Model - Unnamed Tributary

HEC-RAS Plan: CEM River: Tributary Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	1.00	2004.70	2007.19	2004.82	2007.19	0.000000	0.01	97.62	92.00	0.00
trib	-1303	Q50	2.00	2004.70	2007.80	2004.87	2007.80	0.000000	0.01	156.26	99.90	0.00
trib	-1303	Q100	4.00	2004.70	2008.05	2004.90	2008.05	0.000000	0.02	181.64	103.69	0.00
trib	-1303	Q500	7.00	2004.70	2008.64	2004.96	2008.64	0.000000	0.03	245.69	113.41	0.00
trib	-1019	Q10	1.00	2007.91	2008.27	2008.27	2008.30	0.103616	1.40	0.72	31.55	1.04
trib	-1019	Q50	2.00	2007.91	2008.31	2008.31	2008.35	0.096308	1.67	1.20	38.26	1.06
trib	-1019	Q100	4.00	2007.91	2008.36	2008.36	2008.41	0.077292	1.83	2.19	47.75	1.00
trib	-1019	Q500	7.00	2007.91	2008.64	2008.41	2008.64	0.002258	0.58	12.11	93.29	0.20
trib	-880	Q10	1.00	2004.89	2008.31		2008.31	0.000000	0.00	721.14	359.15	0.00
trib	-880	Q50	2.00	2004.89	2008.35		2008.35	0.000000	0.00	738.57	359.95	0.00
trib	-880	Q100	4.00	2004.89	2008.42		2008.42	0.000000	0.01	761.51	361.60	0.00
trib	-880	Q500	7.00	2004.89	2008.64		2008.64	0.000000	0.01	843.68	368.58	0.00
trib	-466	Q10	1.00	2006.89	2008.31		2008.31	0.000000	0.00	410.09	380.79	0.00
trib	-466	Q50	2.00	2006.89	2008.35		2008.35	0.000000	0.00	428.60	384.48	0.00
trib	-466	Q100	4.00	2006.89	2008.42		2008.42	0.000000	0.01	453.25	388.60	0.00
trib	-466	Q500	7.00	2006.89	2008.64		2008.64	0.000000	0.01	542.61	403.49	0.00
trib	-89	Q10	1.00	2006.07	2008.31		2008.31	0.000000	0.00	449.29	336.12	0.00
trib	-89	Q50	2.00	2006.07	2008.35		2008.35	0.000000	0.00	465.65	339.05	0.00
trib	-89	Q100	4.00	2006.07	2008.42		2008.42	0.000000	0.01	487.40	345.54	0.00
trib	-89	Q500	7.00	2006.07	2008.64		2008.64	0.000000	0.01	571.23	388.66	0.00
trib	1	Q10	1.00	1998.92	2005.00		2005.00	0.000000	0.00	225.97	48.42	0.00
trib	1	Q50	2.00	1998.92	2009.60		2009.60	0.000000	0.00	540.96	101.33	0.00
trib	1	Q100	4.00	1998.92	2009.70		2009.70	0.000000	0.01	551.13	102.16	0.00
trib	1	Q500	7.00	1998.92	2010.00		2010.00	0.000000	0.01	582.15	104.63	0.00
trib	149	Q10	10.00	1995.82	2005.00	1996.32	2005.00	0.000000	0.01	1141.63	165.71	0.00
trib	149	Q50	14.00	1995.82	2009.60	1996.38	2009.60	0.000000	0.01	1924.52	175.82	0.00
trib	149	Q100	16.00	1995.82	2009.70	1996.41	2009.70	0.000000	0.01	1942.12	176.16	0.00
trib	149	Q500	20.00	1995.82	2010.00	1996.46	2010.00	0.000000	0.01	1995.13	177.19	0.00
trib	343	Q10	10.00	1993.64	2005.00	1993.99	2005.00	0.000000	0.01	1993.17	252.43	0.00
trib	343	Q50	14.00	1993.64	2009.60	1994.05	2009.60	0.000000	0.00	3182.15	266.09	0.00
trib	343	Q100	16.00	1993.64	2009.70	1994.07	2009.70	0.000000	0.00	3208.78	266.57	0.00
trib	343	Q500	20.00	1993.64	2010.00	1994.11	2010.00	0.000000	0.01	3288.97	267.99	0.00
trib	383	Q10	10.00	1994.23	2005.00	1994.67	2005.00	0.000000	0.01	1938.50	222.78	0.00
trib	383	Q50	14.00	1994.23	2009.60	1994.71	2009.60	0.000000	0.00	3052.64	279.70	0.00
trib	383	Q100	16.00	1994.23	2009.70	1994.73	2009.70	0.000000	0.01	3080.61	279.97	0.00
trib	383	Q500	20.00	1994.23	2010.00	1994.75	2010.00	0.000000	0.01	3164.74	280.78	0.00
trib	472	Q10	10.00	2005.65	2005.00	1999.14	2005.00	0.000000		477.69	135.83	0.00
trib	472	Q50	14.00	2005.65	2009.60	1999.19	2009.60	0.000000	0.01	1255.59	189.45	0.00
trib	472	Q100	16.00	2005.65	2009.70	1999.22	2009.70	0.000000	0.01	1274.72	193.16	0.00
trib	472	Q500	20.00	2005.65	2010.00	1999.26	2010.00	0.000000	0.01	1334.21	203.55	0.00
trib	576	Q10	10.00	2008.78	2009.74	2009.74	2009.99	0.032554	4.02	2.48	4.97	1.00
trib	576	Q50	14.00	2008.78	2009.89	2009.89	2010.17	0.030449	4.27	3.28	5.70	0.99
trib	576	Q100	16.00	2008.78	2009.95	2009.95	2010.25	0.030780	4.43	3.61	5.98	1.01
trib	576	Q500	20.00	2008.78	2010.20	2010.20	2010.37	0.028407	3.36	6.36	21.88	0.93
trib	651	Q10	10.00	2009.50	2010.97	2010.45	2011.02	0.007232	1.65	6.05	55.46	0.46
trib	651	Q50	14.00	2009.50	2011.08	2010.60	2011.13	0.006740	1.82	7.70	59.63	0.46
trib	651	Q100	16.00	2009.50	2011.13	2010.67	2011.18	0.006429	1.87	8.54	63.89	0.46
trib	651	Q500	20.00	2009.50	2011.21	2010.78	2011.28	0.006391	2.02	9.91	75.90	0.47
trib	918	Q10	10.00	2009.10	2011.35	2009.95	2011.36	0.000523	0.96	10.46	9.36	0.14
trib	918	Q50	14.00	2009.10	2011.55	2010.09	2011.57	0.000716	1.17	11.95	29.34	0.16
trib	918	Q100	16.00	2009.10	2011.63	2010.17	2011.66	0.000811	1.27	12.60	43.37	0.18
trib	918	Q500	20.00	2009.10	2011.79	2010.29	2011.82	0.000984	1.45	13.82	61.75	0.19
trib	1472	Q10	10.00	2011.44	2012.38	2012.38	2012.67	0.032363	4.35	2.30	3.82	0.99
trib	1472	Q50	14.00	2011.44	2012.53	2012.53	2012.89	0.032599	4.78	2.93	4.19	1.01
trib	1472	Q100	16.00	2011.44	2012.72	2012.61	2013.00	0.021875	4.28	3.74	4.62	0.84
trib	1472	Q500	20.00	2011.44	2013.01	2012.75	2013.24	0.013910	3.84	5.21	5.32	0.68
trib	1510	Q10	10.00	2011.15	2012.95	2012.17	2013.00	0.002806	1.77	5.64	5.39	0.31
trib	1510	Q50	14.00	2011.15	2013.19	2012.35	2013.25	0.003077	1.99	7.02	5.99	0.32
trib	1510	Q100	16.00	2011.15	2013.26	2012.43	2013.33	0.003434	2.15	7.45	6.17	0.34
trib	1510	Q500	20.00	2011.15	2013.44	2012.58	2013.53	0.003647	2.32	8.61	6.62	0.36
trib	1520		Culvert									
trib	1528	Q10	10.00	2010.84	2013.36	2011.82	2013.38	0.000963	1.00	9.97	6.88	0.15

HEC-RAS Plan: CEM   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2010.84	2013.99	2012.00	2014.00	0.000673	0.95	14.72	8.40	0.13
trib	1528	Q100	16.00	2010.84	2014.30	2012.07	2014.32	0.000575	0.91	17.53	9.52	0.12
trib	1528	Q500	20.00	2010.84	2014.58	2012.23	2014.59	0.000719	0.95	23.45	47.67	0.13
trib	1557	Q10	10.00	2011.79	2013.39	2012.66	2013.44	0.003817	1.69	5.92	5.64	0.29
trib	1557	Q50	14.00	2011.79	2014.00	2012.81	2014.04	0.001935	1.43	9.76	6.94	0.21
trib	1557	Q100	16.00	2011.79	2014.32	2012.88	2014.35	0.001434	1.33	12.05	7.61	0.19
trib	1557	Q500	20.00	2011.79	2014.59	2013.01	2014.62	0.001439	1.41	14.22	8.20	0.19
trib	1963	Q10	10.00	2018.61	2019.48	2019.48	2019.66	0.051975	3.44	2.91	7.79	0.99
trib	1963	Q50	14.00	2018.61	2019.59	2019.59	2019.80	0.045074	3.61	3.92	11.07	0.95
trib	1963	Q100	16.00	2018.61	2019.66	2019.66	2019.85	0.038218	3.52	4.80	15.48	0.89
trib	1963	Q500	20.00	2018.61	2019.75	2019.75	2019.93	0.033517	3.48	6.39	18.55	0.84
trib	1989	Q10	10.00	2017.77	2019.85	2018.80	2019.89	0.002658	1.50	6.69	17.19	0.24
trib	1989	Q50	14.00	2017.77	2020.01	2018.98	2020.06	0.003491	1.86	7.54	40.62	0.28
trib	1989	Q100	16.00	2017.77	2020.06	2019.06	2020.12	0.004030	2.04	7.83	48.44	0.30
trib	1989	Q500	20.00	2017.77	2020.14	2019.22	2020.23	0.005238	2.42	8.27	60.64	0.35
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.19	2019.81	2020.30	0.009432	2.61	3.83	8.68	0.47
trib	2080	Q50	14.00	2018.73	2020.48	2019.96	2020.60	0.007671	2.81	4.99	12.81	0.44
trib	2080	Q100	16.00	2018.73	2020.61	2020.02	2020.74	0.007173	2.90	5.51	14.87	0.44
trib	2080	Q500	20.00	2018.73	2020.86	2020.15	2021.01	0.006452	3.07	6.51	18.47	0.42
trib	2100	Q10	12.00	2018.27	2020.39	2019.40	2020.41	0.002032	1.15	10.46	12.11	0.22
trib	2100	Q50	24.00	2018.27	2020.70	2019.86	2020.74	0.003396	1.65	14.58	14.51	0.29
trib	2100	Q100	30.00	2018.27	2020.83	2020.00	2020.88	0.003580	1.82	16.55	15.31	0.30
trib	2100	Q500	46.00	2018.27	2021.08	2020.26	2021.16	0.004409	2.26	20.54	16.79	0.35
trib	2110	Q10	12.00	2018.27	2020.42	2019.40	2020.43	0.001881	1.11	10.78	12.31	0.21
trib	2110	Q50	24.00	2018.27	2020.74	2019.87	2020.78	0.002981	1.58	15.21	14.78	0.27
trib	2110	Q100	30.00	2018.27	2020.88	2020.00	2020.92	0.003147	1.74	17.27	15.59	0.29
trib	2110	Q500	46.00	2018.27	2021.14	2020.26	2021.21	0.003840	2.17	21.53	17.14	0.32
trib	2120	Q10	12.00	2018.27	2020.44	2019.40	2020.45	0.001769	1.09	11.03	12.47	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.81	0.002698	1.53	15.70	14.97	0.26
trib	2120	Q100	30.00	2018.27	2020.91	2020.00	2020.96	0.002861	1.69	17.82	15.80	0.27
trib	2120	Q500	46.00	2018.27	2021.18	2020.26	2021.25	0.003471	2.10	22.30	17.41	0.31
trib	2651	Q10	12.00	2021.38	2022.48	2022.22	2022.62	0.016295	2.96	4.05	5.21	0.59
trib	2651	Q50	24.00	2021.38	2023.16	2022.58	2023.30	0.009750	3.00	8.00	6.47	0.48
trib	2651	Q100	30.00	2021.38	2023.40	2022.73	2023.55	0.009769	3.10	9.67	7.51	0.48
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008805	3.30	14.05	10.00	0.47
trib	3126	Q10	12.00	2023.82	2025.45	2024.69	2025.49	0.003114	1.53	7.84	7.78	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003750	1.97	12.18	9.47	0.31
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.25	0.003704	2.08	14.43	10.23	0.31
trib	3126	Q500	46.00	2023.82	2026.65	2025.48	2026.74	0.003902	2.35	19.60	12.06	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.90	0.003060	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011028	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: CEM River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51		2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98		2048.02	0.004265	1.60	13.77	17.89	0.32
trib	5676	Q100	28.00	2046.43	2048.08		2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37		2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68		2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031974	4.34	5.07	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07		2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49		2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.006997	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Corrected Effective Model Output - Unnamed Tributary, Floodway

HEC-RAS Plan: CEM FW River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Q100 base	2008.05		2008.05	103.69	0.01	3.90	0.09		70.92	163.31	
trib	-1303	Q100 floodway	2009.05	1.00	2009.05	31.32		4.00		131.99	70.92	163.31	163.31
trib	-1019	Q100 base	2008.36		2008.41	21.08		4.00			152.95	253.19	
trib	-1019	Q100 floodway	2009.05	0.69	2009.05	21.09		4.00		173.33	152.95	253.19	194.42
trib	-880	Q100 base	2008.42		2008.42	361.60	0.08	3.92	0.01		62.73	380.37	
trib	-880	Q100 floodway	2009.05	0.63	2009.05	40.00		4.00		310.00	62.73	380.37	350.00
trib	-466	Q100 base	2008.42		2008.42	388.60		4.00	0.00		129.52	566.57	
trib	-466	Q100 floodway	2009.05	0.64	2009.05	45.57		4.00		521.00	129.52	566.57	566.57
trib	-89	Q100 base	2008.42		2008.42	345.54		4.00			144.89	581.16	
trib	-89	Q100 floodway	2009.05	0.64	2009.05	39.70		4.00		510.00	144.89	581.16	549.70
trib	1	Q100 base	2009.70		2009.70	102.16		4.00			461.25	568.10	
trib	1	Q100 floodway	2010.70	1.00	2010.70	116.77	0.00	4.00			461.25	568.10	
trib	149	Q100 base	2009.70		2009.70	176.16		16.00			421.08	606.95	
trib	149	Q100 floodway	2010.70	1.00	2010.70	179.75		16.00			421.08	606.95	
trib	343	Q100 base	2009.70		2009.70	266.57		16.00			410.55	678.07	
trib	343	Q100 floodway	2010.70	1.00	2010.70	271.14	0.00	16.00	0.00		410.55	678.07	
trib	383	Q100 base	2009.70		2009.70	279.97		16.00	0.00		397.28	677.14	
trib	383	Q100 floodway	2010.70	1.00	2010.70	282.66		16.00	0.00		397.28	677.14	
trib	472	Q100 base	2009.70		2009.70	193.16		0.12	15.88		340.55	365.05	
trib	472	Q100 floodway	2010.70	1.00	2010.70	8.82		16.00		347.00	340.55	365.05	355.82
trib	576	Q100 base	2009.95		2010.25	5.98		16.00			361.81	384.61	
trib	576	Q100 floodway	2010.67	0.73	2010.75	5.41		16.00		368.20	361.81	384.61	373.61
trib	651	Q100 base	2011.13		2011.18	16.46		16.00			360.31	384.41	
trib	651	Q100 floodway	2011.07	-0.06	2011.14	15.66		16.00		367.72	360.31	384.41	384.41
trib	918	Q100 base	2011.63		2011.66	7.79		16.00			466.95	478.43	
trib	918	Q100 floodway	2011.63	0.00	2011.66	7.59		16.00		468.53	466.95	478.43	478.43
trib	1472	Q100 base	2012.72		2013.00	4.62		16.00			706.41	714.93	
trib	1472	Q100 floodway	2012.71	-0.01	2013.00	4.61		16.00		708.23	706.41	714.93	713.11
trib	1510	Q100 base	2013.26		2013.33	6.17		16.00			711.73	722.04	
trib	1510	Q100 floodway	2013.26	0.00	2013.33	6.16		16.00		714.06	711.73	722.04	720.22
trib	1520		Culvert										
trib	1528	Q100 base	2014.30		2014.32	9.52		16.00			727.15	744.68	
trib	1528	Q100 floodway	2014.31	0.00	2014.32	9.50		16.00		727.56	727.15	744.68	737.06
trib	1557	Q100 base	2014.32		2014.35	7.61		16.00			726.74	740.03	
trib	1557	Q100 floodway	2014.32	0.00	2014.35	7.61		16.00		730.81	726.74	740.03	738.42
trib	1963	Q100 base	2019.66		2019.85	15.48		15.72	0.28		739.45	750.61	
trib	1963	Q100 floodway	2019.63	-0.03	2019.86	8.89		16.00		741.45	739.45	750.61	750.61
trib	1989	Q100 base	2020.06		2020.12	5.50		16.00			762.80	771.50	
trib	1989	Q100 floodway	2020.08	0.02	2020.15	5.50		16.00		762.80	762.80	771.50	771.50
trib	2040		Culvert										
trib	2080	Q100 base	2020.61		2020.74	4.00		16.00			39.42	68.83	
trib	2080	Q100 floodway	2020.61	0.00	2020.74	4.00		16.00		46.05	39.42	68.83	60.92
trib	2100	Q100 base	2020.83		2020.88	15.31	0.01	29.99			44.23	60.09	
trib	2100	Q100 floodway	2020.83	0.00	2020.88	14.75		30.00		44.23	44.23	60.09	58.98
trib	2110	Q100 base	2020.88		2020.92	15.59	0.02	29.98			44.23	60.09	
trib	2110	Q100 floodway	2020.88	0.00	2020.93	14.82		30.00		44.23	44.23	60.09	59.05
trib	2120	Q100 base	2020.91		2020.96	15.80	0.03	29.97			44.23	60.09	
trib	2120	Q100 floodway	2020.92	0.00	2020.96	14.87		30.00		44.23	44.23	60.09	59.10
trib	2651	Q100 base	2023.40		2023.55	7.51		30.00			46.44	55.58	
trib	2651	Q100 floodway	2023.40	0.01	2023.55	7.50		30.00		46.68	46.44	55.58	54.18
trib	3126	Q100 base	2026.19		2026.25	10.23		30.00			72.83	95.75	
trib	3126	Q100 floodway	2026.18	0.00	2026.25	10.22		30.00		75.79	72.83	95.75	86.03
trib	3617	Q100 base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Q100 floodway	2030.66	-0.01	2031.13	5.89		30.00		144.39	139.17	162.30	150.31
trib	4127	Q100 base	2035.09		2035.15	9.22		30.00			251.87	265.32	
trib	4127	Q100 floodway	2035.09	0.00	2035.16	9.22		30.00		253.91	251.87	265.32	263.13

HEC-RAS Plan: CEM FW   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4623	Q100 base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Q100 floodway	2037.69	0.00	2037.84	8.13		30.00		316.70	314.09	329.75	324.83
trib	4665	Q100 base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Q100 floodway	2038.70	0.00	2039.53	2.50		30.00		344.05	340.25	349.22	347.43
trib	4685		Culvert										
trib	4704	Q100 base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Q100 floodway	2040.99	-0.01	2041.03	7.52		30.00		352.15	352.15	360.54	360.54
trib	4750	Q100 base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Q100 floodway	2041.05	0.02	2041.07	12.65		28.00		329.79	329.79	342.44	342.44
trib	5165	Q100 base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Q100 floodway	2043.35	-0.05	2043.61	13.81	0.00	28.00	0.00	212.11	212.11	225.92	225.92
trib	5676	Q100 base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Q100 floodway	2048.17	0.09	2048.21	19.14		28.00		187.85	183.69	226.54	206.99
trib	6117	Q100 base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Q100 floodway	2051.88	-0.20	2052.30	6.34		28.00		217.18	211.57	230.44	223.95
trib	6154	Q100 base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Q100 floodway	2052.80	0.04	2052.86	16.44		28.00		219.96	211.25	246.77	236.94
trib	6200		Culvert										
trib	6239	Q100 base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Q100 floodway	2054.11	0.00	2054.13	18.59		28.00		228.52	221.30	259.22	247.11
trib	6274	Q100 base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Q100 floodway	2055.66	0.01	2055.95	10.56		28.00		216.47	210.49	231.21	227.03
trib	6553	Q100 base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Q100 floodway	2064.48	-0.01	2064.67	10.55		28.00		208.19	197.65	240.39	218.78
trib	7086	Q100 base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Q100 floodway	2083.50	0.00	2083.96	3.68		18.00		153.30	150.93	158.25	156.99
trib	7121	Q100 base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Q100 floodway	2084.64	0.00	2085.08	3.10		18.00		118.45	118.04	121.88	121.62
trib	7130		Culvert										
trib	7143	Q100 base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Q100 floodway	2086.04	0.00	2086.16	3.79		18.00		111.74	111.14	115.72	115.53
trib	7169	Q100 base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Q100 floodway	2090.50	-0.01	2091.06	2.64		18.00		115.24	114.91	118.45	117.88
trib	7175		Culvert										
trib	7186	Q100 base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Q100 floodway	2091.45	0.00	2091.64	2.88		18.00		119.03	119.10	122.49	122.26
trib	7220	Q100 base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Q100 floodway	2092.37	-0.02	2092.72	5.77		18.00		130.02	130.02	136.02	135.83

Corrected Effective Model - Unnamed Tributary without DS Levee

HEC-RAS Plan: wo DS lev (CEM) River: Tributary Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	10.00	2004.70	2007.19	2005.00	2007.19	0.000006	0.13	97.62	92.00	0.02
trib	-1303	Q50	14.00	2004.70	2007.80	2005.05	2007.80	0.000004	0.12	156.26	99.90	0.01
trib	-1303	Q100	16.00	2004.70	2008.05	2005.07	2008.05	0.000003	0.12	181.64	103.69	0.01
trib	-1303	Q500	20.00	2004.70	2008.64	2005.11	2008.64	0.000002	0.11	245.69	113.41	0.01
trib	-1019	Q10	10.00	2008.18	2008.47	2008.47	2008.54	0.040241	2.34	5.15	65.40	0.83
trib	-1019	Q50	14.00	2008.18	2008.51	2008.51	2008.59	0.039441	2.57	6.69	70.95	0.84
trib	-1019	Q100	16.00	2008.18	2008.52	2008.52	2008.62	0.045491	2.81	7.00	71.61	0.91
trib	-1019	Q500	20.00	2008.18	2008.64	2008.56	2008.65	0.003347	0.96	26.15	93.34	0.26
trib	-880	Q10	10.00	2007.31	2008.55	2005.25	2008.55	0.000000	0.01	808.03	365.13	0.00
trib	-880	Q50	14.00	2007.31	2008.60	2005.30	2008.60	0.000000	0.01	828.10	367.06	0.00
trib	-880	Q100	16.00	2007.31	2008.63	2005.32	2008.63	0.000000	0.01	837.43	367.97	0.00
trib	-880	Q500	20.00	2007.31	2008.65	2005.36	2008.65	0.000000	0.01	845.25	368.73	0.00
trib	-466	Q10	10.00	2006.96	2008.55	2007.05	2008.55	0.000000	0.02	503.64	396.88	0.00
trib	-466	Q50	14.00	2006.96	2008.60	2007.08	2008.60	0.000001	0.03	525.58	402.65	0.00
trib	-466	Q100	16.00	2006.96	2008.63	2007.08	2008.63	0.000001	0.03	535.81	403.22	0.00
trib	-466	Q500	20.00	2006.96	2008.65	2007.08	2008.65	0.000001	0.04	544.38	403.56	0.01
trib	-89	Q10	10.00	2007.09	2008.55	2006.35	2008.55	0.000000	0.02	533.76	381.64	0.00
trib	-89	Q50	14.00	2007.09	2008.60	2006.40	2008.60	0.000000	0.02	554.94	387.29	0.00
trib	-89	Q100	16.00	2007.09	2008.63	2006.43	2008.63	0.000001	0.03	564.78	388.12	0.00
trib	-89	Q500	20.00	2007.09	2008.65	2006.47	2008.65	0.000001	0.03	573.08	388.82	0.00
trib	1	Q10	10.00	2008.30	2008.57	2008.57	2008.61	0.049508	2.23	7.05	92.01	0.89
trib	1	Q50	14.00	2008.30	2008.60	2008.60	2008.64	0.049091	2.40	9.47	106.80	0.90
trib	1	Q100	16.00	2008.30	2008.61	2008.61	2008.65	0.045516	2.40	10.81	112.72	0.88
trib	1	Q500	20.00	2008.30	2008.63	2008.63	2008.67	0.043045	2.45	13.02	120.22	0.86
trib	149	Q10	10.00	2007.52	2008.62	2006.65	2008.62	0.000000	0.01	417.66	269.94	0.00
trib	149	Q50	14.00	2007.52	2008.65	2006.70	2008.65	0.000001	0.02	425.25	270.23	0.00
trib	149	Q100	16.00	2007.52	2008.66	2006.72	2008.66	0.000001	0.02	428.28	270.35	0.00
trib	149	Q500	20.00	2007.52	2008.68	2006.80	2008.68	0.000001	0.03	433.86	270.56	0.01
trib	343	Q10	10.00	2008.18	2008.62	2007.06	2008.62	0.000001	0.02	272.09	279.48	0.01
trib	343	Q50	14.00	2008.18	2008.65	2007.13	2008.65	0.000003	0.03	279.96	281.03	0.01
trib	343	Q100	16.00	2008.18	2008.66	2007.16	2008.66	0.000003	0.03	283.12	281.64	0.01
trib	343	Q500	20.00	2008.18	2008.68	2007.19	2008.68	0.000005	0.04	288.94	282.74	0.01
trib	383	Q10	10.00	2008.42	2008.62	2007.33	2008.62	0.000003	0.01	193.97	213.44	0.01
trib	383	Q50	14.00	2008.42	2008.65	2007.36	2008.65	0.000006	0.02	199.96	214.83	0.01
trib	383	Q100	16.00	2008.42	2008.66	2007.37	2008.66	0.000007	0.03	202.37	215.39	0.01
trib	383	Q500	20.00	2008.42	2008.68	2007.40	2008.68	0.000011	0.03	206.88	216.43	0.01
trib	472	Q10	10.00	2008.50	2008.62	2007.46	2008.62	0.000008	0.01	146.81	211.42	0.01
trib	472	Q50	14.00	2008.50	2008.65	2007.50	2008.65	0.000014	0.02	152.88	213.77	0.01
trib	472	Q100	16.00	2008.50	2008.66	2007.52	2008.66	0.000017	0.03	155.34	214.71	0.01
trib	472	Q500	20.00	2008.50	2008.68	2007.55	2008.68	0.000025	0.04	159.92	216.36	0.02
trib	576	Q10	10.00	2008.57	2008.62	2007.79	2008.62	0.000034	0.02	83.84	150.04	0.02
trib	576	Q50	14.00	2008.57	2008.65	2007.83	2008.65	0.000057	0.03	88.33	153.40	0.02
trib	576	Q100	16.00	2008.57	2008.66	2007.84	2008.66	0.000069	0.03	90.17	154.76	0.03
trib	576	Q500	20.00	2008.57	2008.68	2007.88	2008.68	0.000096	0.05	93.67	157.85	0.03
trib	651	Q10	10.00	2011.11	2011.18	2011.18	2011.22	0.097087	0.90	6.25	88.01	0.91
trib	651	Q50	14.00	2011.11	2011.20	2011.20	2011.24	0.084641	1.01	8.16	94.94	0.89
trib	651	Q100	16.00	2011.11	2011.21	2011.21	2011.26	0.076146	1.09	9.16	96.15	0.87
trib	651	Q500	20.00	2011.11	2011.22	2011.22	2011.28	0.078399	1.27	10.44	97.72	0.92
trib	918	Q10	10.00	2009.84	2011.22	2010.09	2011.22	0.000004	0.07	191.15	223.46	0.01
trib	918	Q50	14.00	2009.84	2011.25	2010.13	2011.25	0.000006	0.09	197.86	227.01	0.01
trib	918	Q100	16.00	2009.84	2011.27	2010.15	2011.27	0.000008	0.10	200.97	230.82	0.02
trib	918	Q500	20.00	2009.84	2011.30	2010.16	2011.30	0.000012	0.13	207.29	233.18	0.02
trib	1472	Q10	10.00	2013.44	2013.73	2013.73	2013.78	0.038164	2.06	6.11	55.33	0.79
trib	1472	Q50	14.00	2013.44	2013.76	2013.76	2013.82	0.041668	2.34	7.74	62.95	0.84
trib	1472	Q100	16.00	2013.44	2013.77	2013.77	2013.84	0.039601	2.38	8.80	67.96	0.83
trib	1472	Q500	20.00	2013.44	2013.80	2013.80	2013.87	0.039038	2.52	10.69	77.87	0.84
trib	1510	Q10	10.00	2013.81	2014.06	2013.90	2014.06	0.002778	0.39	19.89	120.64	0.19
trib	1510	Q50	14.00	2013.81	2014.10	2013.94	2014.11	0.002801	0.43	25.50	126.84	0.20
trib	1510	Q100	16.00	2013.81	2014.12	2013.95	2014.13	0.002776	0.45	27.85	129.47	0.20
trib	1510	Q500	20.00	2013.81	2014.15	2013.97	2014.16	0.002826	0.50	31.99	137.40	0.21
trib	1520		Culvert									
trib	1528	Q10	10.00	2013.78	2014.06	2013.93	2014.06	0.005201	0.69	15.56	100.95	0.28

HEC-RAS Plan: wo DS lev (CEM)   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2013.78	2014.10	2013.95	2014.11	0.004983	0.76	20.57	116.23	0.29
trib	1528	Q100	16.00	2013.78	2014.12	2013.97	2014.13	0.005184	0.82	22.52	118.90	0.30
trib	1528	Q500	20.00	2013.78	2014.16	2013.99	2014.17	0.004648	0.85	26.76	122.07	0.29
trib	1557	Q10	10.00	2014.07	2014.21	2014.05	2014.21	0.004529	0.32	16.54	122.35	0.22
trib	1557	Q50	14.00	2014.07	2014.25	2014.10	2014.26	0.004585	0.37	22.60	137.57	0.23
trib	1557	Q100	16.00	2014.07	2014.27	2014.12	2014.27	0.004521	0.42	24.77	140.38	0.24
trib	1557	Q500	20.00	2014.07	2014.29	2014.14	2014.30	0.004640	0.50	28.53	145.80	0.25
trib	1963	Q10	10.00	2015.81	2016.24	2016.10	2016.26	0.007062	1.07	10.25	52.15	0.36
trib	1963	Q50	14.00	2015.81	2016.29	2016.15	2016.31	0.007097	1.20	13.09	56.60	0.37
trib	1963	Q100	16.00	2015.81	2016.31	2016.17	2016.33	0.007323	1.27	14.25	57.48	0.38
trib	1963	Q500	20.00	2015.81	2016.35	2016.20	2016.38	0.007236	1.36	16.68	58.71	0.38
trib	1989	Q10	10.00	2017.77	2018.80	2018.80	2019.13	0.055202	4.65	2.15	3.23	1.00
trib	1989	Q50	14.00	2017.77	2018.98	2018.98	2019.38	0.054111	5.05	2.77	3.54	1.01
trib	1989	Q100	16.00	2017.77	2019.07	2019.07	2019.48	0.052722	5.18	3.09	3.69	1.00
trib	1989	Q500	20.00	2017.77	2019.22	2019.22	2019.68	0.051664	5.45	3.67	3.94	0.99
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.21	2019.81	2020.31	0.008855	2.56	3.90	8.86	0.46
trib	2080	Q50	14.00	2018.73	2020.50	2019.96	2020.62	0.007337	2.77	5.05	13.08	0.43
trib	2080	Q100	16.00	2018.73	2020.63	2020.02	2020.76	0.006894	2.87	5.58	15.13	0.43
trib	2080	Q500	20.00	2018.73	2020.87	2020.15	2021.02	0.006295	3.05	6.55	18.57	0.42
trib	2100	Q10	12.00	2018.27	2020.40	2019.40	2020.42	0.001965	1.13	10.60	12.20	0.21
trib	2100	Q50	24.00	2018.27	2020.71	2019.86	2020.75	0.003293	1.63	14.74	14.59	0.29
trib	2100	Q100	30.00	2018.27	2020.84	2020.00	2020.89	0.003479	1.80	16.71	15.37	0.30
trib	2100	Q500	46.00	2018.27	2021.09	2020.26	2021.17	0.004326	2.25	20.67	16.84	0.34
trib	2110	Q10	12.00	2018.27	2020.43	2019.40	2020.44	0.001824	1.10	10.90	12.39	0.21
trib	2110	Q50	24.00	2018.27	2020.75	2019.87	2020.79	0.002895	1.56	15.35	14.83	0.27
trib	2110	Q100	30.00	2018.27	2020.89	2020.00	2020.93	0.003072	1.73	17.40	15.64	0.28
trib	2110	Q500	46.00	2018.27	2021.15	2020.26	2021.22	0.003780	2.15	21.65	17.18	0.32
trib	2120	Q10	12.00	2018.27	2020.45	2019.40	2020.46	0.001720	1.08	11.15	12.55	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.82	0.002629	1.52	15.83	15.03	0.26
trib	2120	Q100	30.00	2018.27	2020.92	2020.00	2020.96	0.002801	1.68	17.94	15.84	0.27
trib	2120	Q500	46.00	2018.27	2021.19	2020.26	2021.26	0.003424	2.09	22.40	17.44	0.31
trib	2651	Q10	12.00	2021.38	2022.47	2022.22	2022.61	0.017129	3.01	3.98	5.18	0.61
trib	2651	Q50	24.00	2021.38	2023.15	2022.58	2023.29	0.009975	3.03	7.93	6.46	0.48
trib	2651	Q100	30.00	2021.38	2023.39	2022.73	2023.54	0.009967	3.13	9.59	7.45	0.49
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008905	3.31	13.99	9.98	0.47
trib	3126	Q10	12.00	2023.82	2025.46	2024.69	2025.50	0.003063	1.52	7.89	7.80	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003719	1.96	12.22	9.48	0.30
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.26	0.003685	2.07	14.46	10.24	0.31
trib	3126	Q500	46.00	2023.82	2026.66	2025.48	2026.74	0.003886	2.34	19.63	12.07	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.90	0.003059	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011028	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: wo DS lev (CEM)   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51	2047.12	2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98	2047.39	2048.02	0.004265	1.60	13.77	17.89	0.32
trib	5676	Q100	28.00	2046.43	2048.08	2047.50	2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37	2047.73	2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68	2051.43	2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031946	4.33	5.08	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07	2051.88	2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49	2052.21	2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.007005	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Corrected Effective Model - Unnamed Tributary Without DS Levee, Floodway

HEC-RAS Plan: wo ds fw (CEM) River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Base	2008.05		2008.05	103.69	5.34	9.25	1.41		134.37	158.76	
trib	-1303	Floodway	2009.05	1.00	2009.05	31.32	0.63	13.98	1.39	131.99	134.37	158.76	163.31
trib	-1019	Base	2008.52		2008.62	38.92	3.31	11.46	1.24		178.65	192.41	
trib	-1019	Floodway	2009.04	0.53	2009.06	21.09	3.29	11.59	1.12	173.33	178.65	192.41	194.42
trib	-880	Base	2008.63		2008.63	367.97	14.91	0.33	0.76		316.80	341.31	
trib	-880	Floodway	2009.07	0.45	2009.07	40.00	2.68	9.02	4.30	310.00	316.80	341.31	350.00
trib	-466	Base	2008.63		2008.63	403.22	15.45	0.52	0.03		552.13	565.20	
trib	-466	Floodway	2009.09	0.46	2009.09	45.57	9.60	6.11	0.28	521.00	552.13	565.20	566.57
trib	-89	Base	2008.63		2008.63	388.12	15.26	0.71	0.03		523.44	545.76	
trib	-89	Floodway	2009.10	0.47	2009.10	39.70	6.49	8.94	0.57	510.00	523.44	545.76	549.70
trib	1	Base	2008.61		2008.65	112.72	11.69	4.27	0.05		423.34	431.01	
trib	1	Floodway	2009.07	0.46	2009.13	15.00	16.00			307.00	423.34	431.01	322.00
trib	149	Base	2008.66		2008.66	270.35	15.86	0.14	0.00		322.78	330.58	
trib	149	Floodway	2009.18	0.53	2009.19	15.00	9.49	6.51		315.58	322.78	330.58	330.58
trib	343	Base	2008.66		2008.66	281.64	15.83	0.12	0.05		326.83	335.39	
trib	343	Floodway	2009.26	0.60	2009.28	15.00	5.98	10.02		320.39	326.83	335.39	335.39
trib	383	Base	2008.66		2008.66	215.39	15.97	0.03	0.00		321.06	327.35	
trib	383	Floodway	2009.30	0.64	2009.32	15.00	10.48	5.52		312.35	321.06	327.35	327.35
trib	472	Base	2008.66		2008.66	214.71	15.97	0.03	0.00		246.06	255.85	
trib	472	Floodway	2009.49	0.84	2009.51	15.00	6.05	9.95		240.85	246.06	255.85	255.85
trib	576	Base	2008.66		2008.66	154.76	15.99	0.01	0.00		247.56	254.23	
trib	576	Floodway	2009.63	0.97	2009.65	15.00	9.60	6.40		239.23	247.56	254.23	254.23
trib	651	Base	2011.21		2011.26	96.15	15.71	0.27	0.02		331.92	337.62	
trib	651	Floodway	2011.47	0.26	2011.63	15.00	16.00			243.59	331.92	337.62	258.59
trib	918	Base	2011.27		2011.27	230.82	7.90	1.56	6.54		290.48	301.36	
trib	918	Floodway	2011.80	0.53	2011.80	15.00	2.00	12.93	1.06	288.00	290.48	301.36	303.00
trib	1472	Base	2013.77		2013.84	67.96	1.43	9.86	4.70		374.56	390.80	
trib	1472	Floodway	2014.15	0.38	2014.31	15.00	16.00			355.00	374.56	390.80	370.00
trib	1510	Base	2014.12		2014.13	129.51	0.02	0.85	15.14		289.44	302.32	
trib	1510	Floodway	2014.63	0.51	2014.66	15.00			16.00	355.00	289.44	302.32	370.00
trib	1520		Culvert										
trib	1528	Base	2014.12		2014.13	119.01	0.00	2.72	13.28		307.04	321.23	
trib	1528	Floodway	2013.79	-0.33	4514.91	2.75			16.00	370.00	307.04	321.23	385.00
trib	1557	Base	2014.27		2014.27	140.34	0.00	0.43	15.57		307.11	317.99	
trib	1557	Floodway	2014.32	0.05	2014.48	15.00			16.00	370.00	307.11	317.99	385.00
trib	1963	Base	2016.31		2016.33	57.50	2.13	13.78	0.09		243.25	273.87	
trib	1963	Floodway	2016.45	0.14	2016.46	66.39	3.52	12.23	0.24		243.25	273.87	
trib	1989	Base	2019.07		2019.48	3.69		16.00			762.80	771.50	
trib	1989	Floodway	2019.07	0.00	2019.48	3.69		16.00			762.80	771.50	
trib	2040		Culvert										
trib	2080	Base	2020.63		2020.76	4.00		16.00			39.42	68.83	
trib	2080	Floodway	2020.63	0.00	2020.76	4.00		16.00			39.42	68.83	
trib	2100	Base	2020.84		2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2100	Floodway	2020.84	0.00	2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2110	Base	2020.89		2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2110	Floodway	2020.89	0.00	2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2120	Base	2020.92		2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2120	Floodway	2020.92	0.00	2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2651	Base	2023.39		2023.54	7.45		30.00			46.44	55.58	
trib	2651	Floodway	2023.39	0.00	2023.54	7.45		30.00			46.44	55.58	
trib	3126	Base	2026.19		2026.26	10.24		30.00			72.83	95.75	
trib	3126	Floodway	2026.19	0.00	2026.26	10.24		30.00			72.83	95.75	
trib	3617	Base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Floodway	2030.67	0.00	2031.13	5.92		30.00			139.17	162.30	
trib	4127	Base	2035.09		2035.15	9.22		30.00			251.87	265.32	

HEC-RAS Plan: wo ds fw (CEM) River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4127	Floodway	2035.09	0.00	2035.15	9.22		30.00			251.87	265.32	
trib	4623	Base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Floodway	2037.69	0.00	2037.84	8.14		30.00			314.09	329.75	
trib	4665	Base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Floodway	2038.70	0.00	2039.53	2.50		30.00			340.25	349.22	
trib	4685		Culvert										
trib	4704	Base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Floodway	2041.00	0.00	2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4750	Base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Floodway	2041.03	0.00	2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	5165	Base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Floodway	2043.40	0.00	2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5676	Base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Floodway	2048.08	0.00	2048.13	19.14		28.00			183.69	226.54	
trib	6117	Base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Floodway	2052.07	0.00	2052.35	6.77		28.00			211.57	230.44	
trib	6154	Base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Floodway	2052.76	0.00	2052.83	16.44		28.00			211.25	246.77	
trib	6200		Culvert										
trib	6239	Base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Floodway	2054.11	0.00	2054.13	18.59		28.00			221.30	259.22	
trib	6274	Base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Floodway	2055.65	0.00	2055.95	10.56		28.00			210.49	231.21	
trib	6553	Base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Floodway	2064.48	0.00	2064.68	10.59		28.00			197.65	240.39	
trib	7086	Base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Floodway	2083.50	0.00	2083.96	3.69		18.00			150.93	158.25	
trib	7121	Base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Floodway	2084.63	0.00	2085.08	3.10		18.00			118.04	121.88	
trib	7130		Culvert										
trib	7143	Base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Floodway	2086.04	0.00	2086.16	3.79		18.00			111.14	115.72	
trib	7169	Base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Floodway	2090.51	0.00	2091.06	2.65		18.00			114.91	118.45	
trib	7175		Culvert										
trib	7186	Base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Floodway	2091.45	0.00	2091.64	2.88		18.00			119.10	122.49	
trib	7220	Base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Floodway	2092.39	0.00	2092.72	7.10	0.01	17.99			130.02	136.02	

Appendix E. Existing Condition HEC-RAS Models

Existing Conditions Model Output - Golf Course Overflow

HEC-RAS Plan: ECM River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	20779	10-yr	30.00	2004.98	2007.19	2005.40	2007.19	0.000006	0.06	517.26	1198.11	0.01
Golf Course	20779	50-yr	54.00	2004.98	2007.80	2005.49	2007.80	0.000003	0.05	1164.72	1860.64	0.01
Golf Course	20779	100-yr	64.00	2004.98	2008.05	2005.52	2008.05	0.000002	0.04	1491.37	1985.36	0.01
Golf Course	20779	500-yr	88.00	2004.98	2008.64	2005.58	2008.64	0.000000	0.03	3229.73	2191.83	0.00
Golf Course	21013	10-yr	30.00	2007.36	2007.65	2007.65	2007.74	0.048676	2.02	13.20	348.57	0.86
Golf Course	21013	50-yr	54.00	2007.36	2007.77	2007.77	2007.86	0.043680	2.09	23.46	392.88	0.83
Golf Course	21013	100-yr	64.00	2007.36	2007.79	2007.79	2007.90	0.048191	2.30	25.52	395.42	0.89
Golf Course	21013	500-yr	88.00	2007.36	2008.64	2007.85	2008.64	0.000463	0.44	192.58	634.20	0.10
Golf Course	21128	10-yr	30.00	2007.08	2008.28	2007.75	2008.28	0.000847	0.54	55.17	320.85	0.14
Golf Course	21128	50-yr	54.00	2007.08	2008.53	2007.86	2008.54	0.001130	0.60	90.05	413.34	0.15
Golf Course	21128	100-yr	64.00	2007.08	2008.60	2007.90	2008.60	0.001189	0.62	103.55	442.36	0.16
Golf Course	21128	500-yr	88.00	2007.08	2008.77	2007.98	2008.77	0.001006	0.60	145.58	511.28	0.15
Golf Course	21229	10-yr	30.00	2006.97	2008.63	2008.48	2008.64	0.007806	0.82	36.50	445.34	0.35
Golf Course	21229	50-yr	54.00	2006.97	2008.82	2008.55	2008.83	0.002308	0.62	86.76	540.31	0.20
Golf Course	21229	100-yr	64.00	2006.97	2008.87	2008.57	2008.88	0.001927	0.63	102.06	545.69	0.19
Golf Course	21229	500-yr	88.00	2006.97	2008.98	2008.63	2008.99	0.001408	0.65	136.13	549.38	0.17
Golf Course	21385	10-yr	30.00	2008.16	2008.94	2008.47	2008.94	0.000409	0.31	97.80	268.00	0.09
Golf Course	21385	50-yr	54.00	2008.16	2009.08	2008.53	2009.08	0.000477	0.40	135.88	283.37	0.10
Golf Course	21385	100-yr	64.00	2008.16	2009.12	2008.56	2009.12	0.000512	0.43	147.76	285.92	0.11
Golf Course	21385	500-yr	88.00	2008.16	2009.22	2008.61	2009.22	0.000552	0.50	176.40	291.98	0.11
Golf Course	21409	10-yr	30.00	2008.27	2008.98	2008.68	2008.98	0.001022	0.46	64.91	246.09	0.14
Golf Course	21409	50-yr	54.00	2008.27	2009.12	2008.75	2009.13	0.001113	0.58	93.59	269.70	0.15
Golf Course	21409	100-yr	64.00	2008.27	2009.17	2008.77	2009.17	0.001210	0.62	103.41	283.87	0.16
Golf Course	21409	500-yr	88.00	2008.27	2009.27	2008.81	2009.28	0.001345	0.68	128.93	323.53	0.17
Golf Course	21431	10-yr	30.00	2008.12	2009.03	2008.45	2009.03	0.000564	0.40	74.75	174.33	0.11
Golf Course	21431	50-yr	54.00	2008.12	2009.18	2008.54	2009.18	0.000767	0.52	103.72	206.07	0.13
Golf Course	21431	100-yr	64.00	2008.12	2009.23	2008.59	2009.24	0.000845	0.56	114.48	222.73	0.14
Golf Course	21431	500-yr	88.00	2008.12	2009.34	2008.66	2009.35	0.000870	0.64	138.33	232.31	0.14
Golf Course	21445	10-yr	30.00	2008.44	2009.09	2008.89	2009.12	0.014872	1.32	22.80	104.20	0.50
Golf Course	21445	50-yr	54.00	2008.44	2009.26	2009.06	2009.28	0.007937	1.23	44.01	139.40	0.38
Golf Course	21445	100-yr	64.00	2008.44	2009.31	2009.10	2009.33	0.006788	1.24	51.65	143.41	0.36
Golf Course	21445	500-yr	88.00	2008.44	2009.42	2009.16	2009.44	0.005945	1.31	67.25	155.76	0.35
Golf Course	21456	10-yr	30.00	2012.42	2013.00	2013.00	2013.09	0.062594	2.50	12.02	61.61	1.00
Golf Course	21456	50-yr	54.00	2012.42	2013.11	2013.11	2013.21	0.055179	2.43	22.25	108.28	0.94
Golf Course	21456	100-yr	64.00	2012.42	2013.13	2013.13	2013.24	0.063554	2.66	24.03	113.14	1.02
Golf Course	21456	500-yr	88.00	2012.42	2013.19	2013.19	2013.31	0.062355	2.79	31.57	136.85	1.02
Golf Course	21481	10-yr	30.00	2009.90	2013.12	2010.50	2013.12	0.000003	0.05	583.29	601.95	0.01
Golf Course	21481	50-yr	54.00	2009.90	2013.23	2010.78	2013.23	0.000007	0.08	653.45	631.97	0.01
Golf Course	21481	100-yr	64.00	2009.90	2013.27	2010.89	2013.28	0.000009	0.09	679.27	641.26	0.02
Golf Course	21481	500-yr	88.00	2009.90	2013.35	2011.13	2013.35	0.000015	0.12	727.60	655.90	0.02
Golf Course	21485		Culvert									
Golf Course	21515	10-yr	30.00	2010.70	2013.12	2011.31	2013.12	0.000022	0.10	297.77	491.60	0.02
Golf Course	21515	50-yr	54.00	2010.70	2013.24	2011.60	2013.24	0.000043	0.15	354.69	513.35	0.03
Golf Course	21515	100-yr	64.00	2010.70	2013.28	2011.69	2013.28	0.000051	0.17	375.78	521.17	0.04
Golf Course	21515	500-yr	88.00	2010.70	2013.35	2011.93	2013.35	0.000071	0.21	415.12	535.47	0.04
Golf Course	21525	10-yr	30.00	2011.57	2013.12	2011.89	2013.12	0.000026	0.11	284.54	491.64	0.02
Golf Course	21525	50-yr	54.00	2011.57	2013.24	2012.02	2013.24	0.000049	0.16	341.59	513.44	0.03
Golf Course	21525	100-yr	64.00	2011.57	2013.28	2012.07	2013.28	0.000057	0.18	362.75	521.29	0.04
Golf Course	21525	500-yr	88.00	2011.57	2013.35	2012.17	2013.35	0.000079	0.22	402.16	535.55	0.04
Golf Course	21609	10-yr	30.00	2011.75	2013.12	2011.92	2013.12	0.000009	0.09	324.30	476.94	0.02
Golf Course	21609	50-yr	54.00	2011.75	2013.24	2011.98	2013.24	0.000021	0.15	360.65	482.95	0.02
Golf Course	21609	100-yr	64.00	2011.75	2013.28	2012.00	2013.28	0.000027	0.17	373.89	484.20	0.03
Golf Course	21609	500-yr	88.00	2011.75	2013.36	2012.04	2013.36	0.000041	0.22	398.34	485.70	0.03
Golf Course	21726	10-yr	30.00	2011.65	2013.13	2012.00	2013.13	0.000022	0.12	246.98	333.11	0.02
Golf Course	21726	50-yr	54.00	2011.65	2013.24	2012.11	2013.24	0.000049	0.19	283.96	355.83	0.04
Golf Course	21726	100-yr	64.00	2011.65	2013.29	2012.14	2013.29	0.000060	0.21	297.87	364.07	0.04
Golf Course	21726	500-yr	88.00	2011.65	2013.36	2012.21	2013.37	0.000088	0.27	324.20	373.58	0.05
Golf Course	21857	10-yr	30.00	2012.03	2013.13	2012.43	2013.13	0.000077	0.20	153.23	235.58	0.04
Golf Course	21857	50-yr	54.00	2012.03	2013.25	2012.49	2013.25	0.000146	0.30	182.35	243.81	0.06
Golf Course	21857	100-yr	64.00	2012.03	2013.30	2012.51	2013.30	0.000174	0.33	193.42	249.75	0.07
Golf Course	21857	500-yr	88.00	2012.03	2013.38	2012.56	2013.38	0.000241	0.41	214.48	255.50	0.08
Golf Course	21983	10-yr	30.00	2012.09	2013.15	2012.50	2013.15	0.000389	0.39	77.47	144.23	0.09
Golf Course	21983	50-yr	54.00	2012.09	2013.28	2012.61	2013.29	0.000717	0.54	99.10	174.74	0.13
Golf Course	21983	100-yr	64.00	2012.09	2013.33	2012.64	2013.34	0.000786	0.59	107.94	179.68	0.13

HEC-RAS Plan: ECM River: Chester Creek Reach: Golf Course (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	21983	500-yr	88.00	2012.09	2013.43	2012.71	2013.44	0.000928	0.70	125.27	183.20	0.15
Golf Course	22423	10-yr	30.00	2012.71	2013.36	2012.98	2013.37	0.000707	0.44	67.98	162.72	0.12
Golf Course	22423	50-yr	54.00	2012.71	2013.58	2013.05	2013.59	0.000664	0.50	107.37	201.63	0.12
Golf Course	22423	100-yr	64.00	2012.71	2013.64	2013.07	2013.65	0.000654	0.53	119.74	202.98	0.12
Golf Course	22423	500-yr	88.00	2012.71	2013.78	2013.12	2013.78	0.000682	0.60	147.51	218.69	0.13
Golf Course	22972	10-yr	30.00	2013.92	2014.45	2014.45	2014.57	0.060255	2.72	11.01	48.22	1.00
Golf Course	22972	50-yr	54.00	2013.92	2014.57	2014.57	2014.72	0.053115	3.18	16.96	53.43	1.00
Golf Course	22972	100-yr	64.00	2013.92	2014.60	2014.60	2014.78	0.054246	3.41	18.77	54.23	1.02
Golf Course	22972	500-yr	88.00	2013.92	2014.69	2014.69	2014.90	0.050317	3.73	23.60	56.31	1.02
Golf Course	23005	10-yr	30.00	2014.38	2015.05	2014.75	2015.05	0.001933	0.69	43.31	112.20	0.20
Golf Course	23005	50-yr	54.00	2014.38	2015.22	2014.83	2015.23	0.002060	0.84	64.21	130.40	0.21
Golf Course	23005	100-yr	64.00	2014.38	2015.28	2014.85	2015.29	0.002060	0.89	72.20	135.50	0.21
Golf Course	23005	500-yr	88.00	2014.38	2015.42	2014.91	2015.43	0.002173	0.95	92.98	164.62	0.22
Golf Course	23050	10-yr	30.00	2014.61	2015.16	2014.87	2015.16	0.001938	0.64	46.54	134.52	0.19
Golf Course	23050	50-yr	54.00	2014.61	2015.33	2014.95	2015.34	0.001742	0.76	71.20	148.90	0.19
Golf Course	23050	100-yr	64.00	2014.61	2015.39	2014.98	2015.40	0.001701	0.80	80.06	151.92	0.19
Golf Course	23050	500-yr	88.00	2014.61	2015.53	2015.03	2015.54	0.001568	0.87	101.32	159.72	0.19
Golf Course	23090	10-yr	30.00	2014.93	2015.45	2015.26	2015.46	0.005092	0.93	32.35	111.85	0.30
Golf Course	23090	50-yr	54.00	2014.93	2015.60	2015.34	2015.61	0.004889	1.03	52.56	151.12	0.31
Golf Course	23090	100-yr	64.00	2014.93	2015.65	2015.37	2015.66	0.004580	1.07	59.89	154.59	0.30
Golf Course	23090	500-yr	88.00	2014.93	2015.76	2015.42	2015.78	0.003922	1.13	77.87	164.55	0.29
Golf Course	23446	10-yr	30.00	2017.57	2017.97	2017.87	2017.99	0.012459	1.10	27.17	141.49	0.44
Golf Course	23446	50-yr	54.00	2017.57	2018.07	2017.95	2018.10	0.012670	1.24	43.59	193.33	0.46
Golf Course	23446	100-yr	64.00	2017.57	2018.10	2017.97	2018.12	0.013760	1.32	48.49	208.12	0.48
Golf Course	23446	500-yr	88.00	2017.57	2018.13	2018.02	2018.17	0.017030	1.57	56.03	217.38	0.55
Golf Course	23887	10-yr	30.00	2022.25	2022.83	2022.66	2022.84	0.005714	0.89	33.70	135.04	0.31
Golf Course	23887	50-yr	54.00	2022.25	2022.95	2022.74	2022.97	0.005672	1.06	51.18	158.01	0.33
Golf Course	23887	100-yr	64.00	2022.25	2022.99	2022.76	2023.01	0.005408	1.11	57.80	160.17	0.32
Golf Course	23887	500-yr	88.00	2022.25	2023.09	2022.81	2023.11	0.004871	1.19	73.82	169.31	0.32
Golf Course	24430	10-yr	30.00	2028.58	2029.25	2029.25	2029.46	0.048764	3.65	8.29	21.75	1.00
Golf Course	24430	50-yr	54.00	2028.58	2029.47	2029.47	2029.73	0.037372	4.21	13.58	28.66	0.94
Golf Course	24430	100-yr	64.00	2028.58	2029.56	2029.56	2029.82	0.031201	4.22	16.81	37.07	0.88
Golf Course	24430	500-yr	88.00	2028.58	2029.72	2029.72	2029.99	0.026137	4.41	23.23	42.98	0.83

Existing Conditions Model Output - Golf Course Overflow Reach, Floodway

HEC-RAS Plan: ECM FW River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Golf Course	20779	Q100 - base	2008.05		2008.05	1327.67		64.00			934.91	2798.66	
Golf Course	20779	Q100 - floodway	2009.05	1.00	2009.05	1178.72		64.00		934.91	934.91	2798.66	2278.72
Golf Course	21013	Q100 - base	2008.05		2008.07	147.76		52.43	11.57		508.09	1602.56	
Golf Course	21013	Q100 - floodway	2009.05	1.00	2009.05	173.18		52.98	11.02	1472.43	508.09	1602.56	1725.00
Golf Course	21128	Q100 - base	2008.53		2008.53	189.79		64.00			409.35	1512.91	
Golf Course	21128	Q100 - floodway	2009.05	0.52	2009.11	25.00		64.00		1045.00	409.35	1512.91	1070.00
Golf Course	21229	Q100 - base	2008.86		2008.87	305.93		64.00			417.95	1452.44	
Golf Course	21229	Q100 - floodway	2009.59	0.72	2009.62	35.00		64.00		985.00	417.95	1452.44	1020.00
Golf Course	21385	Q100 - base	2009.12		2009.12	285.94		64.00			431.52	1001.23	
Golf Course	21385	Q100 - floodway	2010.03	0.91	2010.06	30.00		64.00		785.00	431.52	1001.23	815.00
Golf Course	21409	Q100 - base	2009.17		2009.17	223.27		64.00			426.69	980.16	
Golf Course	21409	Q100 - floodway	2010.12	0.95	2010.16	25.00		64.00		728.00	426.69	980.16	753.00
Golf Course	21431	Q100 - base	2009.23		2009.24	219.82		64.00			440.00	961.58	
Golf Course	21431	Q100 - floodway	2010.23	1.00	2010.26	25.00		64.00		700.00	440.00	961.58	725.00
Golf Course	21445	Q100 - base	2009.31		2009.33	143.43		64.00			440.70	949.64	
Golf Course	21445	Q100 - floodway	2010.29	0.98	2010.37	20.00		64.00		683.00	440.70	949.64	703.00
Golf Course	21456	Q100 - base	2013.13		2013.24	113.14		64.00			0.00	937.26	
Golf Course	21456	Q100 - floodway	2013.79	0.66	2014.05	30.00		64.00		595.00	0.00	937.26	625.00
Golf Course	21481	Q100 - base	2013.27		2013.28	641.26		64.00			494.28	1387.02	
Golf Course	21481	Q100 - floodway	2014.14	0.86	2014.14	45.00		64.00		922.50	494.28	1387.02	967.50
Golf Course	21485		Culvert										
Golf Course	21515	Q100 - base	2013.28		2013.28	521.17		64.00			0.00	751.00	
Golf Course	21515	Q100 - floodway	2014.15	0.87	2014.16	29.00		64.00		415.00	0.00	751.00	444.00
Golf Course	21525	Q100 - base	2013.28		2013.28	521.29		64.00			0.00	751.00	
Golf Course	21525	Q100 - floodway	2014.15	0.87	2014.16	29.00		64.00		421.50	0.00	751.00	450.50
Golf Course	21609	Q100 - base	2013.28		2013.28	316.56		64.00			0.00	522.16	
Golf Course	21609	Q100 - floodway	2014.19	0.91	2014.20	44.00		64.00		278.00	0.00	522.16	322.00
Golf Course	21726	Q100 - base	2013.29		2013.29	329.55		64.00			0.00	402.00	
Golf Course	21726	Q100 - floodway	2014.21	0.92	2014.21	44.00		64.00		194.00	0.00	402.00	238.00
Golf Course	21857	Q100 - base	2013.30		2013.30	249.75		64.00			0.00	319.28	
Golf Course	21857	Q100 - floodway	2014.23	0.94	2014.24	43.00		64.00		132.50	0.00	319.28	175.50
Golf Course	21983	Q100 - base	2013.33		2013.34	179.68		64.00			0.00	248.45	
Golf Course	21983	Q100 - floodway	2014.27	0.94	2014.28	43.00		64.00		105.50	0.00	248.45	148.50
Golf Course	22423	Q100 - base	2013.64		2013.65	202.98		64.00			843.00	1600.75	
Golf Course	22423	Q100 - floodway	2014.45	0.81	2014.47	40.00		64.00		1140.00	843.00	1600.75	1180.00
Golf Course	22972	Q100 - base	2014.61		2014.78	54.37		64.00			888.76	1267.01	
Golf Course	22972	Q100 - floodway	2015.27	0.66	2015.70	14.13		64.00		1162.20	888.76	1267.01	1176.33
Golf Course	23005	Q100 - base	2015.28		2015.29	135.40		64.00			896.09	1271.17	
Golf Course	23005	Q100 - floodway	2016.10	0.83	2016.14	27.34		64.00		1123.02	896.09	1271.17	1150.36
Golf Course	23050	Q100 - base	2015.39		2015.40	151.89		64.00			944.30	1324.65	
Golf Course	23050	Q100 - floodway	2016.21	0.82	2016.27	22.35		64.00		1126.64	944.30	1324.65	1148.99
Golf Course	23090	Q100 - base	2015.65		2015.66	154.60		64.00			951.93	1347.53	
Golf Course	23090	Q100 - floodway	2016.61	0.96	2016.71	20.00		64.00		1095.00	951.93	1347.53	1115.00
Golf Course	23446	Q100 - base	2018.10		2018.12	208.09		64.00			688.98	1310.47	
Golf Course	23446	Q100 - floodway	2019.02	0.92	2019.14	20.00		64.00		1060.00	688.98	1310.47	1080.00
Golf Course	23887	Q100 - base	2022.99		2023.01	160.17		64.00			604.96	928.61	
Golf Course	23887	Q100 - floodway	2023.79	0.80	2023.91	20.00		64.00		829.00	604.96	928.61	849.00
Golf Course	24430	Q100 - base	2029.56		2029.82	37.07	1.56	60.23	2.21		636.32	656.04	
Golf Course	24430	Q100 - floodway	2029.72	0.16	2029.93	19.72		64.00		636.32	636.32	656.04	656.04

Existing Conditions Model - Unnamed Tributary

HEC-RAS Plan: ECM   River: Tributary   Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	1.00	2004.70	2004.82	2004.82	2004.86	0.130185	1.43	0.70	14.35	1.14
trib	-1303	Q50	2.00	2004.70	2004.87	2004.87	2004.90	0.068800	1.40	1.43	18.92	0.89
trib	-1303	Q100	4.00	2004.70	2004.90	2004.90	2004.96	0.082803	1.91	2.09	19.79	1.04
trib	-1303	Q500	7.00	2004.70	2005.00	2004.96	2005.04	0.029151	1.68	4.17	21.92	0.68
trib	-1019	Q10	1.00	2007.91	2008.37	2008.27	2008.37	0.004322	0.44	2.28	48.46	0.24
trib	-1019	Q50	2.00	2007.91	2008.42	2008.31	2008.42	0.005030	0.54	3.69	57.51	0.26
trib	-1019	Q100	4.00	2007.91	2008.50	2008.36	2008.51	0.004824	0.63	6.37	70.20	0.27
trib	-1019	Q500	7.00	2007.91	2008.55	2008.41	2008.56	0.006839	0.85	8.25	74.90	0.33
trib	-880	Q10	1.00	2004.89	2008.37		2008.37	0.000000	0.00	743.71	360.32	0.00
trib	-880	Q50	2.00	2004.89	2008.43		2008.43	0.000000	0.00	764.25	361.79	0.00
trib	-880	Q100	4.00	2004.89	2008.51		2008.51	0.000000	0.01	793.97	364.02	0.00
trib	-880	Q500	7.00	2004.89	2008.56		2008.56	0.000000	0.01	813.43	365.63	0.00
trib	-466	Q10	1.00	2006.89	2008.37		2008.37	0.000000	0.00	434.11	387.02	0.00
trib	-466	Q50	2.00	2006.89	2008.43		2008.43	0.000000	0.00	456.19	389.07	0.00
trib	-466	Q100	4.00	2006.89	2008.51		2008.51	0.000000	0.01	488.37	395.18	0.00
trib	-466	Q500	7.00	2006.89	2008.56		2008.56	0.000000	0.01	509.51	398.13	0.00
trib	-89	Q10	1.00	2006.07	2008.37		2008.37	0.000000	0.00	470.50	340.26	0.00
trib	-89	Q50	2.00	2006.07	2008.43		2008.43	0.000000	0.00	490.02	346.49	0.00
trib	-89	Q100	4.00	2006.07	2008.51		2008.51	0.000000	0.01	519.18	369.61	0.00
trib	-89	Q500	7.00	2006.07	2008.56		2008.56	0.000000	0.01	539.36	383.12	0.00
trib	1	Q10	1.00	1998.92	2008.37	1999.04	2008.37	0.000000	0.00	429.57	80.84	0.00
trib	1	Q50	2.00	1998.92	2008.43	1999.09	2008.43	0.000000	0.00	434.18	81.36	0.00
trib	1	Q100	4.00	1998.92	2008.51	1999.16	2008.51	0.000000	0.01	440.88	82.39	0.00
trib	1	Q500	7.00	1998.92	2008.56	1999.23	2008.56	0.000000	0.02	445.29	82.85	0.00
trib	149	Q10	10.00	1995.82	2008.37	1996.32	2008.37	0.000000	0.01	1710.40	172.13	0.00
trib	149	Q50	14.00	1995.82	2008.43	1996.38	2008.43	0.000000	0.01	1720.20	172.24	0.00
trib	149	Q100	16.00	1995.82	2008.51	1996.41	2008.51	0.000000	0.01	1734.31	172.40	0.00
trib	149	Q500	20.00	1995.82	2008.56	1996.46	2008.56	0.000000	0.01	1743.51	172.50	0.00
trib	343	Q10	10.00	1993.64	2008.37	1993.99	2008.37	0.000000	0.00	2857.81	260.89	0.00
trib	343	Q50	14.00	1993.64	2008.43	1994.05	2008.43	0.000000	0.00	2872.66	261.02	0.00
trib	343	Q100	16.00	1993.64	2008.51	1994.07	2008.51	0.000000	0.01	2894.05	261.22	0.00
trib	343	Q500	20.00	1993.64	2008.56	1994.11	2008.56	0.000000	0.01	2907.99	261.35	0.00
trib	383	Q10	10.00	1994.23	2008.37	1994.67	2008.37	0.000000	0.00	2729.84	244.97	0.00
trib	383	Q50	14.00	1994.23	2008.43	1994.71	2008.43	0.000000	0.01	2743.79	245.28	0.00
trib	383	Q100	16.00	1994.23	2008.51	1994.73	2008.51	0.000000	0.01	2763.90	245.71	0.00
trib	383	Q500	20.00	1994.23	2008.56	1994.75	2008.56	0.000000	0.01	2777.01	245.99	0.00
trib	472	Q10	10.00	2005.65	2008.37	1999.14	2008.37	0.000000	0.00	1026.03	183.04	0.00
trib	472	Q50	14.00	2005.65	2008.43	1999.19	2008.43	0.000000	0.01	1036.45	183.31	0.00
trib	472	Q100	16.00	2005.65	2008.51	1999.22	2008.51	0.000000	0.01	1051.48	183.70	0.00
trib	472	Q500	20.00	2005.65	2008.56	1999.26	2008.56	0.000000	0.01	1061.29	183.95	0.00
trib	576	Q10	10.00	2008.78	2009.74	2009.74	2009.99	0.032554	4.02	2.48	4.97	1.00
trib	576	Q50	14.00	2008.78	2009.89	2009.89	2010.17	0.030449	4.27	3.28	5.70	0.99
trib	576	Q100	16.00	2008.78	2009.95	2009.95	2010.25	0.030780	4.43	3.61	5.98	1.01
trib	576	Q500	20.00	2008.78	2010.20	2010.20	2010.37	0.028407	3.36	6.36	21.88	0.93
trib	651	Q10	10.00	2009.50	2010.97	2010.45	2011.02	0.007232	1.65	6.05	55.46	0.46
trib	651	Q50	14.00	2009.50	2011.08	2010.60	2011.13	0.006740	1.82	7.70	59.63	0.46
trib	651	Q100	16.00	2009.50	2011.13	2010.67	2011.18	0.006429	1.87	8.54	63.89	0.46
trib	651	Q500	20.00	2009.50	2011.21	2010.78	2011.28	0.006391	2.02	9.91	75.90	0.47
trib	918	Q10	10.00	2009.10	2011.35	2009.95	2011.36	0.000523	0.96	10.46	9.36	0.14
trib	918	Q50	14.00	2009.10	2011.55	2010.09	2011.57	0.000716	1.17	11.95	29.34	0.16
trib	918	Q100	16.00	2009.10	2011.63	2010.17	2011.66	0.000811	1.27	12.60	43.37	0.18
trib	918	Q500	20.00	2009.10	2011.79	2010.29	2011.82	0.000984	1.45	13.82	61.75	0.19
trib	1472	Q10	10.00	2011.44	2012.38	2012.38	2012.67	0.032363	4.35	2.30	3.82	0.99
trib	1472	Q50	14.00	2011.44	2012.53	2012.53	2012.89	0.032599	4.78	2.93	4.19	1.01
trib	1472	Q100	16.00	2011.44	2012.72	2012.61	2013.00	0.021875	4.28	3.74	4.62	0.84
trib	1472	Q500	20.00	2011.44	2013.01	2012.75	2013.24	0.013910	3.84	5.21	5.32	0.68
trib	1510	Q10	10.00	2011.15	2012.95	2012.17	2013.00	0.002806	1.77	5.64	5.39	0.31
trib	1510	Q50	14.00	2011.15	2013.19	2012.35	2013.25	0.003077	1.99	7.02	5.99	0.32
trib	1510	Q100	16.00	2011.15	2013.26	2012.43	2013.33	0.003434	2.15	7.45	6.17	0.34
trib	1510	Q500	20.00	2011.15	2013.44	2012.58	2013.53	0.003647	2.32	8.61	6.62	0.36
trib	1520		Culvert									
trib	1528	Q10	10.00	2010.84	2013.36	2011.82	2013.38	0.000963	1.00	9.97	6.88	0.15

HEC-RAS Plan: ECM   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2010.84	2013.99	2012.00	2014.00	0.000673	0.95	14.72	8.40	0.13
trib	1528	Q100	16.00	2010.84	2014.30	2012.07	2014.32	0.000575	0.91	17.53	9.52	0.12
trib	1528	Q500	20.00	2010.84	2014.58	2012.23	2014.59	0.000719	0.95	23.45	47.67	0.13
trib	1557	Q10	10.00	2011.79	2013.39	2012.66	2013.44	0.003817	1.69	5.92	5.64	0.29
trib	1557	Q50	14.00	2011.79	2014.00	2012.81	2014.04	0.001935	1.43	9.76	6.94	0.21
trib	1557	Q100	16.00	2011.79	2014.32	2012.88	2014.35	0.001434	1.33	12.05	7.61	0.19
trib	1557	Q500	20.00	2011.79	2014.59	2013.01	2014.62	0.001439	1.41	14.22	8.20	0.19
trib	1963	Q10	10.00	2018.61	2019.48	2019.48	2019.66	0.051975	3.44	2.91	7.79	0.99
trib	1963	Q50	14.00	2018.61	2019.59	2019.59	2019.80	0.045074	3.61	3.92	11.07	0.95
trib	1963	Q100	16.00	2018.61	2019.66	2019.66	2019.85	0.038218	3.52	4.80	15.48	0.89
trib	1963	Q500	20.00	2018.61	2019.75	2019.75	2019.93	0.033517	3.48	6.39	18.55	0.84
trib	1989	Q10	10.00	2017.77	2019.85	2018.80	2019.89	0.002658	1.50	6.69	17.19	0.24
trib	1989	Q50	14.00	2017.77	2020.01	2018.98	2020.06	0.003491	1.86	7.54	40.62	0.28
trib	1989	Q100	16.00	2017.77	2020.06	2019.06	2020.12	0.004030	2.04	7.83	48.44	0.30
trib	1989	Q500	20.00	2017.77	2020.14	2019.22	2020.23	0.005238	2.42	8.27	60.64	0.35
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.19	2019.81	2020.30	0.009432	2.61	3.83	8.68	0.47
trib	2080	Q50	14.00	2018.73	2020.48	2019.96	2020.60	0.007671	2.81	4.99	12.81	0.44
trib	2080	Q100	16.00	2018.73	2020.61	2020.02	2020.74	0.007173	2.90	5.51	14.87	0.44
trib	2080	Q500	20.00	2018.73	2020.86	2020.15	2021.01	0.006452	3.07	6.51	18.47	0.42
trib	2100	Q10	12.00	2018.27	2020.39	2019.40	2020.41	0.002032	1.15	10.46	12.11	0.22
trib	2100	Q50	24.00	2018.27	2020.70	2019.86	2020.74	0.003396	1.65	14.58	14.51	0.29
trib	2100	Q100	30.00	2018.27	2020.83	2020.00	2020.88	0.003580	1.82	16.55	15.31	0.30
trib	2100	Q500	46.00	2018.27	2021.08	2020.26	2021.16	0.004409	2.26	20.54	16.79	0.35
trib	2110	Q10	12.00	2018.27	2020.42	2019.40	2020.43	0.001881	1.11	10.78	12.31	0.21
trib	2110	Q50	24.00	2018.27	2020.74	2019.87	2020.78	0.002981	1.58	15.21	14.78	0.27
trib	2110	Q100	30.00	2018.27	2020.88	2020.00	2020.92	0.003147	1.74	17.27	15.59	0.29
trib	2110	Q500	46.00	2018.27	2021.14	2020.26	2021.21	0.003840	2.17	21.53	17.14	0.32
trib	2120	Q10	12.00	2018.27	2020.44	2019.40	2020.45	0.001769	1.09	11.03	12.47	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.81	0.002698	1.53	15.70	14.97	0.26
trib	2120	Q100	30.00	2018.27	2020.91	2020.00	2020.96	0.002861	1.69	17.82	15.80	0.27
trib	2120	Q500	46.00	2018.27	2021.18	2020.26	2021.25	0.003471	2.10	22.30	17.41	0.31
trib	2651	Q10	12.00	2021.38	2022.48	2022.22	2022.62	0.016295	2.96	4.05	5.21	0.59
trib	2651	Q50	24.00	2021.38	2023.16	2022.58	2023.30	0.009750	3.00	8.00	6.47	0.48
trib	2651	Q100	30.00	2021.38	2023.40	2022.73	2023.55	0.009769	3.10	9.67	7.51	0.48
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008805	3.30	14.05	10.00	0.47
trib	3126	Q10	12.00	2023.82	2025.45	2024.69	2025.49	0.003114	1.53	7.84	7.78	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003750	1.97	12.18	9.47	0.31
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.25	0.003704	2.08	14.43	10.23	0.31
trib	3126	Q500	46.00	2023.82	2026.65	2025.48	2026.74	0.003902	2.35	19.60	12.06	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.90	0.003060	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011028	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: ECM   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51		2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98		2048.02	0.004265	1.60	13.77	17.89	0.32
trib	5676	Q100	28.00	2046.43	2048.08		2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37		2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68		2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031974	4.34	5.07	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07		2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49		2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.006997	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Existing Conditions Model - Unnamed Tributary, Floodway

HEC-RAS Plan: ECM FW River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Q100 base	2008.05		2008.05	103.69	0.01	3.90	0.09		70.92	163.31	
trib	-1303	Q100 floodway	2009.05	1.00	2009.05	31.32		4.00		131.99	70.92	163.31	163.31
trib	-1019	Q100 base	2008.36		2008.41	21.08		4.00			152.95	253.19	
trib	-1019	Q100 floodway	2009.05	0.69	2009.05	21.09		4.00		173.33	152.95	253.19	194.42
trib	-880	Q100 base	2008.42		2008.42	361.60	0.08	3.92	0.01		62.73	380.37	
trib	-880	Q100 floodway	2009.05	0.63	2009.05	40.00		4.00		310.00	62.73	380.37	350.00
trib	-466	Q100 base	2008.42		2008.42	388.60		4.00	0.00		129.52	566.57	
trib	-466	Q100 floodway	2009.05	0.64	2009.05	45.57		4.00		521.00	129.52	566.57	566.57
trib	-89	Q100 base	2008.42		2008.42	345.54		4.00			144.89	581.16	
trib	-89	Q100 floodway	2009.05	0.64	2009.05	39.70		4.00		510.00	144.89	581.16	549.70
trib	1	Q100 base	2009.70		2009.70	102.16		4.00			461.25	568.10	
trib	1	Q100 floodway	2010.70	1.00	2010.70	116.77	0.00	4.00			461.25	568.10	
trib	149	Q100 base	2009.70		2009.70	176.16		16.00			421.08	606.95	
trib	149	Q100 floodway	2010.70	1.00	2010.70	179.75		16.00			421.08	606.95	
trib	343	Q100 base	2009.70		2009.70	266.57		16.00			410.55	678.07	
trib	343	Q100 floodway	2010.70	1.00	2010.70	271.14	0.00	16.00	0.00		410.55	678.07	
trib	383	Q100 base	2009.70		2009.70	279.97		16.00	0.00		397.28	677.14	
trib	383	Q100 floodway	2010.70	1.00	2010.70	282.66		16.00	0.00		397.28	677.14	
trib	472	Q100 base	2009.70		2009.70	193.16		0.12	15.88		340.55	365.05	
trib	472	Q100 floodway	2010.70	1.00	2010.70	8.82		16.00		347.00	340.55	365.05	355.82
trib	576	Q100 base	2009.95		2010.25	5.98		16.00			361.81	384.61	
trib	576	Q100 floodway	2010.67	0.73	2010.75	5.41		16.00		368.20	361.81	384.61	373.61
trib	651	Q100 base	2011.13		2011.18	16.46		16.00			360.31	384.41	
trib	651	Q100 floodway	2011.07	-0.06	2011.14	15.66		16.00		367.72	360.31	384.41	384.41
trib	918	Q100 base	2011.63		2011.66	7.79		16.00			466.95	478.43	
trib	918	Q100 floodway	2011.63	0.00	2011.66	7.59		16.00		468.53	466.95	478.43	478.43
trib	1472	Q100 base	2012.72		2013.00	4.62		16.00			706.41	714.93	
trib	1472	Q100 floodway	2012.71	-0.01	2013.00	4.61		16.00		708.23	706.41	714.93	713.11
trib	1510	Q100 base	2013.26		2013.33	6.17		16.00			711.73	722.04	
trib	1510	Q100 floodway	2013.26	0.00	2013.33	6.16		16.00		714.06	711.73	722.04	720.22
trib	1520		Culvert										
trib	1528	Q100 base	2014.30		2014.32	9.52		16.00			727.15	744.68	
trib	1528	Q100 floodway	2014.31	0.00	2014.32	9.50		16.00		727.56	727.15	744.68	737.06
trib	1557	Q100 base	2014.32		2014.35	7.61		16.00			726.74	740.03	
trib	1557	Q100 floodway	2014.32	0.00	2014.35	7.61		16.00		730.81	726.74	740.03	738.42
trib	1963	Q100 base	2019.66		2019.85	15.48		15.72	0.28		739.45	750.61	
trib	1963	Q100 floodway	2019.63	-0.03	2019.86	8.89		16.00		741.45	739.45	750.61	750.61
trib	1989	Q100 base	2020.06		2020.12	5.50		16.00			762.80	771.50	
trib	1989	Q100 floodway	2020.08	0.02	2020.15	5.50		16.00		762.80	762.80	771.50	771.50
trib	2040		Culvert										
trib	2080	Q100 base	2020.61		2020.74	4.00		16.00			39.42	68.83	
trib	2080	Q100 floodway	2020.61	0.00	2020.74	4.00		16.00		46.05	39.42	68.83	60.92
trib	2100	Q100 base	2020.83		2020.88	15.31	0.01	29.99			44.23	60.09	
trib	2100	Q100 floodway	2020.83	0.00	2020.88	14.75		30.00		44.23	44.23	60.09	58.98
trib	2110	Q100 base	2020.88		2020.92	15.59	0.02	29.98			44.23	60.09	
trib	2110	Q100 floodway	2020.88	0.00	2020.93	14.82		30.00		44.23	44.23	60.09	59.05
trib	2120	Q100 base	2020.91		2020.96	15.80	0.03	29.97			44.23	60.09	
trib	2120	Q100 floodway	2020.92	0.00	2020.96	14.87		30.00		44.23	44.23	60.09	59.10
trib	2651	Q100 base	2023.40		2023.55	7.51		30.00			46.44	55.58	
trib	2651	Q100 floodway	2023.40	0.01	2023.55	7.50		30.00		46.68	46.44	55.58	54.18
trib	3126	Q100 base	2026.19		2026.25	10.23		30.00			72.83	95.75	
trib	3126	Q100 floodway	2026.18	0.00	2026.25	10.22		30.00		75.79	72.83	95.75	86.03
trib	3617	Q100 base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Q100 floodway	2030.66	-0.01	2031.13	5.89		30.00		144.39	139.17	162.30	150.31
trib	4127	Q100 base	2035.09		2035.15	9.22		30.00			251.87	265.32	
trib	4127	Q100 floodway	2035.09	0.00	2035.16	9.22		30.00		253.91	251.87	265.32	263.13

HEC-RAS Plan: ECM FW River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4623	Q100 base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Q100 floodway	2037.69	0.00	2037.84	8.13		30.00		316.70	314.09	329.75	324.83
trib	4665	Q100 base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Q100 floodway	2038.70	0.00	2039.53	2.50		30.00		344.05	340.25	349.22	347.43
trib	4685		Culvert										
trib	4704	Q100 base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Q100 floodway	2040.99	-0.01	2041.03	7.52		30.00		352.15	352.15	360.54	360.54
trib	4750	Q100 base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Q100 floodway	2041.05	0.02	2041.07	12.65		28.00		329.79	329.79	342.44	342.44
trib	5165	Q100 base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Q100 floodway	2043.35	-0.05	2043.61	13.81	0.00	28.00	0.00	212.11	212.11	225.92	225.92
trib	5676	Q100 base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Q100 floodway	2048.17	0.09	2048.21	19.14		28.00		187.85	183.69	226.54	206.99
trib	6117	Q100 base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Q100 floodway	2051.88	-0.20	2052.30	6.34		28.00		217.18	211.57	230.44	223.95
trib	6154	Q100 base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Q100 floodway	2052.80	0.04	2052.86	16.44		28.00		219.96	211.25	246.77	236.94
trib	6200		Culvert										
trib	6239	Q100 base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Q100 floodway	2054.11	0.00	2054.13	18.59		28.00		228.52	221.30	259.22	247.11
trib	6274	Q100 base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Q100 floodway	2055.66	0.01	2055.95	10.56		28.00		216.47	210.49	231.21	227.03
trib	6553	Q100 base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Q100 floodway	2064.48	-0.01	2064.67	10.55		28.00		208.19	197.65	240.39	218.78
trib	7086	Q100 base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Q100 floodway	2083.50	0.00	2083.96	3.68		18.00		153.30	150.93	158.25	156.99
trib	7121	Q100 base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Q100 floodway	2084.64	0.00	2085.08	3.10		18.00		118.45	118.04	121.88	121.62
trib	7130		Culvert										
trib	7143	Q100 base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Q100 floodway	2086.04	0.00	2086.16	3.79		18.00		111.74	111.14	115.72	115.53
trib	7169	Q100 base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Q100 floodway	2090.50	-0.01	2091.06	2.64		18.00		115.24	114.91	118.45	117.88
trib	7175		Culvert										
trib	7186	Q100 base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Q100 floodway	2091.45	0.00	2091.64	2.88		18.00		119.03	119.10	122.49	122.26
trib	7220	Q100 base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Q100 floodway	2092.37	-0.02	2092.72	5.77		18.00		130.02	130.02	136.02	135.83

Existing Conditions Model - Unnamed Tributary Without DS Levee

HEC-RAS Plan: wo DS lev (ECM)   River: Tributary   Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-1303	Q10	10.00	2004.70	2007.19	2005.00	2007.19	0.000006	0.13	97.62	92.00	0.02
trib	-1303	Q50	14.00	2004.70	2007.80	2005.05	2007.80	0.000004	0.12	156.26	99.90	0.01
trib	-1303	Q100	16.00	2004.70	2008.05	2005.07	2008.05	0.000003	0.12	181.64	103.69	0.01
trib	-1303	Q500	20.00	2004.70	2008.64	2005.11	2008.64	0.000002	0.11	245.69	113.41	0.01
trib	-1019	Q10	10.00	2008.18	2008.47	2008.47	2008.54	0.040241	2.34	5.15	65.40	0.83
trib	-1019	Q50	14.00	2008.18	2008.51	2008.51	2008.59	0.039441	2.57	6.69	70.95	0.84
trib	-1019	Q100	16.00	2008.18	2008.52	2008.52	2008.62	0.045491	2.81	7.00	71.61	0.91
trib	-1019	Q500	20.00	2008.18	2008.64	2008.56	2008.65	0.003347	0.96	26.15	93.34	0.26
trib	-880	Q10	10.00	2007.31	2008.55	2005.25	2008.55	0.000000	0.01	808.03	365.13	0.00
trib	-880	Q50	14.00	2007.31	2008.60	2005.30	2008.60	0.000000	0.01	828.10	367.06	0.00
trib	-880	Q100	16.00	2007.31	2008.63	2005.32	2008.63	0.000000	0.01	837.43	367.97	0.00
trib	-880	Q500	20.00	2007.31	2008.65	2005.36	2008.65	0.000000	0.01	845.25	368.73	0.00
trib	-466	Q10	10.00	2006.96	2008.55	2007.05	2008.55	0.000000	0.02	503.64	396.88	0.00
trib	-466	Q50	14.00	2006.96	2008.60	2007.08	2008.60	0.000001	0.03	525.58	402.65	0.00
trib	-466	Q100	16.00	2006.96	2008.63	2007.08	2008.63	0.000001	0.03	535.81	403.22	0.00
trib	-466	Q500	20.00	2006.96	2008.65	2007.08	2008.65	0.000001	0.04	544.38	403.56	0.01
trib	-89	Q10	10.00	2007.09	2008.55	2006.35	2008.55	0.000000	0.02	533.76	381.64	0.00
trib	-89	Q50	14.00	2007.09	2008.60	2006.40	2008.60	0.000000	0.02	554.94	387.29	0.00
trib	-89	Q100	16.00	2007.09	2008.63	2006.43	2008.63	0.000001	0.03	564.78	388.12	0.00
trib	-89	Q500	20.00	2007.09	2008.65	2006.47	2008.65	0.000001	0.03	573.08	388.82	0.00
trib	1	Q10	10.00	2008.30	2008.57	2008.57	2008.61	0.049508	2.23	7.05	92.01	0.89
trib	1	Q50	14.00	2008.30	2008.60	2008.60	2008.64	0.049091	2.40	9.47	106.80	0.90
trib	1	Q100	16.00	2008.30	2008.61	2008.61	2008.65	0.045516	2.40	10.81	112.72	0.88
trib	1	Q500	20.00	2008.30	2008.63	2008.63	2008.67	0.043045	2.45	13.02	120.22	0.86
trib	149	Q10	10.00	2007.52	2008.62	2006.65	2008.62	0.000000	0.01	417.66	269.94	0.00
trib	149	Q50	14.00	2007.52	2008.65	2006.70	2008.65	0.000001	0.02	425.25	270.23	0.00
trib	149	Q100	16.00	2007.52	2008.66	2006.72	2008.66	0.000001	0.02	428.28	270.35	0.00
trib	149	Q500	20.00	2007.52	2008.68	2006.80	2008.68	0.000001	0.03	433.86	270.56	0.01
trib	343	Q10	10.00	2008.18	2008.62	2007.06	2008.62	0.000001	0.02	272.09	279.48	0.01
trib	343	Q50	14.00	2008.18	2008.65	2007.13	2008.65	0.000003	0.03	279.96	281.03	0.01
trib	343	Q100	16.00	2008.18	2008.66	2007.16	2008.66	0.000003	0.03	283.12	281.64	0.01
trib	343	Q500	20.00	2008.18	2008.68	2007.19	2008.68	0.000005	0.04	288.94	282.74	0.01
trib	383	Q10	10.00	2008.42	2008.62	2007.33	2008.62	0.000003	0.01	193.97	213.44	0.01
trib	383	Q50	14.00	2008.42	2008.65	2007.36	2008.65	0.000006	0.02	199.96	214.83	0.01
trib	383	Q100	16.00	2008.42	2008.66	2007.37	2008.66	0.000007	0.03	202.37	215.39	0.01
trib	383	Q500	20.00	2008.42	2008.68	2007.40	2008.68	0.000011	0.03	206.88	216.43	0.01
trib	472	Q10	10.00	2008.50	2008.62	2007.46	2008.62	0.000008	0.01	146.81	211.42	0.01
trib	472	Q50	14.00	2008.50	2008.65	2007.50	2008.65	0.000014	0.02	152.88	213.77	0.01
trib	472	Q100	16.00	2008.50	2008.66	2007.52	2008.66	0.000017	0.03	155.34	214.71	0.01
trib	472	Q500	20.00	2008.50	2008.68	2007.55	2008.68	0.000025	0.04	159.92	216.36	0.02
trib	576	Q10	10.00	2008.57	2008.62	2007.79	2008.62	0.000034	0.02	83.84	150.04	0.02
trib	576	Q50	14.00	2008.57	2008.65	2007.83	2008.65	0.000057	0.03	88.33	153.40	0.02
trib	576	Q100	16.00	2008.57	2008.66	2007.84	2008.66	0.000069	0.03	90.17	154.76	0.03
trib	576	Q500	20.00	2008.57	2008.68	2007.88	2008.68	0.000096	0.05	93.67	157.85	0.03
trib	651	Q10	10.00	2011.11	2011.18	2011.18	2011.22	0.097087	0.90	6.25	88.01	0.91
trib	651	Q50	14.00	2011.11	2011.20	2011.20	2011.24	0.084641	1.01	8.16	94.94	0.89
trib	651	Q100	16.00	2011.11	2011.21	2011.21	2011.26	0.076146	1.09	9.16	96.15	0.87
trib	651	Q500	20.00	2011.11	2011.22	2011.22	2011.28	0.078399	1.27	10.44	97.72	0.92
trib	918	Q10	10.00	2009.84	2011.22	2010.09	2011.22	0.000004	0.07	191.15	223.46	0.01
trib	918	Q50	14.00	2009.84	2011.25	2010.13	2011.25	0.000006	0.09	197.86	227.01	0.01
trib	918	Q100	16.00	2009.84	2011.27	2010.15	2011.27	0.000008	0.10	200.97	230.82	0.02
trib	918	Q500	20.00	2009.84	2011.30	2010.16	2011.30	0.000012	0.13	207.29	233.18	0.02
trib	1472	Q10	10.00	2013.44	2013.73	2013.73	2013.78	0.038164	2.06	6.11	55.33	0.79
trib	1472	Q50	14.00	2013.44	2013.76	2013.76	2013.82	0.041668	2.34	7.74	62.95	0.84
trib	1472	Q100	16.00	2013.44	2013.77	2013.77	2013.84	0.039601	2.38	8.80	67.96	0.83
trib	1472	Q500	20.00	2013.44	2013.80	2013.80	2013.87	0.039038	2.52	10.69	77.87	0.84
trib	1510	Q10	10.00	2013.81	2014.06	2013.90	2014.06	0.002778	0.39	19.89	120.64	0.19
trib	1510	Q50	14.00	2013.81	2014.10	2013.94	2014.11	0.002801	0.43	25.50	126.84	0.20
trib	1510	Q100	16.00	2013.81	2014.12	2013.95	2014.13	0.002776	0.45	27.85	129.47	0.20
trib	1510	Q500	20.00	2013.81	2014.15	2013.97	2014.16	0.002826	0.50	31.99	137.40	0.21
trib	1520		Culvert									
trib	1528	Q10	10.00	2013.78	2014.06	2013.93	2014.06	0.005201	0.69	15.56	100.95	0.28

HEC-RAS Plan: wo DS lev (ECM)   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1528	Q50	14.00	2013.78	2014.10	2013.95	2014.11	0.004983	0.76	20.57	116.23	0.29
trib	1528	Q100	16.00	2013.78	2014.12	2013.97	2014.13	0.005184	0.82	22.52	118.90	0.30
trib	1528	Q500	20.00	2013.78	2014.16	2013.99	2014.17	0.004648	0.85	26.76	122.07	0.29
trib	1557	Q10	10.00	2014.07	2014.21	2014.05	2014.21	0.004529	0.32	16.54	122.35	0.22
trib	1557	Q50	14.00	2014.07	2014.25	2014.10	2014.26	0.004585	0.37	22.60	137.57	0.23
trib	1557	Q100	16.00	2014.07	2014.27	2014.12	2014.27	0.004521	0.42	24.77	140.38	0.24
trib	1557	Q500	20.00	2014.07	2014.29	2014.14	2014.30	0.004640	0.50	28.53	145.80	0.25
trib	1963	Q10	10.00	2015.81	2016.24	2016.10	2016.26	0.007062	1.07	10.25	52.15	0.36
trib	1963	Q50	14.00	2015.81	2016.29	2016.15	2016.31	0.007097	1.20	13.09	56.60	0.37
trib	1963	Q100	16.00	2015.81	2016.31	2016.17	2016.33	0.007323	1.27	14.25	57.48	0.38
trib	1963	Q500	20.00	2015.81	2016.35	2016.20	2016.38	0.007236	1.36	16.68	58.71	0.38
trib	1989	Q10	10.00	2017.77	2018.80	2018.80	2019.13	0.055202	4.65	2.15	3.23	1.00
trib	1989	Q50	14.00	2017.77	2018.98	2018.98	2019.38	0.054111	5.05	2.77	3.54	1.01
trib	1989	Q100	16.00	2017.77	2019.07	2019.07	2019.48	0.052722	5.18	3.09	3.69	1.00
trib	1989	Q500	20.00	2017.77	2019.22	2019.22	2019.68	0.051664	5.45	3.67	3.94	0.99
trib	2040		Culvert									
trib	2080	Q10	10.00	2018.73	2020.21	2019.81	2020.31	0.008855	2.56	3.90	8.86	0.46
trib	2080	Q50	14.00	2018.73	2020.50	2019.96	2020.62	0.007337	2.77	5.05	13.08	0.43
trib	2080	Q100	16.00	2018.73	2020.63	2020.02	2020.76	0.006894	2.87	5.58	15.13	0.43
trib	2080	Q500	20.00	2018.73	2020.87	2020.15	2021.02	0.006295	3.05	6.55	18.57	0.42
trib	2100	Q10	12.00	2018.27	2020.40	2019.40	2020.42	0.001965	1.13	10.60	12.20	0.21
trib	2100	Q50	24.00	2018.27	2020.71	2019.86	2020.75	0.003293	1.63	14.74	14.59	0.29
trib	2100	Q100	30.00	2018.27	2020.84	2020.00	2020.89	0.003479	1.80	16.71	15.37	0.30
trib	2100	Q500	46.00	2018.27	2021.09	2020.26	2021.17	0.004326	2.25	20.67	16.84	0.34
trib	2110	Q10	12.00	2018.27	2020.43	2019.40	2020.44	0.001824	1.10	10.90	12.39	0.21
trib	2110	Q50	24.00	2018.27	2020.75	2019.87	2020.79	0.002895	1.56	15.35	14.83	0.27
trib	2110	Q100	30.00	2018.27	2020.89	2020.00	2020.93	0.003072	1.73	17.40	15.64	0.28
trib	2110	Q500	46.00	2018.27	2021.15	2020.26	2021.22	0.003780	2.15	21.65	17.18	0.32
trib	2120	Q10	12.00	2018.27	2020.45	2019.40	2020.46	0.001720	1.08	11.15	12.55	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.82	0.002629	1.52	15.83	15.03	0.26
trib	2120	Q100	30.00	2018.27	2020.92	2020.00	2020.96	0.002801	1.68	17.94	15.84	0.27
trib	2120	Q500	46.00	2018.27	2021.19	2020.26	2021.26	0.003424	2.09	22.40	17.44	0.31
trib	2651	Q10	12.00	2021.38	2022.47	2022.22	2022.61	0.017129	3.01	3.98	5.18	0.61
trib	2651	Q50	24.00	2021.38	2023.15	2022.58	2023.29	0.009975	3.03	7.93	6.46	0.48
trib	2651	Q100	30.00	2021.38	2023.39	2022.73	2023.54	0.009967	3.13	9.59	7.45	0.49
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008905	3.31	13.99	9.98	0.47
trib	3126	Q10	12.00	2023.82	2025.46	2024.69	2025.50	0.003063	1.52	7.89	7.80	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003719	1.96	12.22	9.48	0.30
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.26	0.003685	2.07	14.46	10.24	0.31
trib	3126	Q500	46.00	2023.82	2026.66	2025.48	2026.74	0.003886	2.34	19.63	12.07	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.90	0.003059	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011028	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03

HEC-RAS Plan: wo DS lev (ECM) River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51	2047.12	2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98	2047.39	2048.02	0.004265	1.60	13.77	17.89	0.32
trib	5676	Q100	28.00	2046.43	2048.08	2047.50	2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37	2047.73	2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68	2051.43	2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031946	4.33	5.08	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07	2051.88	2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49	2052.21	2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.007005	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Existing Conditions Model - Unnamed Tributary Without DS Levee, Floodway

HEC-RAS Plan: wo DS fw (ECM) River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-1303	Base	2008.05		2008.05	103.69	5.34	9.25	1.41		134.37	158.76	
trib	-1303	Floodway	2009.05	1.00	2009.05	31.32	0.63	13.98	1.39	131.99	134.37	158.76	163.31
trib	-1019	Base	2008.52		2008.62	38.92	3.31	11.46	1.24		178.65	192.41	
trib	-1019	Floodway	2009.04	0.53	2009.06	21.09	3.29	11.59	1.12	173.33	178.65	192.41	194.42
trib	-880	Base	2008.63		2008.63	367.97	14.91	0.33	0.76		316.80	341.31	
trib	-880	Floodway	2009.07	0.45	2009.07	40.00	2.68	9.02	4.30	310.00	316.80	341.31	350.00
trib	-466	Base	2008.63		2008.63	403.22	15.45	0.52	0.03		552.13	565.20	
trib	-466	Floodway	2009.09	0.46	2009.09	45.57	9.60	6.11	0.28	521.00	552.13	565.20	566.57
trib	-89	Base	2008.63		2008.63	388.12	15.26	0.71	0.03		523.44	545.76	
trib	-89	Floodway	2009.10	0.47	2009.10	39.70	6.49	8.94	0.57	510.00	523.44	545.76	549.70
trib	1	Base	2008.61		2008.65	112.72	11.69	4.27	0.05		423.34	431.01	
trib	1	Floodway	2009.07	0.46	2009.13	15.00	16.00			307.00	423.34	431.01	322.00
trib	149	Base	2008.66		2008.66	270.35	15.86	0.14	0.00		322.78	330.58	
trib	149	Floodway	2009.18	0.53	2009.19	15.00	9.49	6.51		315.58	322.78	330.58	330.58
trib	343	Base	2008.66		2008.66	281.64	15.83	0.12	0.05		326.83	335.39	
trib	343	Floodway	2009.26	0.60	2009.28	15.00	5.98	10.02		320.39	326.83	335.39	335.39
trib	383	Base	2008.66		2008.66	215.39	15.97	0.03	0.00		321.06	327.35	
trib	383	Floodway	2009.30	0.64	2009.32	15.00	10.48	5.52		312.35	321.06	327.35	327.35
trib	472	Base	2008.66		2008.66	214.71	15.97	0.03	0.00		246.06	255.85	
trib	472	Floodway	2009.49	0.84	2009.51	15.00	6.05	9.95		240.85	246.06	255.85	255.85
trib	576	Base	2008.66		2008.66	154.76	15.99	0.01	0.00		247.56	254.23	
trib	576	Floodway	2009.63	0.97	2009.65	15.00	9.60	6.40		239.23	247.56	254.23	254.23
trib	651	Base	2011.21		2011.26	96.15	15.71	0.27	0.02		331.92	337.62	
trib	651	Floodway	2011.47	0.26	2011.63	15.00	16.00			243.59	331.92	337.62	258.59
trib	918	Base	2011.27		2011.27	230.82	7.90	1.56	6.54		290.48	301.36	
trib	918	Floodway	2011.80	0.53	2011.80	15.00	2.00	12.93	1.06	288.00	290.48	301.36	303.00
trib	1472	Base	2013.77		2013.84	67.96	1.43	9.86	4.70		374.56	390.80	
trib	1472	Floodway	2014.15	0.38	2014.31	15.00	16.00			355.00	374.56	390.80	370.00
trib	1510	Base	2014.12		2014.13	129.47	0.02	0.84	15.14		289.44	302.32	
trib	1510	Floodway	2014.63	0.51	2014.66	15.00			16.00	355.00	289.44	302.32	370.00
trib	1520		Culvert										
trib	1528	Base	2014.12		2014.13	118.90	0.00	2.72	13.28		307.04	321.23	
trib	1528	Floodway	2013.79	-0.33	4514.91	2.75			16.00	370.00	307.04	321.23	385.00
trib	1557	Base	2014.27		2014.27	140.38	0.00	0.43	15.57		307.11	317.99	
trib	1557	Floodway	2014.32	0.05	2014.48	15.00			16.00	370.00	307.11	317.99	385.00
trib	1963	Base	2016.31		2016.33	57.48	2.12	13.79	0.09		243.25	273.87	
trib	1963	Floodway	2016.45	0.14	2016.46	66.39	3.52	12.23	0.24		243.25	273.87	
trib	1989	Base	2019.07		2019.48	3.69		16.00			762.80	771.50	
trib	1989	Floodway	2019.07	0.00	2019.48	3.69		16.00			762.80	771.50	
trib	2040		Culvert										
trib	2080	Base	2020.63		2020.76	4.00		16.00			39.42	68.83	
trib	2080	Floodway	2020.63	0.00	2020.76	4.00		16.00			39.42	68.83	
trib	2100	Base	2020.84		2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2100	Floodway	2020.84	0.00	2020.89	15.37	0.01	29.99			44.23	60.09	
trib	2110	Base	2020.89		2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2110	Floodway	2020.89	0.00	2020.93	15.64	0.02	29.98			44.23	60.09	
trib	2120	Base	2020.92		2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2120	Floodway	2020.92	0.00	2020.96	15.84	0.04	29.96			44.23	60.09	
trib	2651	Base	2023.39		2023.54	7.45		30.00			46.44	55.58	
trib	2651	Floodway	2023.39	0.00	2023.54	7.45		30.00			46.44	55.58	
trib	3126	Base	2026.19		2026.26	10.24		30.00			72.83	95.75	
trib	3126	Floodway	2026.19	0.00	2026.26	10.24		30.00			72.83	95.75	
trib	3617	Base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Floodway	2030.67	0.00	2031.13	5.92		30.00			139.17	162.30	
trib	4127	Base	2035.09		2035.15	9.22		30.00			251.87	265.32	

HEC-RAS Plan: wo DS fw (ECM) River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4127	Floodway	2035.09	0.00	2035.15	9.22		30.00			251.87	265.32	
trib	4623	Base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Floodway	2037.69	0.00	2037.84	8.14		30.00			314.09	329.75	
trib	4665	Base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Floodway	2038.70	0.00	2039.53	2.50		30.00			340.25	349.22	
trib	4685		Culvert										
trib	4704	Base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Floodway	2041.00	0.00	2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4750	Base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Floodway	2041.03	0.00	2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	5165	Base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Floodway	2043.40	0.00	2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5676	Base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Floodway	2048.08	0.00	2048.13	19.14		28.00			183.69	226.54	
trib	6117	Base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Floodway	2052.07	0.00	2052.35	6.77		28.00			211.57	230.44	
trib	6154	Base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Floodway	2052.76	0.00	2052.83	16.44		28.00			211.25	246.77	
trib	6200		Culvert										
trib	6239	Base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Floodway	2054.11	0.00	2054.13	18.59		28.00			221.30	259.22	
trib	6274	Base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Floodway	2055.65	0.00	2055.95	10.56		28.00			210.49	231.21	
trib	6553	Base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Floodway	2064.48	0.00	2064.68	10.59		28.00			197.65	240.39	
trib	7086	Base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Floodway	2083.50	0.00	2083.96	3.69		18.00			150.93	158.25	
trib	7121	Base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Floodway	2084.63	0.00	2085.08	3.10		18.00			118.04	121.88	
trib	7130		Culvert										
trib	7143	Base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Floodway	2086.04	0.00	2086.16	3.79		18.00			111.14	115.72	
trib	7169	Base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Floodway	2090.51	0.00	2091.06	2.65		18.00			114.91	118.45	
trib	7175		Culvert										
trib	7186	Base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Floodway	2091.45	0.00	2091.64	2.88		18.00			119.10	122.49	
trib	7220	Base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Floodway	2092.39	0.00	2092.72	7.10	0.01	17.99			130.02	136.02	

Appendix F. Post Project Conditions HEC-RAS Models

Proposed Conditions Model - Golf Course Overflow

HEC-RAS Plan: PCM River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	-2737	10-yr	30.00	2001.24	2002.25	2002.16	2002.63	0.010010	4.97	6.03	10.02	0.87
Golf Course	-2737	50-yr	54.00	2001.24	2002.67	2002.60	2003.29	0.010009	6.29	8.58	11.72	0.93
Golf Course	-2737	100-yr	64.00	2001.24	2002.82	2002.77	2003.53	0.010003	6.73	9.51	12.34	0.94
Golf Course	-2737	500-yr	118.00	2001.24	2003.54	2003.54	2004.68	0.009819	8.55	13.80	15.20	0.99
Golf Course	-2000		Culvert									
Golf Course	-680	10-yr	30.00	2003.42	2005.61	2004.34	2005.69	0.000389	2.29	13.13	6.00	0.27
Golf Course	-680	50-yr	54.00	2003.42	2006.39	2004.78	2006.54	0.000547	3.03	17.84	6.00	0.31
Golf Course	-680	100-yr	64.00	2003.42	2006.68	2004.94	2006.85	0.000601	3.27	19.56	6.00	0.32
Golf Course	-680	500-yr	118.00	2003.42	2008.11	2005.70	2008.38	0.000800	4.19	28.15	6.00	0.34
Golf Course	-679	10-yr	30.00	2003.42	2005.53	2004.62	2005.72	0.001247	3.56	8.43	4.00	0.43
Golf Course	-679	50-yr	54.00	2003.42	2006.25	2005.20	2006.60	0.001884	4.78	11.30	4.00	0.50
Golf Course	-679	100-yr	64.00	2003.42	2006.51	2005.41	2006.92	0.002116	5.18	12.34	4.00	0.52
Golf Course	-679	500-yr	118.00	2003.42	2007.82	2006.41	2008.51	0.003005	6.71	17.58	4.00	0.56
Golf Course	-460		Culvert									
Golf Course	-409	10-yr	30.00	2005.50	2007.88	2006.70	2008.03	0.000411	3.15	9.51	12.00	0.36
Golf Course	-409	50-yr	54.00	2005.50	2008.79	2007.28	2009.05	0.000451	4.11	13.15	12.00	0.40
Golf Course	-409	100-yr	64.00	2005.50	2009.13	2007.50	2009.43	0.000456	4.41	14.52	12.00	0.41
Golf Course	-409	500-yr	118.00	2005.50	2011.28	2008.51	2011.68	0.000329	5.10	23.12	12.00	0.37
Golf Course	-396	10-yr	30.00	2007.12	2008.16	2008.16	2008.68	0.006621	5.78	5.19	5.00	1.00
Golf Course	-396	50-yr	54.00	2007.12	2008.66	2008.66	2009.43	0.006941	7.04	7.67	5.00	1.00
Golf Course	-396	100-yr	64.00	2007.12	2008.89	2008.84	2009.71	0.006574	7.25	8.83	5.00	0.96
Golf Course	-396	500-yr	118.00	2007.12	2011.23	2009.70	2011.75	0.002395	5.74	20.56	5.00	0.50
Golf Course	-42	10-yr	30.00	2007.33	2009.30	2008.36	2009.45	0.001061	3.04	9.87	5.00	0.38
Golf Course	-42	50-yr	54.00	2007.33	2010.12	2008.86	2010.35	0.001358	3.87	13.94	5.00	0.41
Golf Course	-42	100-yr	64.00	2007.33	2010.40	2009.04	2010.67	0.001483	4.17	15.35	5.00	0.42
Golf Course	-42	500-yr	118.00	2007.33	2012.07	2009.91	2012.45	0.001685	4.98	23.68	5.00	0.40
Golf Course	-32	10-yr	30.00	2007.33	2009.51	2007.65	2009.52	0.000012	0.47	63.35	29.00	0.06
Golf Course	-32	50-yr	54.00	2007.33	2010.46	2007.81	2010.47	0.000013	0.59	90.78	29.00	0.06
Golf Course	-32	100-yr	64.00	2007.33	2010.80	2007.86	2010.80	0.000013	0.64	100.52	29.00	0.06
Golf Course	-32	500-yr	118.00	2007.33	2012.63	2008.13	2012.64	0.000013	0.77	153.73	29.00	0.06
Golf Course	-23	10-yr	30.00	2007.34	2009.52	2007.66	2009.52	0.000013	0.48	63.06	29.00	0.06
Golf Course	-23	50-yr	54.00	2007.34	2010.46	2007.81	2010.47	0.000013	0.60	90.49	29.00	0.06
Golf Course	-23	100-yr	64.00	2007.34	2010.80	2007.87	2010.80	0.000014	0.64	100.23	29.00	0.06
Golf Course	-23	500-yr	118.00	2007.34	2012.63	2008.14	2012.64	0.000013	0.77	153.45	29.00	0.06
Golf Course	0		Culvert									
Golf Course	23	10-yr	30.00	2007.58	2009.52	2007.91	2009.52	0.000158	0.53	56.15	29.00	0.07
Golf Course	23	50-yr	54.00	2007.58	2010.46	2008.05	2010.47	0.000146	0.65	83.63	29.00	0.07
Golf Course	23	100-yr	64.00	2007.58	2010.80	2008.10	2010.81	0.000146	0.68	93.45	29.00	0.07
Golf Course	23	500-yr	118.00	2007.58	2012.67	2008.38	2012.68	0.000227	0.48	246.03	213.47	0.08
Golf Course	36	10-yr	30.00	2011.57	2011.99	2011.99	2012.13	0.056936	3.07	9.78	112.30	1.01
Golf Course	36	50-yr	54.00	2011.57	2012.14	2012.14	2012.33	0.049365	3.42	15.77	127.85	0.99
Golf Course	36	100-yr	64.00	2011.57	2012.20	2012.20	2012.39	0.046927	3.52	18.18	133.37	0.98
Golf Course	36	500-yr	118.00	2011.57	2012.68	2012.40	2012.69	0.002092	0.95	124.79	215.04	0.22
Golf Course	178	10-yr	30.00	2011.75	2012.36	2011.92	2012.36	0.000308	0.29	103.21	389.10	0.08
Golf Course	178	50-yr	54.00	2011.75	2012.56	2011.98	2012.56	0.000295	0.35	155.39	429.02	0.08
Golf Course	178	100-yr	64.00	2011.75	2012.63	2012.00	2012.63	0.000291	0.37	174.52	439.18	0.08
Golf Course	178	500-yr	118.00	2011.75	2012.81	2012.09	2012.81	0.000448	0.52	226.87	464.93	0.11
Golf Course	276	10-yr	30.00	2011.65	2012.41	2012.00	2012.41	0.001147	0.46	64.56	205.81	0.15
Golf Course	276	50-yr	54.00	2011.65	2012.60	2012.11	2012.61	0.000814	0.51	106.65	232.06	0.13
Golf Course	276	100-yr	64.00	2011.65	2012.67	2012.14	2012.67	0.000763	0.52	122.37	244.95	0.13
Golf Course	276	500-yr	118.00	2011.65	2012.87	2012.31	2012.87	0.000957	0.68	172.58	283.08	0.15
Golf Course	402	10-yr	30.00	2012.03	2012.63	2012.42	2012.63	0.002993	0.66	45.61	177.23	0.23
Golf Course	402	50-yr	54.00	2012.03	2012.77	2012.48	2012.77	0.002485	0.75	72.29	201.80	0.22
Golf Course	402	100-yr	64.00	2012.03	2012.82	2012.51	2012.83	0.002193	0.77	83.43	203.77	0.21
Golf Course	402	500-yr	118.00	2012.03	2013.03	2012.60	2013.05	0.001999	0.90	130.54	232.48	0.21
Golf Course	528	10-yr	30.00	2012.09	2012.89	2012.50	2012.90	0.001592	0.66	45.72	110.96	0.18
Golf Course	528	50-yr	54.00	2012.09	2013.04	2012.61	2013.06	0.002028	0.85	63.77	126.64	0.21
Golf Course	528	100-yr	64.00	2012.09	2013.09	2012.64	2013.10	0.002178	0.92	69.80	129.79	0.22
Golf Course	528	500-yr	118.00	2012.09	2013.32	2012.78	2013.34	0.002820	1.11	106.08	179.16	0.25
Golf Course	964	10-yr	30.00	2012.71	2013.36	2012.98	2013.36	0.000740	0.45	66.97	162.28	0.12
Golf Course	964	50-yr	54.00	2012.71	2013.55	2013.05	2013.56	0.000766	0.53	101.97	197.12	0.13
Golf Course	964	100-yr	64.00	2012.71	2013.62	2013.07	2013.63	0.000744	0.56	115.11	202.46	0.13
Golf Course	964	500-yr	118.00	2012.71	2013.91	2013.18	2013.91	0.000749	0.67	177.12	238.74	0.14

HEC-RAS Plan: PCM   River: Chester Creek   Reach: Golf Course (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	1404	10-yr	30.00	2013.92	2014.45	2014.45	2014.57	0.060255	2.72	11.01	48.22	1.00
Golf Course	1404	50-yr	54.00	2013.92	2014.57	2014.57	2014.72	0.053115	3.18	16.96	53.43	1.00
Golf Course	1404	100-yr	64.00	2013.92	2014.60	2014.60	2014.78	0.054246	3.41	18.77	54.23	1.02
Golf Course	1404	500-yr	118.00	2013.92	2014.78	2014.78	2015.04	0.047389	4.05	29.11	58.60	1.01
Golf Course	1489	10-yr	30.00	2014.38	2015.05	2014.75	2015.05	0.001933	0.69	43.31	112.20	0.20
Golf Course	1489	50-yr	54.00	2014.38	2015.22	2014.83	2015.23	0.002060	0.84	64.21	130.40	0.21
Golf Course	1489	100-yr	64.00	2014.38	2015.28	2014.85	2015.29	0.002060	0.89	72.20	135.50	0.21
Golf Course	1489	500-yr	118.00	2014.38	2015.56	2014.98	2015.58	0.002264	0.99	119.78	205.88	0.23
Golf Course	1547	10-yr	30.00	2014.61	2015.16	2014.87	2015.16	0.001938	0.64	46.54	134.52	0.19
Golf Course	1547	50-yr	54.00	2014.61	2015.33	2014.95	2015.34	0.001742	0.76	71.20	148.90	0.19
Golf Course	1547	100-yr	64.00	2014.61	2015.39	2014.98	2015.40	0.001701	0.80	80.06	151.92	0.19
Golf Course	1547	500-yr	118.00	2014.61	2015.67	2015.09	2015.69	0.001637	0.93	126.65	185.64	0.20
Golf Course	1647	10-yr	30.00	2014.93	2015.45	2015.26	2015.46	0.005092	0.93	32.35	111.85	0.30
Golf Course	1647	50-yr	54.00	2014.93	2015.60	2015.34	2015.61	0.004889	1.03	52.56	151.12	0.31
Golf Course	1647	100-yr	64.00	2014.93	2015.65	2015.37	2015.66	0.004580	1.07	59.89	154.59	0.30
Golf Course	1647	500-yr	118.00	2014.93	2015.90	2015.50	2015.92	0.003351	1.17	101.20	181.33	0.28
Golf Course	1981	10-yr	30.00	2017.57	2017.97	2017.87	2017.99	0.012459	1.10	27.17	141.49	0.44
Golf Course	1981	50-yr	54.00	2017.57	2018.07	2017.95	2018.10	0.012670	1.24	43.59	193.33	0.46
Golf Course	1981	100-yr	64.00	2017.57	2018.10	2017.97	2018.12	0.013760	1.32	48.49	208.12	0.48
Golf Course	1981	500-yr	118.00	2017.57	2018.17	2018.07	2018.22	0.021273	1.81	65.10	240.68	0.61
Golf Course	2578	10-yr	30.00	2022.25	2022.83	2022.66	2022.84	0.005714	0.89	33.70	135.04	0.31
Golf Course	2578	50-yr	54.00	2022.25	2022.95	2022.74	2022.97	0.005672	1.06	51.18	158.01	0.33
Golf Course	2578	100-yr	64.00	2022.25	2022.99	2022.76	2023.01	0.005408	1.11	57.80	160.17	0.32
Golf Course	2578	500-yr	118.00	2022.25	2023.19	2022.87	2023.22	0.004422	1.29	91.23	172.16	0.31
Golf Course	2863	10-yr	30.00	2028.58	2029.26	2029.26	2029.46	0.050578	3.53	8.49	22.03	1.00
Golf Course	2863	50-yr	54.00	2028.58	2029.49	2029.49	2029.71	0.047430	3.77	14.32	32.12	1.00
Golf Course	2863	100-yr	64.00	2028.58	2029.56	2029.56	2029.79	0.047397	3.81	16.79	37.05	1.00
Golf Course	2863	500-yr	118.00	2028.58	2029.79	2029.79	2030.10	0.045198	4.51	26.15	43.13	1.02

Proposed Conditions Model - Golf Course Overflow, Floodway

HEC-RAS Plan: PCM FW River: Chester Creek Reach: Golf Course

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Golf Course	-2737	Base	64.00	2001.24	2002.82	2002.77	2003.53	0.010003	6.73	9.51	12.34	0.94
Golf Course	-2737	Floodway	64.00	2001.24	2002.82	2002.77	2003.53	0.010003	6.73	9.51	12.34	0.94
Golf Course	-2000		Culvert									
Golf Course	-680	Base	64.00	2003.42	2006.68	2004.94	2006.85	0.000601	3.27	19.56	6.00	0.32
Golf Course	-680	Floodway	64.00	2003.42	2006.68	2004.94	2006.85	0.000601	3.27	19.56	6.00	0.32
Golf Course	-679	Base	64.00	2003.42	2006.51	2005.41	2006.92	0.002116	5.18	12.34	4.00	0.52
Golf Course	-679	Floodway	64.00	2003.42	2006.51	2005.41	2006.92	0.002116	5.18	12.34	4.00	0.52
Golf Course	-460		Culvert									
Golf Course	-409	Base	64.00	2005.50	2009.13	2007.50	2009.43	0.000456	4.41	14.52	12.00	0.41
Golf Course	-409	Floodway	64.00	2005.50	2009.13	2007.50	2009.43	0.000456	4.41	14.52	12.00	0.41
Golf Course	-396	Base	64.00	2007.12	2008.89	2008.84	2009.71	0.006574	7.25	8.83	5.00	0.96
Golf Course	-396	Floodway	64.00	2007.12	2008.89	2008.84	2009.71	0.006574	7.25	8.83	5.00	0.96
Golf Course	-42	Base	64.00	2007.33	2010.40	2009.04	2010.67	0.001483	4.17	15.35	5.00	0.42
Golf Course	-42	Floodway	64.00	2007.33	2010.40	2009.04	2010.67	0.001483	4.17	15.35	5.00	0.42
Golf Course	-32	Base	64.00	2007.33	2010.80	2007.86	2010.80	0.000013	0.64	100.52	29.00	0.06
Golf Course	-32	Floodway	64.00	2007.33	2010.80	2007.86	2010.80	0.000013	0.64	100.52	29.00	0.06
Golf Course	-23	Base	64.00	2007.34	2010.80	2007.87	2010.80	0.000014	0.64	100.23	29.00	0.06
Golf Course	-23	Floodway	64.00	2007.34	2010.80	2007.87	2010.80	0.000014	0.64	100.23	29.00	0.06
Golf Course	0		Culvert									
Golf Course	23	Base	64.00	2007.58	2010.80	2008.10	2010.81	0.000146	0.68	93.45	29.00	0.07
Golf Course	23	Floodway	64.00	2007.58	2010.80	2008.11	2010.81	0.000146	0.68	93.45	29.00	0.07
Golf Course	36	Base	64.00	2011.57	2012.20	2012.20	2012.39	0.046927	3.52	18.18	133.37	0.98
Golf Course	36	Floodway	64.00	2011.58	2012.24	2012.24	2012.51	0.047961	4.17	15.35	29.00	1.01
Golf Course	178	Base	64.00	2011.75	2012.63	2012.00	2012.63	0.000291	0.37	174.52	439.18	0.08
Golf Course	178	Floodway	64.00	2011.75	2013.09	2012.21	2013.11	0.001103	1.13	56.78	44.00	0.17
Golf Course	276	Base	64.00	2011.65	2012.67	2012.14	2012.67	0.000763	0.52	122.37	244.95	0.13
Golf Course	276	Floodway	64.00	2011.65	2013.20	2012.35	2013.22	0.001194	1.15	55.45	44.00	0.18
Golf Course	402	Base	64.00	2012.03	2012.82	2012.51	2012.83	0.002193	0.77	83.43	203.77	0.21
Golf Course	402	Floodway	64.00	2012.03	2013.39	2012.69	2013.42	0.001955	1.36	47.22	43.00	0.23
Golf Course	528	Base	64.00	2012.09	2013.09	2012.64	2013.10	0.002178	0.92	69.80	129.79	0.22
Golf Course	528	Floodway	64.00	2012.09	2013.59	2012.75	2013.61	0.001277	1.19	53.71	43.00	0.19
Golf Course	964	Base	64.00	2012.71	2013.62	2013.07	2013.63	0.000744	0.56	115.11	202.46	0.13
Golf Course	964	Floodway	64.00	2012.75	2014.11	2013.21	2014.13	0.001101	1.14	56.27	43.00	0.18
Golf Course	1404	Base	64.00	2013.92	2014.60	2014.60	2014.78	0.054246	3.41	18.77	54.23	1.02
Golf Course	1404	Floodway	64.00	2014.07	2015.27	2015.26	2015.70	0.044736	5.27	12.14	14.13	1.00
Golf Course	1489	Base	64.00	2014.38	2015.28	2014.85	2015.29	0.002060	0.89	72.20	135.50	0.21
Golf Course	1489	Floodway	64.00	2014.38	2016.10	2015.10	2016.14	0.001661	1.51	42.37	27.34	0.21
Golf Course	1547	Base	64.00	2014.61	2015.39	2014.98	2015.40	0.001701	0.80	80.06	151.92	0.19
Golf Course	1547	Floodway	64.00	2014.68	2016.21	2015.36	2016.27	0.002980	1.93	33.09	22.35	0.28
Golf Course	1647	Base	64.00	2014.93	2015.65	2015.37	2015.66	0.004580	1.07	59.89	154.59	0.30
Golf Course	1647	Floodway	64.00	2015.17	2016.61	2016.04	2016.71	0.006502	2.57	24.92	20.00	0.41
Golf Course	1981	Base	64.00	2017.57	2018.10	2017.97	2018.12	0.013760	1.32	48.49	208.12	0.48
Golf Course	1981	Floodway	64.00	2017.71	2019.02	2018.54	2019.14	0.008168	2.75	23.24	20.00	0.45
Golf Course	2578	Base	64.00	2022.25	2022.99	2022.76	2023.01	0.005408	1.11	57.80	160.17	0.32
Golf Course	2578	Floodway	64.00	2022.49	2023.79	2023.29	2023.91	0.007820	2.71	23.60	20.00	0.44
Golf Course	2863	Base	64.00	2028.58	2029.56	2029.56	2029.79	0.047397	3.81	16.79	37.05	1.00
Golf Course	2863	Floodway	64.00	2028.58	2029.72	2029.52	2029.93	0.019588	3.68	17.37	19.72	0.69

Proposed Conditions Model - Unnamed Tributary

HEC-RAS Plan: PCM River: Tributary Reach: trib

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	-36	Q10	10.00	1990.06	1990.90	1990.84	1991.05	0.028617	3.14	3.19	7.38	0.84
trib	-36	Q50	14.00	1990.06	1991.00	1990.96	1991.19	0.031272	3.53	3.97	8.23	0.90
trib	-36	Q100	16.00	1990.06	1991.10	1991.00	1991.27	0.021753	3.33	4.83	8.78	0.77
trib	-36	Q500	20.00	1990.06	2005.00	1991.08	2005.00	0.000000	0.06	480.84	52.99	0.00
trib	-20	Q10	10.00	1998.29	1999.10	1999.10	1999.31	0.041387	3.62	2.76	6.79	1.00
trib	-20	Q50	14.00	1998.29	1999.21	1999.21	1999.45	0.040662	3.96	3.53	7.72	1.02
trib	-20	Q100	16.00	1998.29	1999.27	1999.27	1999.52	0.037652	4.04	3.99	8.67	0.99
trib	-20	Q500	20.00	1998.29	2005.00		2005.00	0.000002	0.17	159.56	44.32	0.01
trib	0	Q10	10.00	2008.02	2009.13	2009.13	2009.27	0.015617	3.22	3.89	15.14	0.71
trib	0	Q50	14.00	2008.02	2009.20	2009.20	2009.37	0.017590	3.67	5.07	17.80	0.77
trib	0	Q100	16.00	2008.02	2009.26	2009.26	2009.42	0.015217	3.60	6.24	21.69	0.72
trib	0	Q500	20.00	2008.02	2009.32	2009.32	2009.48	0.015408	3.81	7.66	25.00	0.74
trib	75	Q10	10.00	2008.70	2009.72	2009.27	2009.76	0.003364	1.62	6.17	9.11	0.35
trib	75	Q50	14.00	2008.70	2009.86	2009.39	2009.92	0.003803	1.86	7.55	9.98	0.38
trib	75	Q100	16.00	2008.70	2009.91	2009.45	2009.97	0.004235	2.00	8.00	10.25	0.40
trib	75	Q500	20.00	2008.70	2010.00	2009.54	2010.08	0.004802	2.22	9.01	10.82	0.43
trib	174	Q10	10.00	2006.80	2009.77	2007.37	2009.77	0.000030	0.28	35.41	20.83	0.04
trib	174	Q50	14.00	2006.80	2009.93	2007.50	2009.94	0.000046	0.36	38.88	21.81	0.05
trib	174	Q100	16.00	2006.80	2009.99	2007.55	2009.99	0.000055	0.40	40.13	22.15	0.05
trib	174	Q500	20.00	2006.80	2010.11	2007.64	2010.11	0.000073	0.47	42.73	22.84	0.06
trib	275	Q10	10.00	2007.00	2009.78	2007.58	2009.78	0.000042	0.32	31.43	19.65	0.04
trib	275	Q50	14.00	2007.00	2009.94	2007.69	2009.94	0.000062	0.40	34.74	20.64	0.05
trib	275	Q100	16.00	2007.00	2010.00	2007.74	2010.00	0.000074	0.45	35.95	20.98	0.06
trib	275	Q500	20.00	2007.00	2010.12	2007.85	2010.12	0.000097	0.52	38.45	21.69	0.07
trib	374	Q10	10.00	2007.90	2009.78	2008.48	2009.79	0.000244	0.62	16.25	14.28	0.10
trib	374	Q50	14.00	2007.90	2009.95	2008.59	2009.96	0.000328	0.75	18.71	15.28	0.12
trib	374	Q100	16.00	2007.90	2010.01	2008.64	2010.02	0.000376	0.81	19.63	15.64	0.13
trib	374	Q500	20.00	2007.90	2010.13	2008.75	2010.14	0.000458	0.93	21.55	16.36	0.14
trib	474	Q10	10.00	2008.30	2009.81	2008.87	2009.83	0.000633	0.88	11.41	12.08	0.16
trib	474	Q50	14.00	2008.30	2009.99	2008.99	2010.01	0.000768	1.03	13.63	13.14	0.18
trib	474	Q100	16.00	2008.30	2010.06	2009.05	2010.07	0.000850	1.10	14.50	13.53	0.19
trib	474	Q500	20.00	2008.30	2010.18	2009.14	2010.21	0.000970	1.23	16.30	14.30	0.20
trib	574	Q10	10.00	2008.00	2009.86	2008.57	2009.87	0.000257	0.63	15.94	14.15	0.10
trib	574	Q50	14.00	2008.00	2010.05	2008.70	2010.06	0.000328	0.75	18.70	15.28	0.12
trib	574	Q100	16.00	2008.00	2010.12	2008.74	2010.13	0.000367	0.81	19.81	15.71	0.13
trib	574	Q500	20.00	2008.00	2010.26	2008.84	2010.27	0.000430	0.91	22.07	16.55	0.14
trib	674	Q10	10.00	2008.60	2009.90	2009.17	2009.92	0.001223	1.12	8.95	10.79	0.22
trib	674	Q50	14.00	2008.60	2010.09	2009.29	2010.12	0.001312	1.25	11.18	11.96	0.23
trib	674	Q100	16.00	2008.60	2010.17	2009.35	2010.20	0.001381	1.32	12.11	12.42	0.24
trib	674	Q500	20.00	2008.60	2010.32	2009.44	2010.35	0.001460	1.43	14.00	13.30	0.25
trib	774	Q10	10.00	2009.90	2010.48	2010.48	2010.69	0.031381	3.64	2.74	6.48	0.99
trib	774	Q50	14.00	2009.90	2010.60	2010.60	2010.84	0.029768	3.93	3.56	7.19	0.98
trib	774	Q100	16.00	2009.90	2010.65	2010.65	2010.91	0.029462	4.06	3.94	7.50	0.99
trib	774	Q500	20.00	2009.90	2010.75	2010.75	2011.03	0.028659	4.28	4.68	8.07	0.99
trib	874	Q10	10.00	2010.80	2011.71	2011.38	2011.77	0.005292	1.91	5.22	8.47	0.43
trib	874	Q50	14.00	2010.80	2011.87	2011.50	2011.94	0.005478	2.12	6.60	9.39	0.45
trib	874	Q100	16.00	2010.80	2011.93	2011.55	2012.01	0.005543	2.21	7.25	9.80	0.45
trib	874	Q500	20.00	2010.80	2012.06	2011.64	2012.14	0.005634	2.36	8.49	10.53	0.46
trib	974	Q10	10.00	2011.00	2012.09	2011.58	2012.12	0.002541	1.46	6.83	9.54	0.30
trib	974	Q50	14.00	2011.00	2012.27	2011.68	2012.31	0.002664	1.63	8.60	10.59	0.32
trib	974	Q100	16.00	2011.00	2012.34	2011.75	2012.39	0.002716	1.70	9.43	11.05	0.32
trib	974	Q500	20.00	2011.00	2012.48	2011.84	2012.53	0.002804	1.82	10.99	11.87	0.33
trib	1073	Q10	10.00	2012.60	2013.17	2013.17	2013.39	0.032783	3.70	2.70	6.44	1.01
trib	1073	Q50	14.00	2012.60	2013.29	2013.29	2013.54	0.030742	3.98	3.52	7.16	1.00
trib	1073	Q100	16.00	2012.60	2013.35	2013.35	2013.61	0.030075	4.09	3.91	7.48	1.00
trib	1073	Q500	20.00	2012.60	2013.44	2013.44	2013.73	0.029850	4.34	4.61	8.02	1.01
trib	1174	Q10	10.00	2013.90	2014.73	2014.48	2014.81	0.007662	2.19	4.57	7.99	0.51
trib	1174	Q50	14.00	2013.90	2014.87	2014.59	2014.97	0.007922	2.43	5.76	8.84	0.53
trib	1174	Q100	16.00	2013.90	2014.94	2014.64	2015.04	0.008038	2.53	6.32	9.21	0.54
trib	1174	Q500	20.00	2013.90	2015.05	2014.74	2015.16	0.008129	2.70	7.42	9.90	0.55
trib	1274	Q10	10.00	2015.70	2016.28	2016.28	2016.49	0.032229	3.68	2.72	6.45	1.00
trib	1274	Q50	14.00	2015.70	2016.39	2016.39	2016.64	0.030806	3.98	3.52	7.16	1.00
trib	1274	Q100	16.00	2015.70	2016.45	2016.45	2016.71	0.030017	4.09	3.91	7.48	1.00

HEC-RAS Plan: PCM   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	1274	Q500	20.00	2015.70	2016.54	2016.54	2016.83	0.029315	4.31	4.64	8.04	1.00
trib	1324	Q10	10.00	2016.70	2017.46	2017.40	2017.76	0.019970	4.38	2.28	7.57	0.88
trib	1324	Q50	14.00	2016.70	2017.59	2017.57	2018.02	0.022965	5.22	2.68	8.36	0.97
trib	1324	Q100	16.00	2016.70	2017.66	2017.66	2018.14	0.023540	5.55	2.88	8.77	1.00
trib	1324	Q500	20.00	2016.70	2017.80	2017.80	2018.37	0.023469	6.06	3.30	9.60	1.02
trib	1450		Culvert									
trib	2080	Q10	10.00	2018.73	2020.20	2019.81	2020.30	0.009243	2.60	3.85	8.74	0.47
trib	2080	Q50	14.00	2018.73	2020.49	2019.96	2020.61	0.007544	2.79	5.01	12.91	0.44
trib	2080	Q100	16.00	2018.73	2020.62	2020.02	2020.75	0.007078	2.89	5.53	14.96	0.43
trib	2080	Q500	20.00	2018.73	2020.86	2020.15	2021.01	0.006428	3.07	6.51	18.48	0.42
trib	2100	Q10	12.00	2018.27	2020.39	2019.40	2020.41	0.002011	1.14	10.51	12.14	0.22
trib	2100	Q50	24.00	2018.27	2020.70	2019.86	2020.75	0.003356	1.64	14.64	14.54	0.29
trib	2100	Q100	30.00	2018.27	2020.83	2020.00	2020.89	0.003549	1.81	16.60	15.33	0.30
trib	2100	Q500	46.00	2018.27	2021.08	2020.26	2021.16	0.004396	2.26	20.56	16.80	0.34
trib	2110	Q10	12.00	2018.27	2020.42	2019.40	2020.44	0.001863	1.11	10.82	12.34	0.21
trib	2110	Q50	24.00	2018.27	2020.75	2019.87	2020.78	0.002944	1.57	15.27	14.80	0.27
trib	2110	Q100	30.00	2018.27	2020.88	2020.00	2020.93	0.003124	1.74	17.31	15.60	0.28
trib	2110	Q500	46.00	2018.27	2021.14	2020.26	2021.21	0.003831	2.16	21.55	17.15	0.32
trib	2120	Q10	12.00	2018.27	2020.44	2019.40	2020.46	0.001754	1.08	11.07	12.49	0.20
trib	2120	Q50	24.00	2018.27	2020.78	2019.87	2020.82	0.002669	1.52	15.76	15.00	0.26
trib	2120	Q100	30.00	2018.27	2020.92	2020.00	2020.96	0.002843	1.69	17.86	15.81	0.27
trib	2120	Q500	46.00	2018.27	2021.18	2020.26	2021.25	0.003464	2.09	22.31	17.41	0.31
trib	2651	Q10	12.00	2021.38	2022.47	2022.22	2022.61	0.016627	2.98	4.02	5.20	0.60
trib	2651	Q50	24.00	2021.38	2023.15	2022.58	2023.29	0.009808	3.01	7.98	6.47	0.48
trib	2651	Q100	30.00	2021.38	2023.39	2022.73	2023.54	0.009826	3.11	9.65	7.49	0.48
trib	2651	Q500	46.00	2021.38	2023.89	2023.07	2024.06	0.008818	3.30	14.04	10.00	0.47
trib	3126	Q10	12.00	2023.82	2025.46	2024.69	2025.49	0.003093	1.53	7.86	7.79	0.27
trib	3126	Q50	24.00	2023.82	2025.96	2025.03	2026.02	0.003743	1.97	12.19	9.47	0.31
trib	3126	Q100	30.00	2023.82	2026.19	2025.18	2026.25	0.003699	2.08	14.44	10.23	0.31
trib	3126	Q500	46.00	2023.82	2026.65	2025.48	2026.74	0.003898	2.35	19.61	12.06	0.32
trib	3617	Q10	12.00	2029.08	2030.11	2030.11	2030.42	0.049822	4.51	2.66	4.15	0.99
trib	3617	Q50	24.00	2029.08	2030.51	2030.51	2030.93	0.045914	5.20	4.62	5.43	0.99
trib	3617	Q100	30.00	2029.08	2030.67	2030.67	2031.13	0.044711	5.44	5.52	5.92	0.99
trib	3617	Q500	46.00	2029.08	2031.02	2031.02	2031.57	0.042644	5.94	7.75	7.00	0.99
trib	4127	Q10	12.00	2032.61	2034.24	2033.46	2034.28	0.002893	1.55	7.75	7.24	0.26
trib	4127	Q50	24.00	2032.61	2034.85	2033.81	2034.91	0.003056	1.91	12.55	8.66	0.28
trib	4127	Q100	30.00	2032.61	2035.09	2033.95	2035.15	0.003115	2.04	14.68	9.22	0.29
trib	4127	Q500	46.00	2032.61	2035.61	2034.26	2035.69	0.003256	2.32	19.79	10.44	0.30
trib	4623	Q10	12.00	2035.96	2036.97	2036.69	2037.08	0.013584	2.65	4.52	6.04	0.54
trib	4623	Q50	24.00	2035.96	2037.48	2037.01	2037.62	0.011042	2.99	8.02	7.54	0.51
trib	4623	Q100	30.00	2035.96	2037.69	2037.15	2037.84	0.010391	3.11	9.65	8.14	0.50
trib	4623	Q500	46.00	2035.96	2038.17	2037.47	2038.34	0.009167	3.33	13.83	9.51	0.49
trib	4665	Q10	12.00	2036.85	2037.96	2037.96	2038.40	0.044689	5.35	2.24	2.87	1.00
trib	4665	Q50	24.00	2036.85	2038.47	2038.47	2039.19	0.039641	6.81	3.52	3.14	1.01
trib	4665	Q100	30.00	2036.85	2038.70	2038.70	2039.53	0.037071	7.30	4.11	3.38	1.00
trib	4665	Q500	46.00	2036.85	2039.25	2039.25	2040.35	0.033376	8.39	5.48	4.22	1.00
trib	4685		Culvert									
trib	4704	Q10	12.00	2037.52	2039.43	2038.69	2039.46	0.002145	1.38	9.18	34.56	0.23
trib	4704	Q50	24.00	2037.52	2040.38	2039.01	2040.40	0.000850	1.31	19.32	102.88	0.16
trib	4704	Q100	30.00	2037.52	2041.00	2039.13	2041.03	0.000501	1.20	26.03	291.32	0.13
trib	4704	Q500	46.00	2037.52	2041.27	2039.39	2041.27	0.000031	0.32	282.27	344.58	0.03
trib	4750	Q10	11.00	2038.64	2039.58	2039.24	2039.63	0.007883	1.81	6.09	11.34	0.42
trib	4750	Q50	22.00	2038.64	2040.41	2039.51	2040.41	0.000085	0.31	133.48	357.36	0.05
trib	4750	Q100	28.00	2038.64	2041.03	2039.62	2041.03	0.000007	0.12	368.77	520.83	0.01
trib	4750	Q500	45.00	2038.64	2041.27	2039.96	2041.27	0.000008	0.14	466.80	590.32	0.02
trib	5165	Q10	11.00	2042.61	2043.28	2043.12	2043.32	0.010179	1.70	7.59	156.47	0.46
trib	5165	Q50	22.00	2042.61	2043.32	2043.32	2043.45	0.029050	3.03	9.04	171.87	0.78
trib	5165	Q100	28.00	2042.61	2043.40	2043.40	2043.50	0.021265	2.88	14.01	232.95	0.69
trib	5165	Q500	45.00	2042.61	2043.49	2043.49	2043.59	0.019619	3.08	22.51	275.32	0.68
trib	5676	Q10	11.00	2046.43	2047.51		2047.55	0.006827	1.64	6.71	11.93	0.39
trib	5676	Q50	22.00	2046.43	2047.98		2048.02	0.004265	1.60	13.77	17.89	0.32

HEC-RAS Plan: PCM   River: Tributary   Reach: trib (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
trib	5676	Q100	28.00	2046.43	2048.08		2048.13	0.004979	1.79	15.61	19.14	0.35
trib	5676	Q500	45.00	2046.43	2048.37		2048.44	0.005525	2.09	21.54	22.70	0.38
trib	6117	Q10	11.00	2050.75	2051.68		2051.79	0.014346	2.65	4.14	5.91	0.56
trib	6117	Q50	22.00	2050.75	2051.83	2051.73	2052.13	0.031974	4.34	5.07	6.25	0.85
trib	6117	Q100	28.00	2050.75	2052.07		2052.35	0.024147	4.22	6.64	6.77	0.75
trib	6117	Q500	45.00	2050.75	2052.49		2052.83	0.021971	4.67	9.63	7.67	0.73
trib	6154	Q10	11.00	2051.54	2052.27	2052.10	2052.32	0.013435	1.90	5.78	13.92	0.52
trib	6154	Q50	22.00	2051.54	2052.63	2052.28	2052.69	0.006997	1.94	11.36	16.54	0.41
trib	6154	Q100	28.00	2051.54	2052.76	2052.36	2052.83	0.006400	2.06	13.56	16.98	0.40
trib	6154	Q500	45.00	2051.54	2053.16	2052.55	2053.23	0.004689	2.24	20.12	18.24	0.36
trib	6200		Culvert									
trib	6239	Q10	11.00	2052.53	2053.54	2052.99	2053.55	0.001418	0.90	12.24	16.61	0.18
trib	6239	Q50	22.00	2052.53	2053.93	2053.16	2053.95	0.001478	1.16	19.00	17.98	0.20
trib	6239	Q100	28.00	2052.53	2054.11	2053.23	2054.13	0.001494	1.26	22.21	18.59	0.20
trib	6239	Q500	45.00	2052.53	2054.53	2053.41	2054.57	0.001512	1.48	30.45	20.08	0.21
trib	6274	Q10	11.00	2054.55	2055.35	2055.35	2055.52	0.056217	3.31	3.32	9.87	1.01
trib	6274	Q50	22.00	2054.55	2055.56	2055.56	2055.82	0.047771	4.06	5.42	10.35	0.99
trib	6274	Q100	28.00	2054.55	2055.65	2055.65	2055.95	0.047024	4.41	6.35	10.56	1.00
trib	6274	Q500	45.00	2054.55	2055.89	2055.89	2056.28	0.043042	5.06	8.90	11.10	1.00
trib	6553	Q10	11.00	2063.24	2064.09	2063.94	2064.19	0.019730	2.62	4.19	8.16	0.64
trib	6553	Q50	22.00	2063.24	2064.36	2064.18	2064.53	0.022013	3.31	6.64	9.84	0.71
trib	6553	Q100	28.00	2063.24	2064.48	2064.31	2064.68	0.022330	3.55	7.88	10.59	0.73
trib	6553	Q500	45.00	2063.24	2064.75	2064.57	2065.01	0.023749	4.13	10.90	12.22	0.77
trib	7086	Q10	7.00	2082.28	2083.02	2083.02	2083.29	0.040330	4.17	1.68	3.16	1.01
trib	7086	Q50	14.00	2082.28	2083.35	2083.35	2083.74	0.038233	5.05	2.77	3.52	1.00
trib	7086	Q100	18.00	2082.28	2083.50	2083.50	2083.96	0.037725	5.40	3.33	3.69	1.00
trib	7086	Q500	28.00	2082.28	2083.90	2083.90	2084.38	0.035210	5.60	5.00	5.17	1.00
trib	7121	Q10	7.00	2083.49	2084.19	2084.10	2084.38	0.024420	3.57	1.96	3.10	0.79
trib	7121	Q50	14.00	2083.49	2084.50	2084.42	2084.85	0.026475	4.77	2.93	3.15	0.86
trib	7121	Q100	18.00	2083.49	2084.63	2084.58	2085.08	0.028160	5.38	3.35	3.17	0.91
trib	7121	Q500	28.00	2083.49	2084.93	2084.92	2085.60	0.030058	6.54	4.28	3.21	0.98
trib	7130		Culvert									
trib	7143	Q10	7.00	2084.11	2085.20	2084.68	2085.26	0.004776	1.99	3.51	3.52	0.35
trib	7143	Q50	14.00	2084.11	2085.74	2084.98	2085.84	0.005635	2.56	5.48	3.69	0.37
trib	7143	Q100	18.00	2084.11	2086.04	2085.13	2086.16	0.005671	2.73	6.60	3.79	0.36
trib	7143	Q500	28.00	2084.11	2087.67	2085.47	2087.74	0.002300	2.12	13.20	4.31	0.21
trib	7169	Q10	7.00	2089.14	2089.93	2089.93	2090.25	0.043149	4.56	1.54	2.43	1.01
trib	7169	Q50	14.00	2089.14	2090.31	2090.31	2090.80	0.044959	5.60	2.50	2.57	1.00
trib	7169	Q100	18.00	2089.14	2090.51	2090.51	2091.06	0.045443	5.99	3.00	2.65	0.99
trib	7169	Q500	28.00	2089.14	2090.90	2090.90	2091.63	0.049847	6.90	4.06	2.80	1.01
trib	7175		Culvert									
trib	7186	Q10	7.00	2089.36	2090.59	2090.11	2090.69	0.008472	2.52	2.78	2.60	0.43
trib	7186	Q50	14.00	2089.36	2091.16	2090.49	2091.33	0.010658	3.24	4.32	10.51	0.46
trib	7186	Q100	18.00	2089.36	2091.45	2090.65	2091.64	0.011308	3.51	5.13	23.40	0.46
trib	7186	Q500	28.00	2089.36	2092.18	2091.08	2092.41	0.011178	3.83	7.32	80.36	0.44
trib	7220	Q10	7.00	2091.27	2092.00	2092.00	2092.21	0.033770	3.68	1.90	4.41	0.99
trib	7220	Q50	14.00	2091.27	2092.26	2092.26	2092.56	0.031983	4.39	3.19	5.38	1.01
trib	7220	Q100	18.00	2091.27	2092.39	2092.39	2092.72	0.029090	4.57	3.96	7.10	0.98
trib	7220	Q500	28.00	2091.27	2092.67	2092.67	2092.98	0.019326	4.62	6.75	109.88	0.84

Proposed Conditions Model - Unnamed Tributary, Floodway

HEC-RAS Plan: PCM FW River: Tributary Reach: trib

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	-36	Q100 base	1991.10		1991.27	8.78	0.03	15.97	0.00		22.70	30.95	
trib	-36	Q100 floodway	1992.10	1.00	1992.12	8.25		16.00		22.70	22.70	30.95	30.95
trib	-20	Q100 base	1999.27		1999.52	8.67	0.02	15.97	0.00		22.68	30.76	
trib	-20	Q100 floodway	1999.26	-0.01	1999.52	7.65		16.00		22.68	22.68	30.76	30.76
trib	0	Q100 base	2009.26		2009.42	21.69	2.35	11.89	1.76		26.57	30.87	
trib	0	Q100 floodway	2009.24	-0.02	2009.62	4.30		16.00		26.57	26.57	30.87	30.87
trib	75	Q100 base	2009.91		2009.97	10.25		16.00			20.00	42.80	
trib	75	Q100 floodway	2010.08	0.17	2010.12	11.25		16.00		20.00	20.00	42.80	42.80
trib	174	Q100 base	2009.99		2009.99	22.15		16.00			20.30	57.80	
trib	174	Q100 floodway	2010.13	0.14	2010.13	22.99		16.00		20.30	20.30	57.80	57.80
trib	275	Q100 base	2010.00		2010.00	20.98		16.00			20.30	58.10	
trib	275	Q100 floodway	2010.14	0.14	2010.14	21.82		16.00		20.30	20.30	58.10	58.10
trib	374	Q100 base	2010.01		2010.02	15.64		16.00			20.30	54.20	
trib	374	Q100 floodway	2010.14	0.14	2010.15	16.46		16.00		20.30	20.30	54.20	54.20
trib	474	Q100 base	2010.06		2010.07	13.53		16.00			19.10	50.90	
trib	474	Q100 floodway	2010.18	0.13	2010.20	14.28		16.00		19.10	19.10	50.90	50.90
trib	574	Q100 base	2010.12		2010.13	15.71		16.00			19.10	58.70	
trib	574	Q100 floodway	2010.23	0.11	2010.24	16.37		16.00		19.10	19.10	58.70	58.70
trib	674	Q100 base	2010.17		2010.20	12.42		16.00			19.40	52.70	
trib	674	Q100 floodway	2010.27	0.10	2010.29	13.02		16.00		19.40	19.40	52.70	52.70
trib	774	Q100 base	2010.65		2010.91	7.50		16.00			19.10	48.80	
trib	774	Q100 floodway	2010.65	0.00	2010.91	7.50		16.00		19.10	19.10	48.80	48.80
trib	874	Q100 base	2011.93		2012.01	9.80		16.00			20.00	45.20	
trib	874	Q100 floodway	2011.93	0.00	2012.01	9.80		16.00		20.00	20.00	45.20	45.20
trib	974	Q100 base	2012.34		2012.39	11.05		16.00			20.00	48.50	
trib	974	Q100 floodway	2012.34	0.00	2012.39	11.05		16.00		20.00	20.00	48.50	48.50
trib	1073	Q100 base	2013.35		2013.61	7.48		16.00			18.80	44.00	
trib	1073	Q100 floodway	2013.35	0.00	2013.61	7.48		16.00		18.80	18.80	44.00	44.00
trib	1174	Q100 base	2014.94		2015.04	9.21		16.00			20.00	47.60	
trib	1174	Q100 floodway	2014.94	0.00	2015.04	9.21		16.00		20.00	20.00	47.60	47.60
trib	1274	Q100 base	2016.45		2016.71	7.48		16.00			19.10	48.50	
trib	1274	Q100 floodway	2016.45	0.00	2016.71	7.48		16.00		19.10	19.10	48.50	48.50
trib	1324	Q100 base	2017.66		2018.14	3.00		16.00			20.00	45.80	
trib	1324	Q100 floodway	2017.66	0.00	2018.14	3.00		16.00		20.00	20.00	45.80	45.80
trib	1450		Culvert										
trib	2080	Q100 base	2020.62		2020.75	4.00		16.00			39.42	68.83	
trib	2080	Q100 floodway	2020.62	0.00	2020.75	4.00		16.00		46.05	39.42	68.83	60.92
trib	2100	Q100 base	2020.83		2020.89	15.33	0.01	29.99			44.23	60.09	
trib	2100	Q100 floodway	2020.84	0.00	2020.89	14.75		30.00		44.23	44.23	60.09	58.98
trib	2110	Q100 base	2020.88		2020.93	15.60	0.02	29.98			44.23	60.09	
trib	2110	Q100 floodway	2020.88	0.00	2020.93	14.82		30.00		44.23	44.23	60.09	59.05
trib	2120	Q100 base	2020.92		2020.96	15.81	0.03	29.97			44.23	60.09	
trib	2120	Q100 floodway	2020.92	0.00	2020.96	14.87		30.00		44.23	44.23	60.09	59.10
trib	2651	Q100 base	2023.39		2023.54	7.49		30.00			46.44	55.58	
trib	2651	Q100 floodway	2023.40	0.01	2023.55	7.50		30.00		46.68	46.44	55.58	54.18
trib	3126	Q100 base	2026.19		2026.25	10.23		30.00			72.83	95.75	
trib	3126	Q100 floodway	2026.19	0.00	2026.25	10.23		30.00		75.79	72.83	95.75	86.03
trib	3617	Q100 base	2030.67		2031.13	5.92		30.00			139.17	162.30	
trib	3617	Q100 floodway	2030.66	-0.01	2031.13	5.89		30.00		144.39	139.17	162.30	150.31
trib	4127	Q100 base	2035.09		2035.15	9.22		30.00			251.87	265.32	
trib	4127	Q100 floodway	2035.09	0.00	2035.16	9.22		30.00		253.91	251.87	265.32	263.13
trib	4623	Q100 base	2037.69		2037.84	8.14		30.00			314.09	329.75	
trib	4623	Q100 floodway	2037.69	0.00	2037.84	8.13		30.00		316.70	314.09	329.75	324.83
trib	4665	Q100 base	2038.70		2039.53	2.50		30.00			340.25	349.22	
trib	4665	Q100 floodway	2038.70	0.00	2039.53	2.50		30.00		344.05	340.25	349.22	347.43
trib	4685		Culvert										

HEC-RAS Plan: PCM FW River: Tributary Reach: trib (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
trib	4704	Q100 base	2041.00		2041.03	10.70	5.75	24.25			352.15	360.54	
trib	4704	Q100 floodway	2040.99	-0.01	2041.03	7.52		30.00		352.15	352.15	360.54	360.54
trib	4750	Q100 base	2041.03		2041.03	400.62	13.78	2.79	11.43		329.79	342.44	
trib	4750	Q100 floodway	2041.05	0.02	2041.07	12.65		28.00		329.79	329.79	342.44	342.44
trib	5165	Q100 base	2043.40		2043.50	77.29	5.63	21.68	0.69		212.11	225.92	
trib	5165	Q100 floodway	2043.35	-0.05	2043.61	13.81	0.00	28.00	0.00	212.11	212.11	225.92	225.92
trib	5676	Q100 base	2048.08		2048.13	19.14		28.00			183.69	226.54	
trib	5676	Q100 floodway	2048.17	0.09	2048.21	19.14		28.00		187.85	183.69	226.54	206.99
trib	6117	Q100 base	2052.07		2052.35	6.77		28.00			211.57	230.44	
trib	6117	Q100 floodway	2051.88	-0.20	2052.30	6.34		28.00		217.18	211.57	230.44	223.95
trib	6154	Q100 base	2052.76		2052.83	16.44		28.00			211.25	246.77	
trib	6154	Q100 floodway	2052.80	0.04	2052.86	16.44		28.00		219.96	211.25	246.77	236.94
trib	6200		Culvert										
trib	6239	Q100 base	2054.11		2054.13	18.59		28.00			221.30	259.22	
trib	6239	Q100 floodway	2054.11	0.00	2054.13	18.59		28.00		228.52	221.30	259.22	247.11
trib	6274	Q100 base	2055.65		2055.95	10.56		28.00			210.49	231.21	
trib	6274	Q100 floodway	2055.66	0.01	2055.95	10.56		28.00		216.47	210.49	231.21	227.03
trib	6553	Q100 base	2064.48		2064.68	10.59		28.00			197.65	240.39	
trib	6553	Q100 floodway	2064.48	-0.01	2064.67	10.55		28.00		208.19	197.65	240.39	218.78
trib	7086	Q100 base	2083.50		2083.96	3.69		18.00			150.93	158.25	
trib	7086	Q100 floodway	2083.50	0.00	2083.96	3.68		18.00		153.30	150.93	158.25	156.99
trib	7121	Q100 base	2084.63		2085.08	3.10		18.00			118.04	121.88	
trib	7121	Q100 floodway	2084.64	0.00	2085.08	3.10		18.00		118.45	118.04	121.88	121.62
trib	7130		Culvert										
trib	7143	Q100 base	2086.04		2086.16	3.79		18.00			111.14	115.72	
trib	7143	Q100 floodway	2086.04	0.00	2086.16	3.79		18.00		111.74	111.14	115.72	115.53
trib	7169	Q100 base	2090.51		2091.06	2.65		18.00			114.91	118.45	
trib	7169	Q100 floodway	2090.50	-0.01	2091.06	2.64		18.00		115.24	114.91	118.45	117.88
trib	7175		Culvert										
trib	7186	Q100 base	2091.45		2091.64	2.88		18.00			119.10	122.49	
trib	7186	Q100 floodway	2091.45	0.00	2091.64	2.88		18.00		119.03	119.10	122.49	122.26
trib	7220	Q100 base	2092.39		2092.72	7.10	0.01	17.99			130.02	136.02	
trib	7220	Q100 floodway	2092.37	-0.02	2092.72	5.77		18.00		130.02	130.02	136.02	135.83

Proposed Conditions Model - Unnamed Tributary without DS

HEC-RAS Plan: PCM wo ds l   River: Unnamed Trib   Reach: LOB Overflow   Profile: Q500

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
LOB Overflow	535	Q500	20.00	2004.70	2007.19	2005.11	2007.19	0.000044	0.20	98.05	92.00	0.03
LOB Overflow	817	Q500	20.00	2007.91	2008.40	2008.40	2008.47	0.061028	2.21	9.03	54.46	0.96
LOB Overflow	957	Q500	20.00	2004.90	2008.48	2005.36	2008.48	0.000000	0.03	784.89	363.39	0.00
LOB Overflow	1103	Q500	20.00	2006.99	2008.48	2007.31	2008.48	0.000015	0.10	191.77	218.70	0.02
LOB Overflow	1388	Q500	20.00	2006.87	2008.48	2007.09	2008.48	0.000002	0.04	475.73	394.11	0.01
LOB Overflow	1648	Q500	20.00	2005.94	2008.48	2006.24	2008.48	0.000001	0.04	530.10	319.80	0.00
LOB Overflow	1868	Q500	20.00	2008.36	2008.63	2008.63	2008.69	0.080917	1.87	10.69	111.47	1.02
LOB Overflow	2078	Q500	20.00	2006.90	2008.70	2007.41	2008.70	0.000011	0.09	212.51	221.24	0.02
LOB Overflow	2285	Q500	20.00	2007.53	2008.70	2007.87	2008.70	0.000100	0.21	96.43	165.53	0.05
LOB Overflow	2417	Q500	20.00	2010.99	2011.20	2011.20	2011.24	0.059019	1.67	11.95	106.99	0.88
LOB Overflow	2683	Q500	20.00	2009.87	2011.27	2010.23	2011.27	0.000022	0.11	174.36	231.84	0.02
LOB Overflow	2975	Q500	20.00	2011.13	2011.53	2011.53	2011.59	0.060432	1.95	10.24	73.95	0.93
LOB Overflow	3407	Q500	20.00	2013.75	2014.36	2014.14	2014.37	0.002293	0.53	37.80	166.63	0.20
LOB Overflow	3786	Q500	20.00	2016.54	2016.79	2016.78	2016.84	0.064484	1.91	10.48	82.31	0.94

Appendix G. Effective Flood Insurance Rate Map (FIRM), Flood Profile, and Floodway Data Table

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
CHESTER CREEK-GOLF COURSE OVERFLOW								
A[2]	0	_	_	_	2,008.10	_	_	_
B[2]	773	_	_	_	2,008.10	_	_	_
C[2]	961	_	_	_	2,008.50	_	_	_
D	1,145	35	41	1.6	2,008.90	2,008.90	2,009.60	0.7
E	1,425	30	50	1.3	2,009.10	2,009.10	2,010.00	0.9
F	1,600	20	28	2.3	2,009.30	2,009.30	2,010.30	1.0
G	1,800	45	86	0.7	2,013.30	2,013.30	2,014.10	0.8
H	2,123	43	81	0.8	2,013.30	2,013.30	2,014.20	0.9
I	2,704	40	67	1.0	2,013.50	2,013.50	2,014.50	1.0
J	3,144	14	12	5.3	2,014.80	2,014.80	2,015.30	0.5
K	3,287	22	33	1.9	2,015.40	2,015.40	2,016.20	0.8
L	3,387	20	25	2.6	2,015.70	2,015.70	2,016.60	0.9
M	3,721	20	23	2.8	2,018.10	2,018.10	2,019.00	0.9
N	4,318	20	24	2.7	2,023.00	2,023.00	2,023.80	0.8

[1] Feet above Golf Course Storage Area

[2] - Floodway not computed

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

CHESTER CREEK - GOLF COURSE OVERFLOW

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
UNNAMED TRIBUTARY TO CHESTER CREEK								
AA	6,570	14	7	4.1	2,043.40	2,043.40	2,043.40	0.0
AB	7,082	19	17	1.6	2,048.10	2,048.10	2,048.20	0.1
AC	7,522	7	5	5.2	2,052.10	2,052.10	2,052.10	0.0
AD	7,645	19	22	1.3	2,054.10	2,054.10	2,054.10	0.0
AE	7,679	11	6	4.4	2,055.70	2,055.70	2,055.70	0.0
AF	7,958	11	8	3.6	2,064.50	2,064.50	2,064.50	0.0
AG	8,491	4	3	5.4	2,083.50	2,083.50	2,083.50	0.0
AH	8,548	4	7	2.7	2,086.00	2,086.00	2,086.00	0.0
AI	8,592	3	5	3.5	2,091.50	2,091.50	2,091.50	0.0
AJ	8,625	6	4	4.7	2,092.40	2,092.40	2,092.40	0.0

---

[1] Feet above confleunce with Chester creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED TRIBUTARY TO CHESTER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LEFT BANK OVER FLOW CHANNEL								
A[2]	0	–	–	–	2,008.10	–	–	–
B[2]	283	–	–	–	2,008.50	–	–	–
C[2]	422	–	–	–	2,008.60	–	–	–
D[2]	836	–	–	–	2,008.60	–	–	–
E[2]	1,244	–	–	–	2,008.60	–	–	–
F	1,400	15	8	2.0	2,008.60	2,008.60	2,009.10	0.5
G	1,487	15	23	0.7	2,008.70	2,008.70	2,009.20	0.5
H	1,623	15	15	1.1	2,008.70	2,008.70	2,009.30	0.6
I	1,649	15	14	1.2	2,008.70	2,008.70	2,009.30	0.6
J	1,755	15	15	1.1	2,008.70	2,008.70	2,009.50	0.8
K	1,856	15	16	1.0	2,008.70	2,008.70	2,009.60	0.9
L	1,985	15	5	3.3	2,011.20	2,011.20	2,011.50	0.3
M	2,240	15	28	0.6	2,011.30	2,011.30	2,011.80	0.5
N	2,873	15	5	3.3	2,013.80	2,013.80	2,014.20	0.4
O	2,936	15	12	1.3	2,014.10	2,014.10	2,014.60	0.5
P	2,966	15	11	1.4	2,014.30	2,014.30	2,014.70	0.4

[1] Feet above storage area #1

[2] Cross section A through E are common for both Unnamed Tributary to Chester Creek and West Bank Overflow. See Unnamed Tribuatary to Chester Creek for Floodway Data

TABLE 6

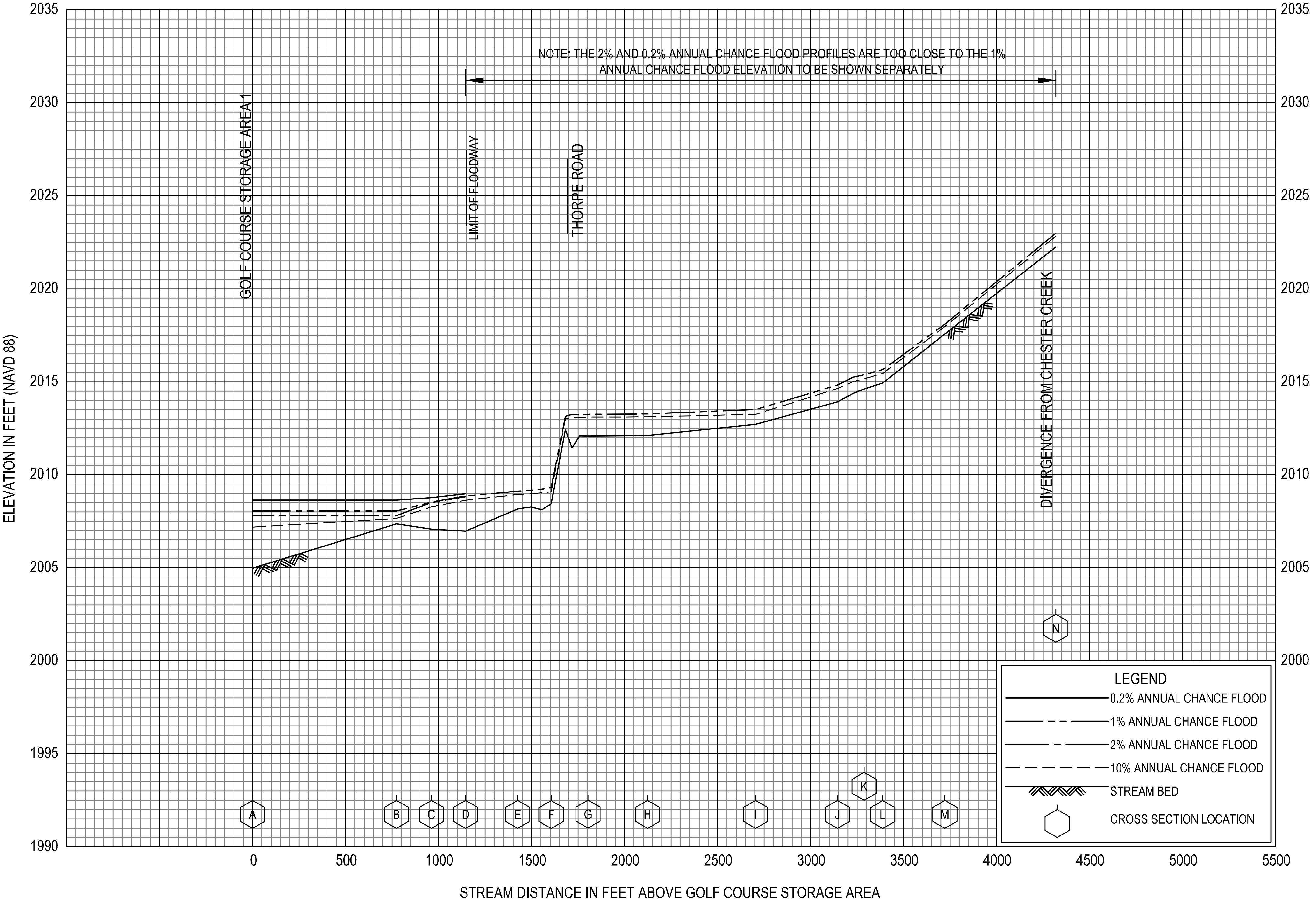
FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED TRIBUTARY TO CHESTR CREEK - LEFT BANK OVERFLOW CHANNEL



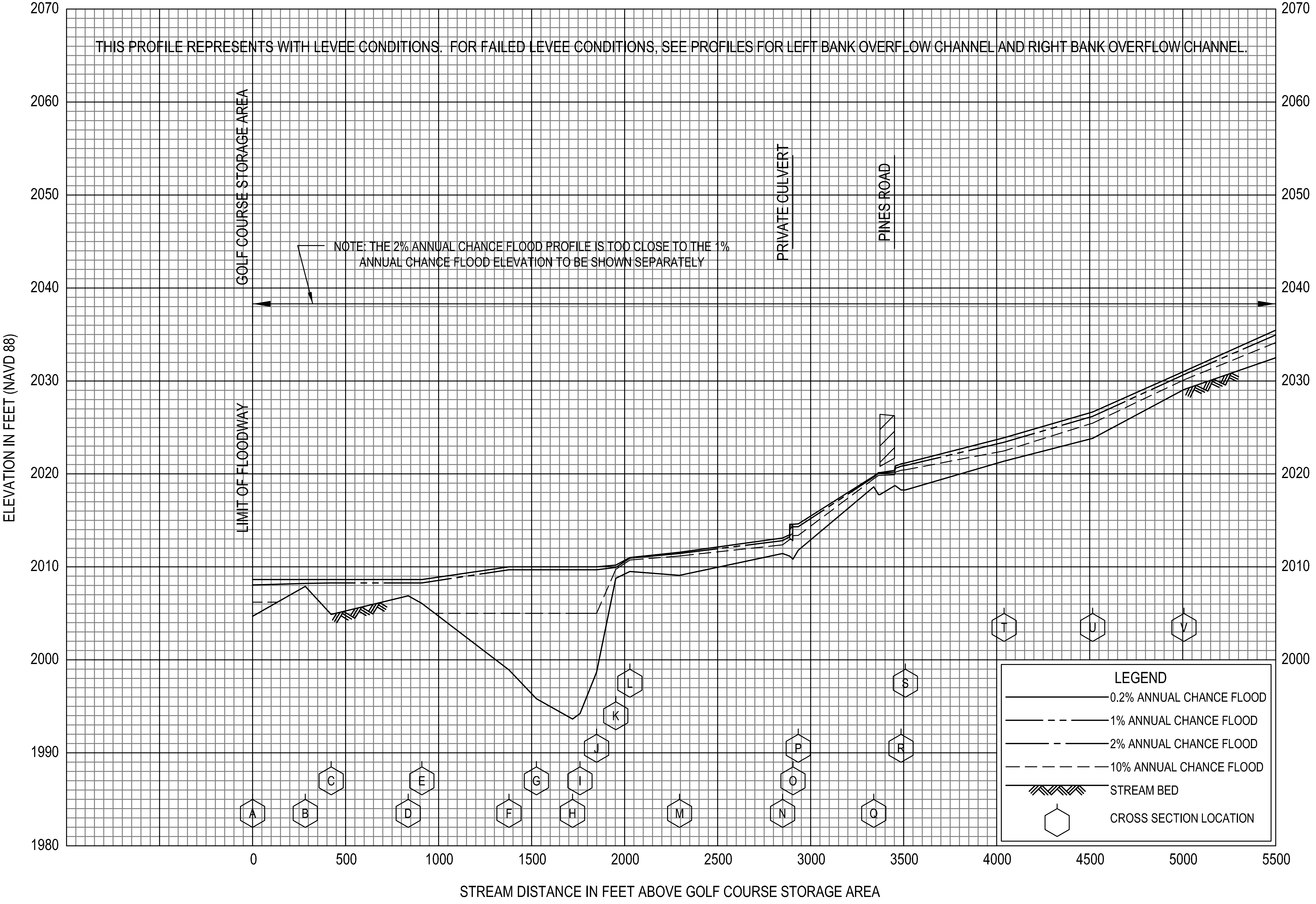
FLOOD PROFILES

CHESTER CREEK - GOLF COURSE OVERFLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS



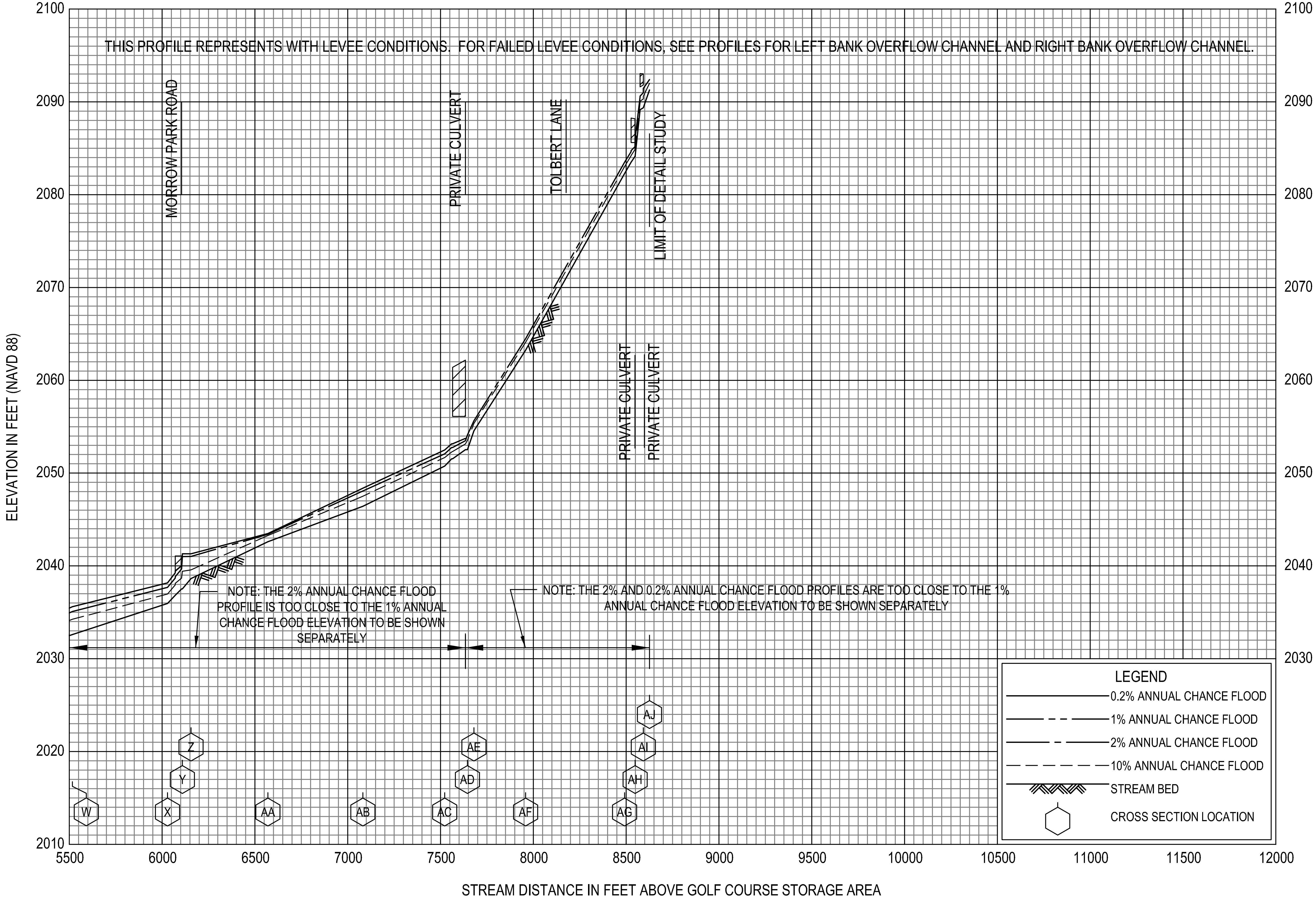
FLOOD PROFILES

UNNAMED TRIBUTARY TO CHESTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS



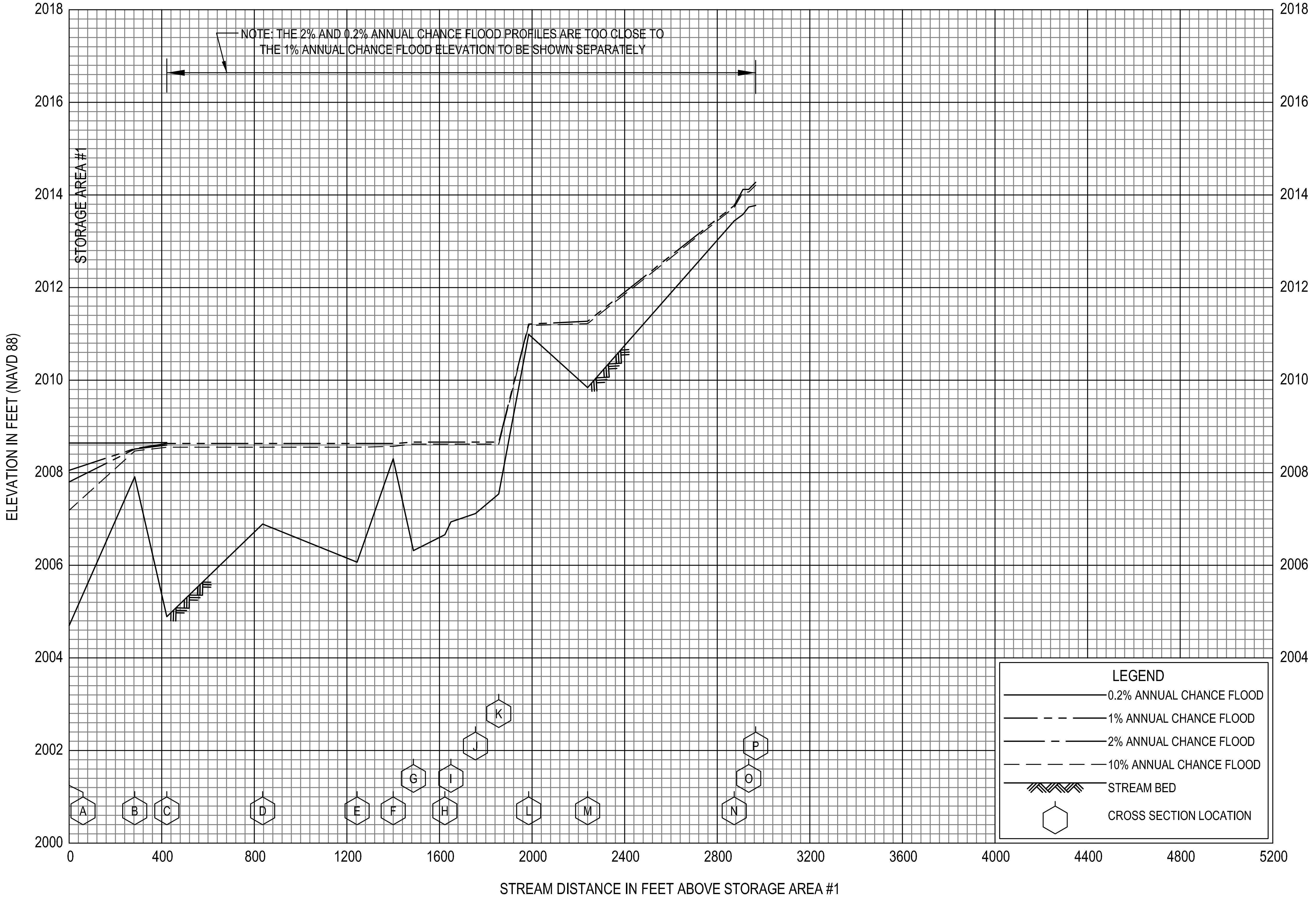
FLOOD PROFILES

UNNAMED TRIBUTARY TO CHESTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS



FLOOD PROFILES

UNNAMED TRIBUTARY TO CHESTER CREEK (LEFT BANK OVERFLOW CHANNEL)

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA
AND INCORPORATED AREAS

NOTES TO USERS

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The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC–3, #9202
1315 East–West Highway
Silver Spring, MD 20910–3282

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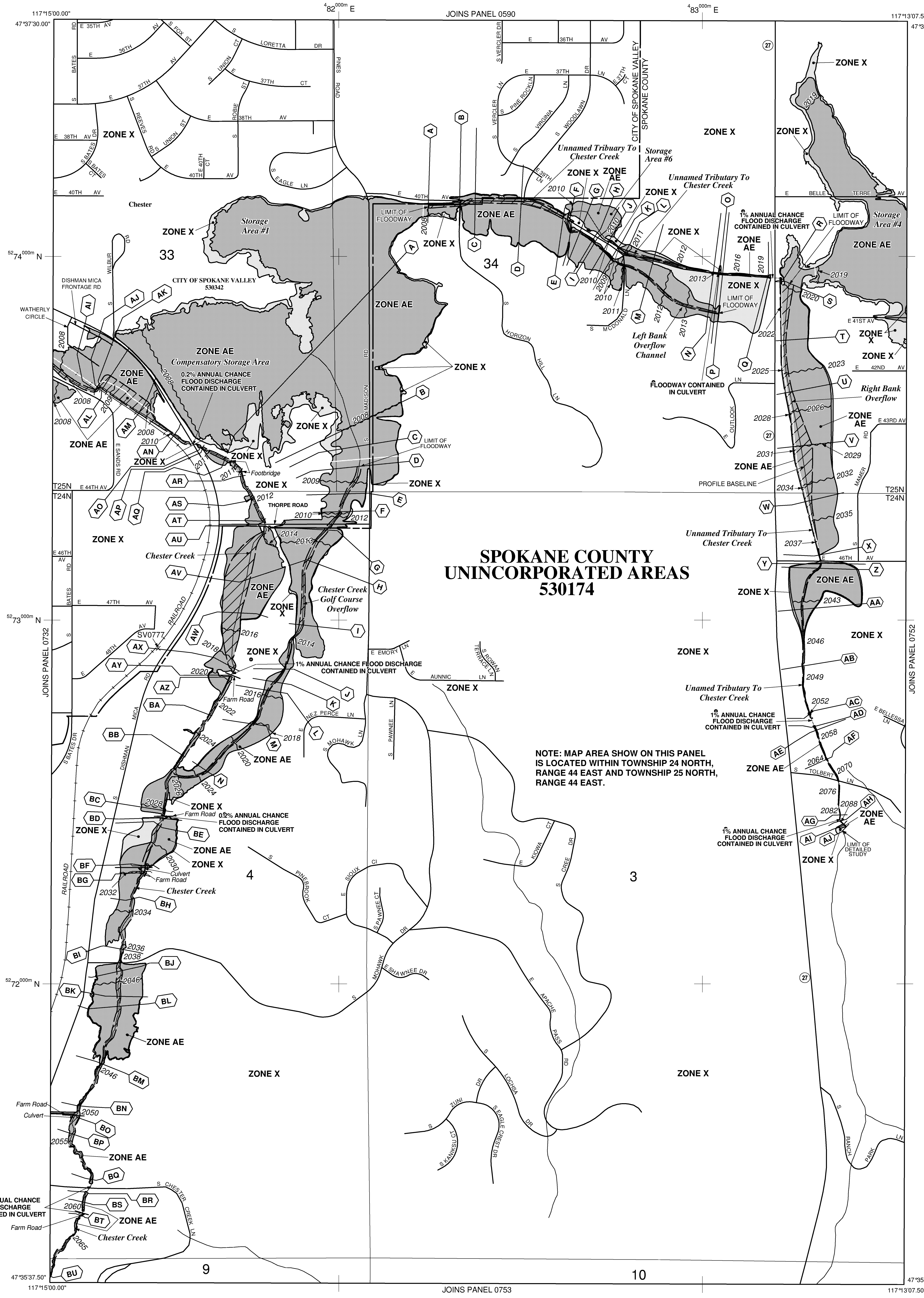

LEGEND

▨ SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———————	Floodplain boundary
—— —— ——	Floodway boundary
– ——— ——— –	Zone D boundary
●●●●●●●●●●●●	CBRS and OPA boundary
▭ ←	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ 513 ~~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

⟨A⟩——⟨A⟩	Cross section line
(23)- - - - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 M	5000-foot grid ticks: Washington State Plane coordinate system, north zone (FIPSZONE 4601), Lambert Conformal Conic
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 6, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1–800–638–6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0751D

FIRM

FLOOD INSURANCE RATE MAP

SPOKANE COUNTY,
WASHINGTON
AND INCORPORATED AREAS

PANEL 751 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SPOKANE COUNTY	530174	0751	D
SPOKANE VALLEY, CITY OF	530342	0751	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53063C0751D

EFFECTIVE DATE
JULY 6, 2010

Federal Emergency Management Agency

Appendix H. Revised Floodplain Boundaries Flood Profile, and Floodway Data Table

Legend

- BFE
- Cross Sections

Flood Hazard Line

- 100 Year
- 500 Year
- FW
- Zone A
- Zone Break
- Infiltration Facility

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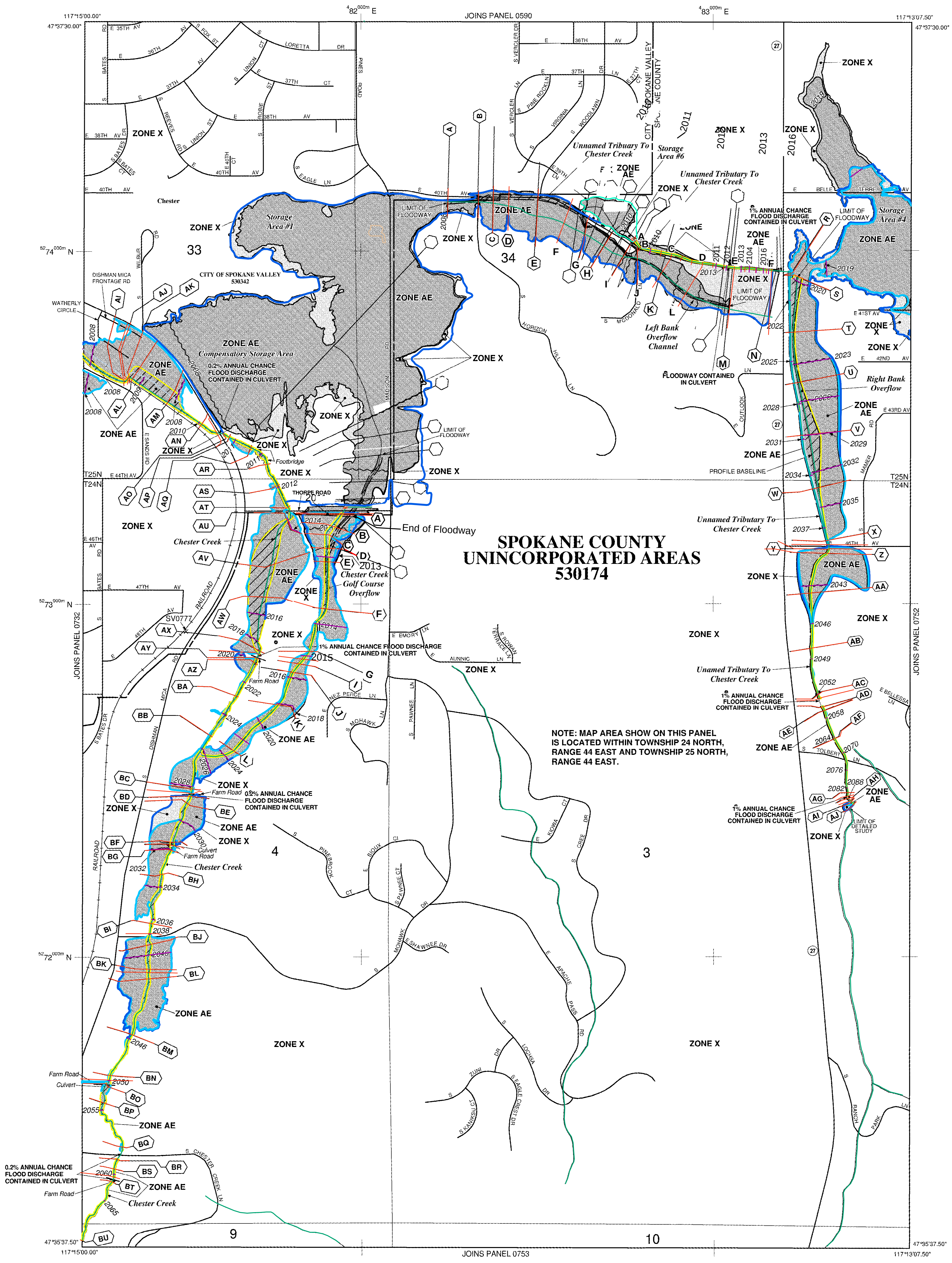

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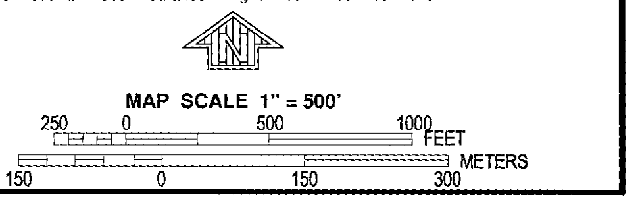
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
July 6, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0751D

FIRM
FLOOD INSURANCE RATE MAP
SPOKANE COUNTY,
WASHINGTON
AND INCORPORATED AREAS

PANEL 751 OF 1150
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SPOKANE COUNTY	530174	0751	D
SPOKANE VALLEY, CITY OF	530342	0751	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

**MAP NUMBER
53063C0751D**

**EFFECTIVE DATE
JULY 6, 2010**

Federal Emergency Management Agency

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
CHESTER CREEK-GOLF COURSE OVERFLOW								
A	23	29	93	0.7	2010.8	2010.8	2010.8	0.0
B	178	44	57	1.1	2012.6	2012.6	2013.1	0.5
C	276	44	55	1.2	2012.7	2012.7	2013.2	0.5
D	402	43	47	1.4	2012.8	2012.8	2013.4	0.6
E	528	43	54	1.2	2013.1	2013.1	2013.6	0.5
F	964	43	56	1.1	2013.6	2013.6	2014.1	0.5
G	1404	14	12	5.3	2014.6	2014.6	2015.3	0.7
H	1489	27	42	1.5	2015.3	2015.3	2016.1	0.8
I	1547	22	33	1.9	2015.4	2015.4	2016.2	0.8
J	1647	20	25	2.6	2015.7	2015.7	2016.6	0.9
K	1981	20	23	2.8	2018.1	2018.1	2019.0	0.9
L	2578	20	24	2.7	2023.0	2023.0	2023.8	0.8

[1] Feet above Thorpe Road

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA
AND INCORPORATED AREAS

FLOODWAY DATA

CHESTER CREEK - GOLF COURSE OVERFLOW

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
UNNAMED TRIBUTARY TO CHESTER CREEK								
A	0	4	3	5.0	2009.3	2009.3	2009.3	0.0
B	75	11	10	1.6	2009.9	2009.9	2010.1	0.2
C	374	16	22	0.7	2010.0	2010.0	2010.1	0.1
D	674	13	13	1.2	2010.2	2010.2	2010.3	0.1
E	974	11	9	1.7	2012.3	2012.3	2012.3	0.0
F	1324	3	6	5.6	2017.7	2017.7	2017.7	0.0

[1] Feet above entrance to Storage Area 6/Infitration Facility

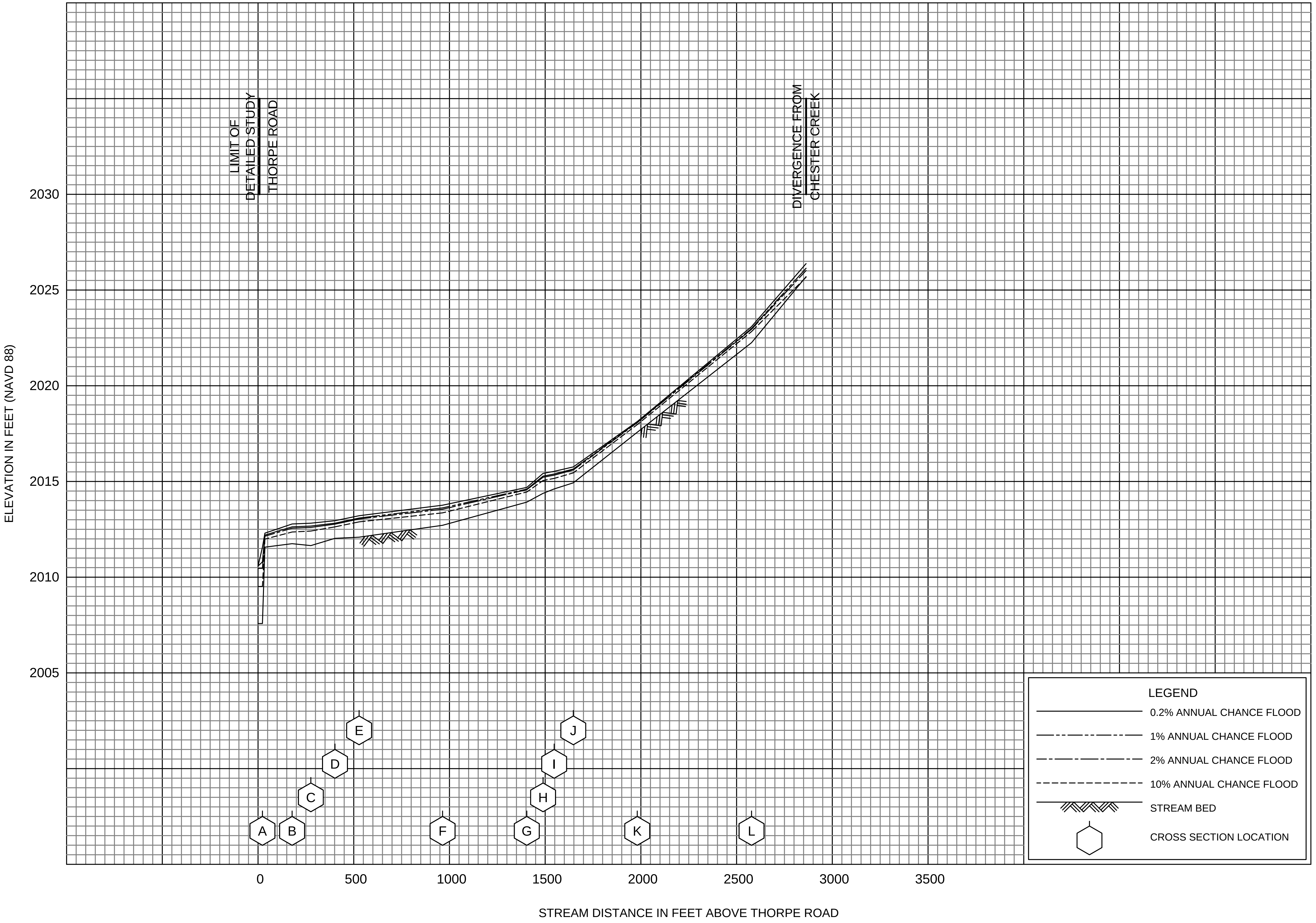
TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA
AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED TRIBUTARY TO CHESTER CREEK



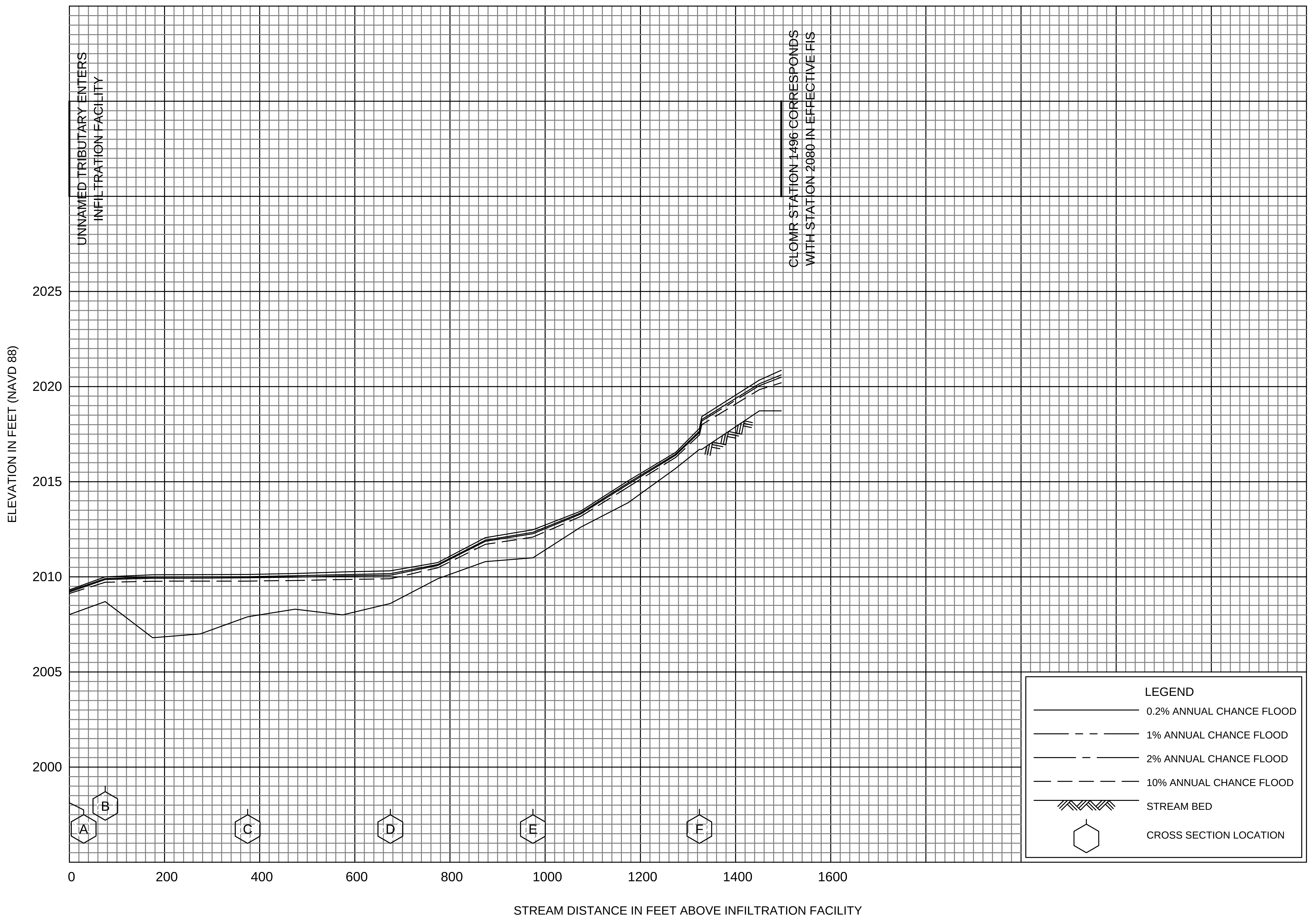
FLOOD PROFILES

CHESTER CREEK - GOLF COURSE OVERFLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS



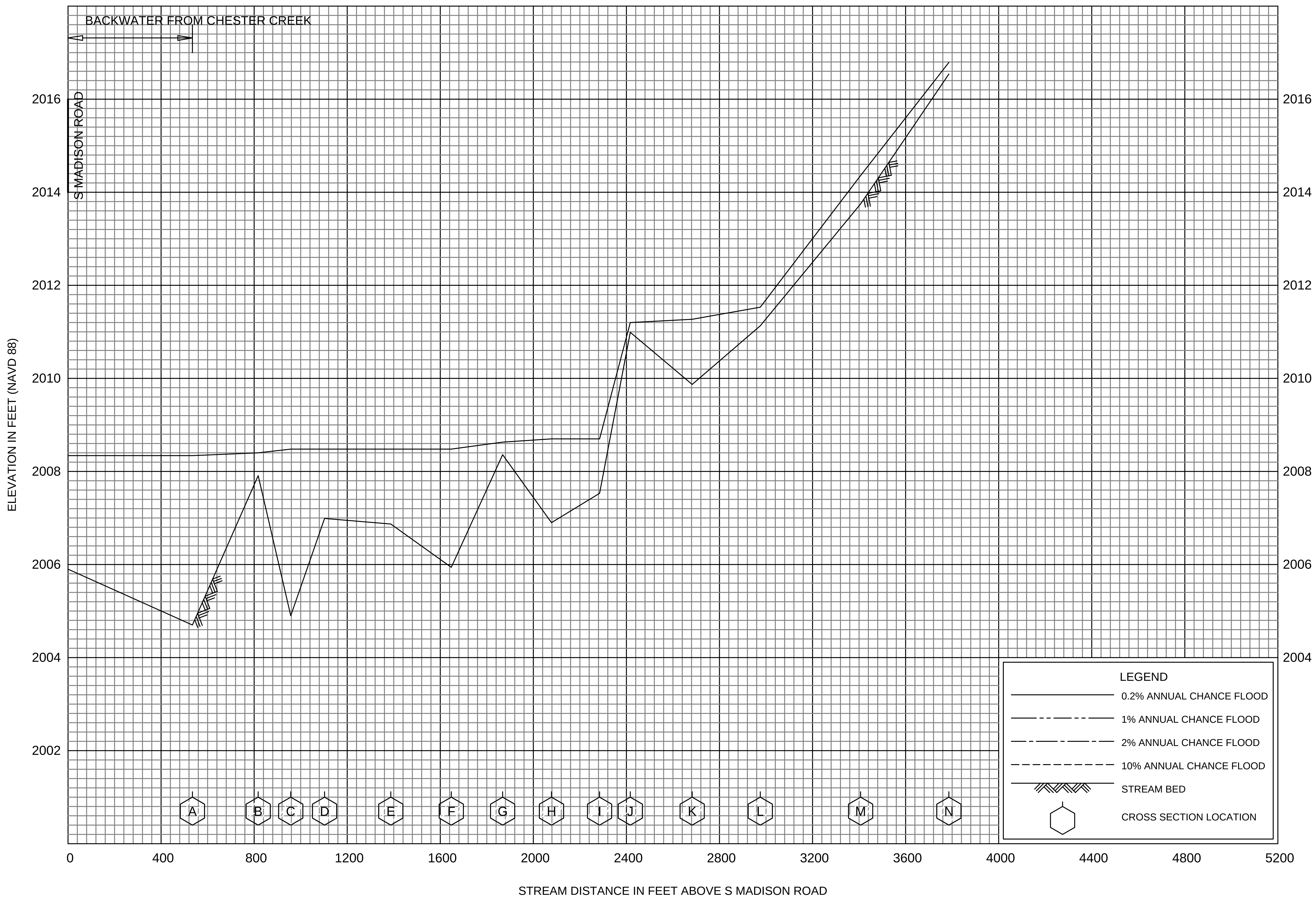
FLOOD PROFILES

UNNAMED TRIBUTARY TO CHESTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

SPOKANE COUNTY, WA

AND INCORPORATED AREAS



FLOOD PROFILES

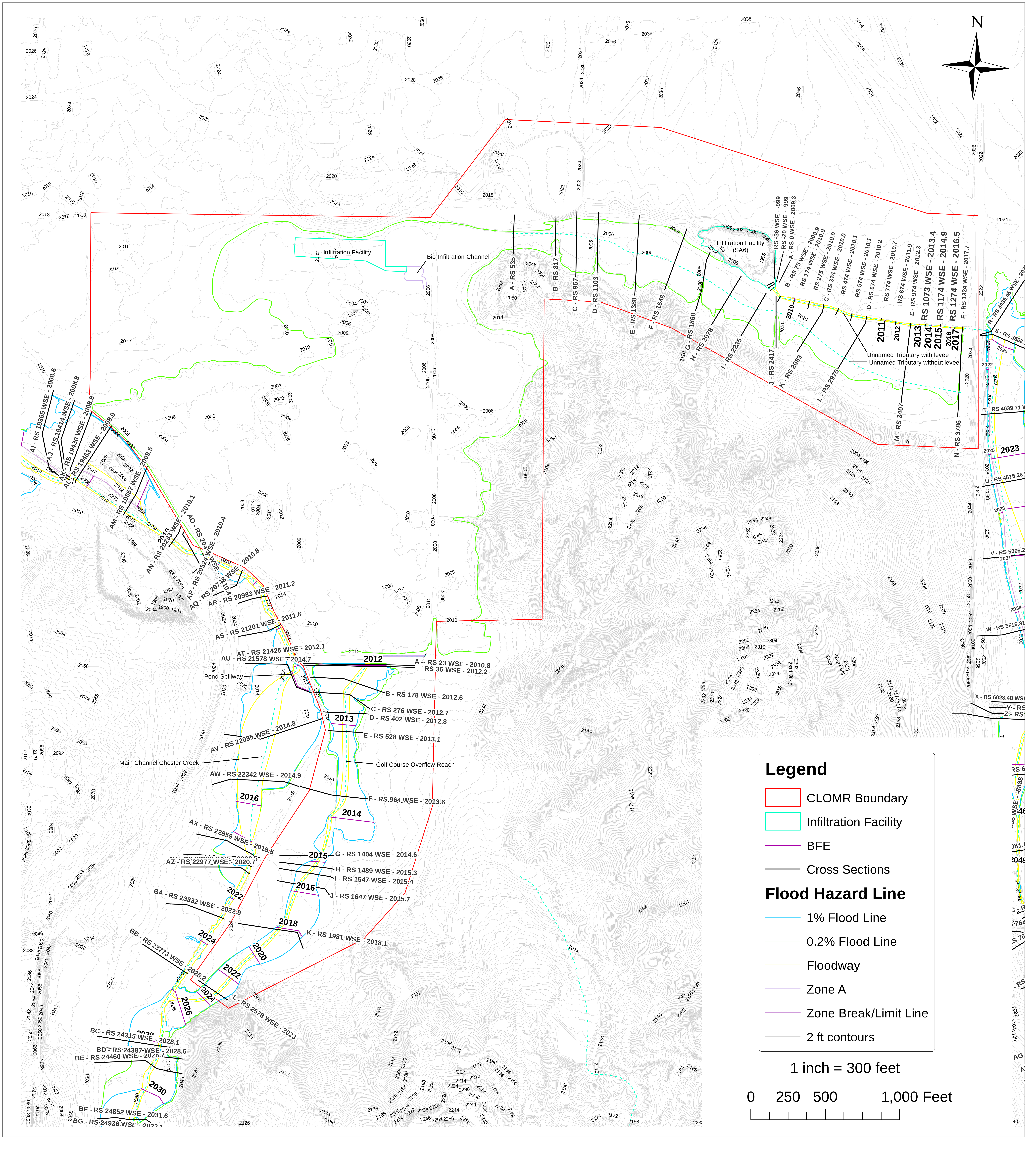
UNNAMED TRIBUTARY TO CHESTER CREEK (LEFT BANK OVERFLOW CHANNEL)

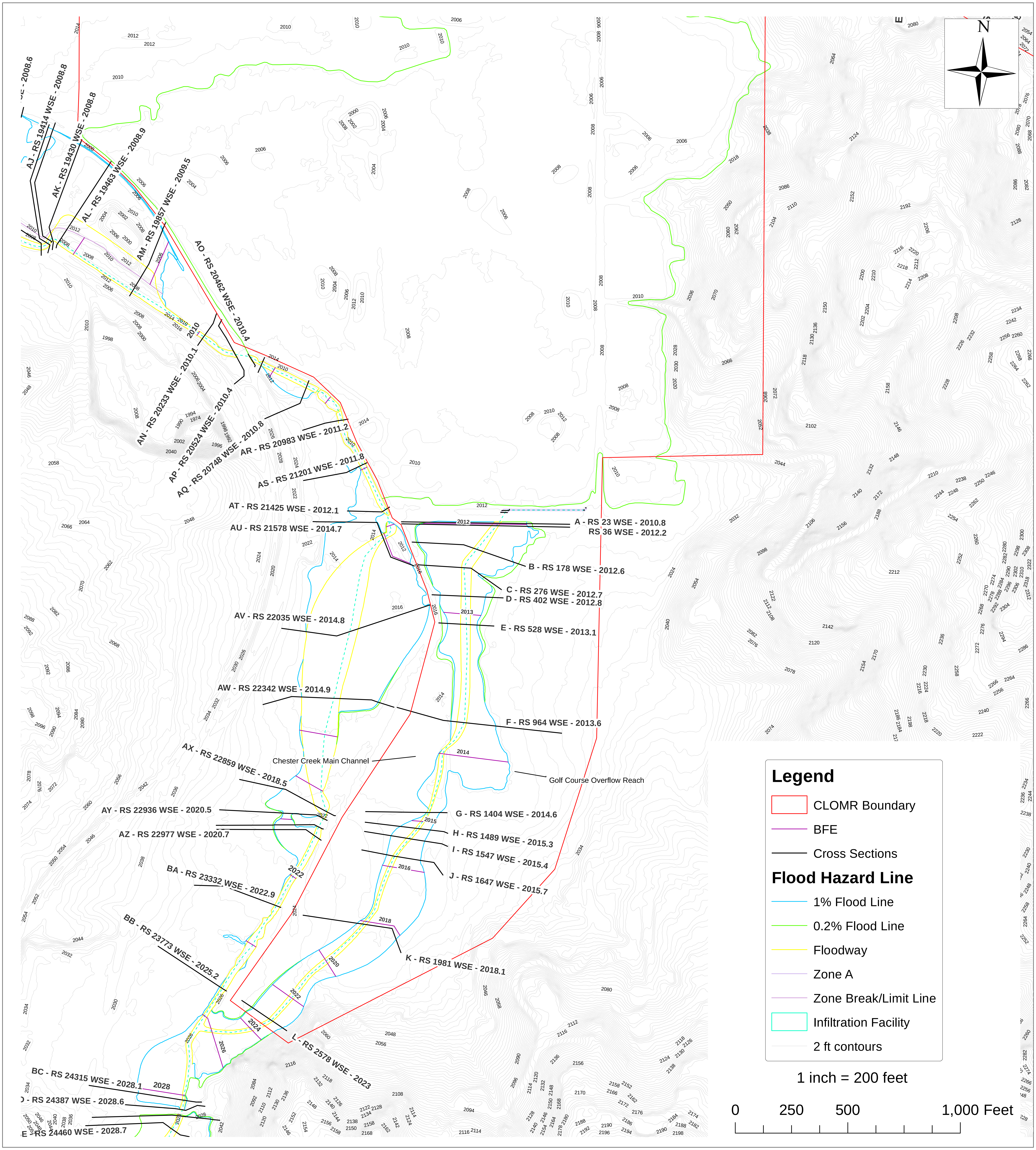
FEDERAL EMERGENCY MANAGEMENT AGENCY

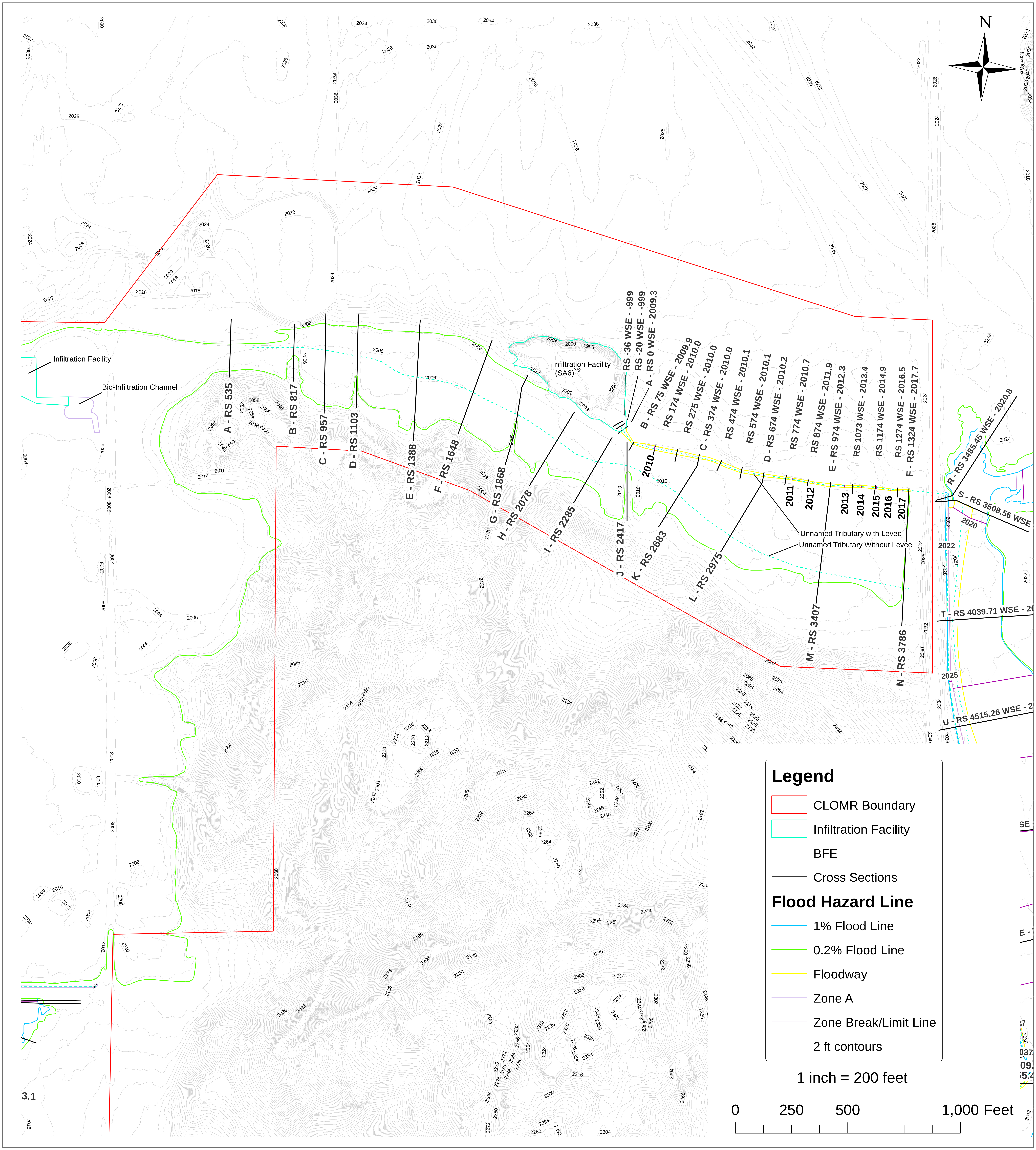
SPOKANE COUNTY, WA

AND INCORPORATED AREAS

Appendix I. Floodplain Workmap for CLOMR


N
Infiltration Facility
Bio-Infiltration Channel
Infiltration Facility (SA6)
Unnamed Tributary with levee
Unnamed Tributary without levee
Main Channel Chester Creek
Golf Course Overflow Reach
Pond Spillway
A - RS 535
B - RS 817
C - RS 957
D - RS 1103
E - RS 1388
F - RS 1648
G - RS 1868
H - RS 2078
I - RS 2285
J - RS 2417
K - RS 2683
L - RS 2975
M - RS 3407
N - RS 3786
RS -36 WSE - 999
RS -20 WSE - 999
A - RS 0 WSE - 2009.3
B - RS 75 WSE - 2009.9
RS 174 WSE - 2010.0
RS 275 WSE - 2010.0
C - RS 374 WSE - 2010.0
RS 474 WSE - 2010.1
RS 574 WSE - 2010.1
D - RS 674 WSE - 2010.2
RS 774 WSE - 2010.7
RS 874 WSE - 2011.9
E - RS 974 WSE - 2012.3
RS 1073 WSE - 2013.4
RS 1174 WSE - 2014.9
RS 1274 WSE - 2016.5
F - RS 1324 WSE - 2017.7
A - RS 23 WSE - 2010.8
RS 36 WSE - 2012.2
B - RS 178 WSE - 2012.6
C - RS 276 WSE - 2012.7
D - RS 402 WSE - 2012.8
E - RS 528 WSE - 2013.1
F - RS 964 WSE - 2013.6
G - RS 1404 WSE - 2014.6
H - RS 1489 WSE - 2015.3
I - RS 1547 WSE - 2015.4
J - RS 1647 WSE - 2015.7
K - RS 1981 WSE - 2018.1
L - RS 2578 WSE - 2023
AI - RS 19365 WSE - 2008.6
AJ - RS 19414 WSE - 2008.8
AK - RS 19430 WSE - 2008.8
AL - RS 19463 WSE - 2008.9
AM - RS 19857 WSE - 2009.5
AN - RS 20233 WSE - 2010.1
AO - RS 20524 WSE - 2010.4
AP - RS 20748 WSE - 2010.8
AR - RS 20983 WSE - 2011.2
AS - RS 21201 WSE - 2011.8
AT - RS 21425 WSE - 2012.1
AU - RS 21578 WSE - 2014.7
AV - RS 22035 WSE - 2014.8
AW - RS 22342 WSE - 2014.9
AX - RS 22859 WSE - 2018.5
AZ - RS 22977 WSE - 2020.7
BA - RS 23332 WSE - 2022.9
BB - RS 23773 WSE - 2025.2
BC - RS 24315 WSE - 2028.1
BD - RS 24387 WSE - 2028.6
BE - RS 24460 WSE - 2028.7
BF - RS 24852 WSE - 2031.6
BG - RS 24936 WSE - 2032.1
R - RS 3485.45 WSE
S - RS 3508
T - RS 4039.71
U - RS 4515.26
V - RS 5006.2
W - RS 5516.31
X - RS 6028.48 WSE
Legend
CLOMR Boundary
Infiltration Facility
BFE
Cross Sections
Flood Hazard Line
1% Flood Line
0.2% Flood Line
Floodway
Zone A
Zone Break/Limit Line
2 ft contours
1 inch = 300 feet
0
250
500
1,000 Feet


AJ - RS 19414 WSE - 2008.6
AK - RS 19430 WSE - 2008.8
AL - RS 19463 WSE - 2008.8
AM - RS 19857 WSE - 2008.9
AO - RS 20462 WSE - 2009.5
AN - RS 20233 WSE - 2010.1
AP - RS 20524 WSE - 2010.4
AQ - RS 20748 WSE - 2010.8
AR - RS 20983 WSE - 2011.2
AS - RS 21201 WSE - 2011.8
AT - RS 21425 WSE - 2012.1
AU - RS 21578 WSE - 2014.7
AV - RS 22035 WSE - 2014.8
AW - RS 22342 WSE - 2014.9
AX - RS 22859 WSE - 2018.5
AY - RS 22936 WSE - 2020.5
AZ - RS 22977 WSE - 2020.7
BA - RS 23332 WSE - 2022.9
BB - RS 23773 WSE - 2025.2
BC - RS 24315 WSE - 2028.1
D - RS 24387 WSE - 2028.6
E - RS 24460 WSE - 2028.7
A - RS 23 WSE - 2010.8
RS 36 WSE - 2012.2
B - RS 178 WSE - 2012.6
C - RS 276 WSE - 2012.7
D - RS 402 WSE - 2012.8
E - RS 528 WSE - 2013.1
F - RS 964 WSE - 2013.6
G - RS 1404 WSE - 2014.6
H - RS 1489 WSE - 2015.3
I - RS 1547 WSE - 2015.4
J - RS 1647 WSE - 2015.7
K - RS 1981 WSE - 2018.1
L - RS 2578 WSE - 2023
Chester Creek Main Channel
Golf Course Overflow Reach
N
Legend
CLOMR Boundary
BFE
Cross Sections
Flood Hazard Line
1% Flood Line
0.2% Flood Line
Floodway
Zone A
Zone Break/Limit Line
Infiltration Facility
2 ft contours
1 inch = 200 feet
0
250
500
1,000 Feet

N
Infiltration Facility
Bio-Infiltration Channel
Infiltration Facility (SA6)
A - RS 535
B - RS 817
C - RS 957
D - RS 1103
E - RS 1388
F - RS 1648
G - RS 1868
H - RS 2078
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J - RS 2417
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L - RS 2975
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N - RS 3786
RS -36 WSE - -999
RS -20 WSE - -999
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RS 174 WSE - 2010.0
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RS 474 WSE - 2010.1
RS 574 WSE - 2010.1
D - RS 674 WSE - 2010.2
RS 774 WSE - 2010.7
RS 874 WSE - 2011.9
E - RS 974 WSE - 2012.3
RS 1073 WSE - 2013.4
RS 1174 WSE - 2014.9
RS 1274 WSE - 2016.5
F - RS 1324 WSE - 2017.7
2010
2011
2012
2013
2014
2015
2016
2017
Unnamed Tributary with Levee
Unnamed Tributary Without Levee
R - RS 3485.45 WSE - 2020.8
S - RS 3508.56 WSE
T - RS 4039.71 WSE - 20
U - RS 4515.26 WSE - 2
2020
2022
2025
3.1
Legend
CLOMR Boundary
Infiltration Facility
BFE
Cross Sections
Flood Hazard Line
1% Flood Line
0.2% Flood Line
Floodway
Zone A
Zone Break/Limit Line
2 ft contours
1 inch = 200 feet
0
250
500
1,000 Feet

Appendix J. Geotechnical Evaluation and Levee Certification Reports

PAINTED HILLS PRD

GEOTECHNICAL REPORTS
LEVEE EVALUATIONS

INDEX

REPORT 1

Preliminary Geotechnical Evaluation, Phase I, dated December 31.2013, revised August 29,2016

PRELIMINARY GEOTECHNICAL EVALUATION
PHASE I
PAINTED HILLS GOLF COURSE PROPERTY
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 2013-026

December 31, 2013
Revised August 29, 2016

Prepared for:

NAI Black
Spokane, Washington

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

December 31, 2013
Project No. 2013-026

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Preliminary Geotechnical Evaluation Phase I**
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane County, WA

Dear Mr. Walker:

As you authorized, we have completed the Phase I preliminary geotechnical evaluation for the Painted Hills Golf Course property at the above-referenced site in Spokane County, Washington. The purpose of the preliminary evaluation is to assess subsurface soil and groundwater conditions to assist your civil engineer, Whipple Consulting Engineers, Inc. (WCE) in evaluating stormwater management alternatives relative to potential future development. This report summarizes the results of our field investigation, laboratory testing, engineering analyses, and our preliminary opinions and recommendations for stormwater management.

PROJECT DESCRIPTION

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. We have assumed that stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. This preliminary evaluation is intended to identify areas where subsurface infiltration of stormwater may be feasible.

AVAILABLE INFORMATION

We were provided a topographic survey for the project site by WCE. This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

FIELD EVALUATION

Procedures

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) observed the excavation of thirty-one test pits at the site. The test pits were excavated on December 2 and 3, 2013 using a rubber-tired backhoe operated by an independent firm working under subcontract to IPEC. A geotechnical engineer from IPEC observed the test pit excavations and logged the surface and subsurface conditions. After we logged each test pit, the test pit was immediately backfilled. Ground surface elevations at the test pits were provided by WCE.

The soils encountered in the test pits were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, “Description and Identification of Soils (Visual-Manual Procedures)”. The samples were returned to our facility for review of the classification by a geotechnical engineer and potential laboratory testing.

Soils Encountered

In general, the test pits encountered 1 to 2 feet of topsoil at the surface. Below the topsoil, the test pits generally encountered alluvial lean clay, silt, or silty sand to depths ranging from 2 to 8 feet. Test Pits TP-5 through TP-16 did not encounter alluvial soils. Test Pits TP-15 and TP-16 encountered silty sand fill to depths of 3 and 7.5 feet, respectively. Below the topsoil, alluvial soils, or fill, most of the test pits encountered glacially deposited sands and gravels to their termination depths. However, Test Pits TP-20 and TP-23 through TP-28 encountered alluvial lean clay or silty to clayey sand to their termination depths.

Groundwater was not encountered in the test pits during or immediately after excavation. Groundwater is believed to currently exist at some depth below the termination depths of the test pits. Fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made. Well log data in the vicinity of the site indicate that groundwater levels range from approximately 50 to 80 feet.

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam, Narcisse silt loam, Endoaquolls and Fluvaquents, Phoebe ashy sandy loam, and Urban land-Springdale disturbed complex. The native soils encountered in the test pits were consistent with the NRCS data.

Field Permeability Testing

We performed five test pit permeability tests at the site. The test pit permeability tests were performed in accordance with the Spokane Regional Stormwater Manual (SRSM) Appendix 4C procedures. Test pit permeability tests were performed adjacent to Test Pits TP-3, TP-8, TP-19, TP-22, and TP-28. The following table summarizes the results of the tests performed.

Test Location	Depth (feet)	USCS Classification	Percent Fines	Infiltration Rate (cfs/ft^2)
P-1 (TP-3)	1 – 3	SW-SM	10.8	2.84×10^{-4}
P-2 (TP-8)	1.5 – 3.5	SM	12.5	8.36×10^{-4}
P-3 (TP-19)	1 – 3	GW	3.0	1.21×10^{-3}
P-4 (TP-22)	2 – 4	ML	64.0	1.29×10^{-4}
P-5 (TP-28)	2 – 4	SM	47.0	6.93×10^{-5}

Attached are data sheets summarizing the results of the tests performed. The above results do not include a safety factor.

ANALYSIS AND PRELIMINARY RECOMMENDATIONS

Discussion

Based on the data obtained from the test pits, field permeability tests, and laboratory tests performed, it is our opinion that subsurface infiltration of stormwater is feasible. The most promising layers are the glacial sands and gravels. These soils would be suitable for infiltration using standard drywells.

In areas where the alluvial soils are deeper, use of gravel galleries could be considered. These soils are present in the southern portion of the site south and east of Test Pits TP-18, TP-19, and TP-21. Glacial sands were encountered at depth in Test Pits TP-29 and TP-30 at the south end of the site. It is our opinion that drywells could be considered at the south end of the site.

Drywell Recommendations
We analyzed recommended design rates for drywells using the Spokane 200 Method from the SRSM (Appendix 4A). The following table summarizes the results of the tests performed.

Test Pit	Depth (feet)	USCS Classification	Percent Fines	Hydraulic Conductivity (cm/s)	Recommended Drywell Outflow Rate (cfs)	
					Type A	Type B
TP-3	10 – 12	SP	3.5	6.1 x 10^{-2}	0.3	1.0
TP-4	10 – 12	GW	4.4	4.1 x 10^{-2}	0.3	0.8
TP-8	10 – 12	GW	3.6	5.9 x 10^{-2}	0.3	1.0
TP-9	8 – 10	GW	2.1	1.7 x 10^{-1}	0.3	1.0
TP-11	10 – 12	SP	2.3	1.5 x 10^{-1}	0.3	1.0
TP-13	10 – 12	SP	2.2	1.6 x 10^{-1}	0.3	1.0
TP-17	10 – 12	SW	2.9	9.0 x 10^{-2}	0.3	1.0
TP-19	10 – 12	SP	1.6	2.5 x 10^{-1}	0.3	1.0
TP-29	10 – 12	SP	2.3	1.5 x 10^{-1}	0.3	1.0
TP-30	14 – 15	SP	4.3	4.3 x 10^{-2}	0.3	0.8

These recommended design infiltration rates include a safety factor of 1.3 as recommended by the SRSM. Higher design outflow rates may be possible if full-scale drywell tests are performed.

Gravel Gallery Recommendations
We analyzed gravel gallery design infiltration rates using the data from the test pit permeability tests performed. The following table summarizes our recommended design infiltration rates for design of gravel galleries.

Test Location	Depth (feet)	USCS Classification	Percent Fines	Design Infiltration Rate (cfs/ft^2)	Safety Factor
P-1 (TP-3)	1 – 3	SW-SM	10.8	1.13 x 10^{-4}	2.5
P-2 (TP-8)	1.5 – 3.5	SM	12.5	3.34 x 10^{-4}	2.5
P-3 (TP-19)	1 – 3	GW	3.0	1.10 x 10^{-3}	1.1
P-4 (TP-22)	2 – 4	ML	64.0	5.16 x 10^{-5}	2.5
P-5 (TP-28)	2 – 4	SM	47.0	2.77 x 10^{-5}	2.5

Additional Recommendations
We recommend that soil borings be considered to evaluate soil and groundwater conditions at depth. It may be possible that suitable sands and gravels are present below the alluvial soils in the southern portion of the site as evidenced by the sands encountered at depth in Test Pits TP-29 and TP-30. Also, we recommend that additional test pits be excavated for pavement section analysis when a site development plan and traffic data are available.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
12-31-13

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Figure 3, Test Pit Location Map
Logs of Test Pits TP-1 through TP-30
Descriptive Terminology
Test Pit Permeability Test Results
Laboratory Test Results

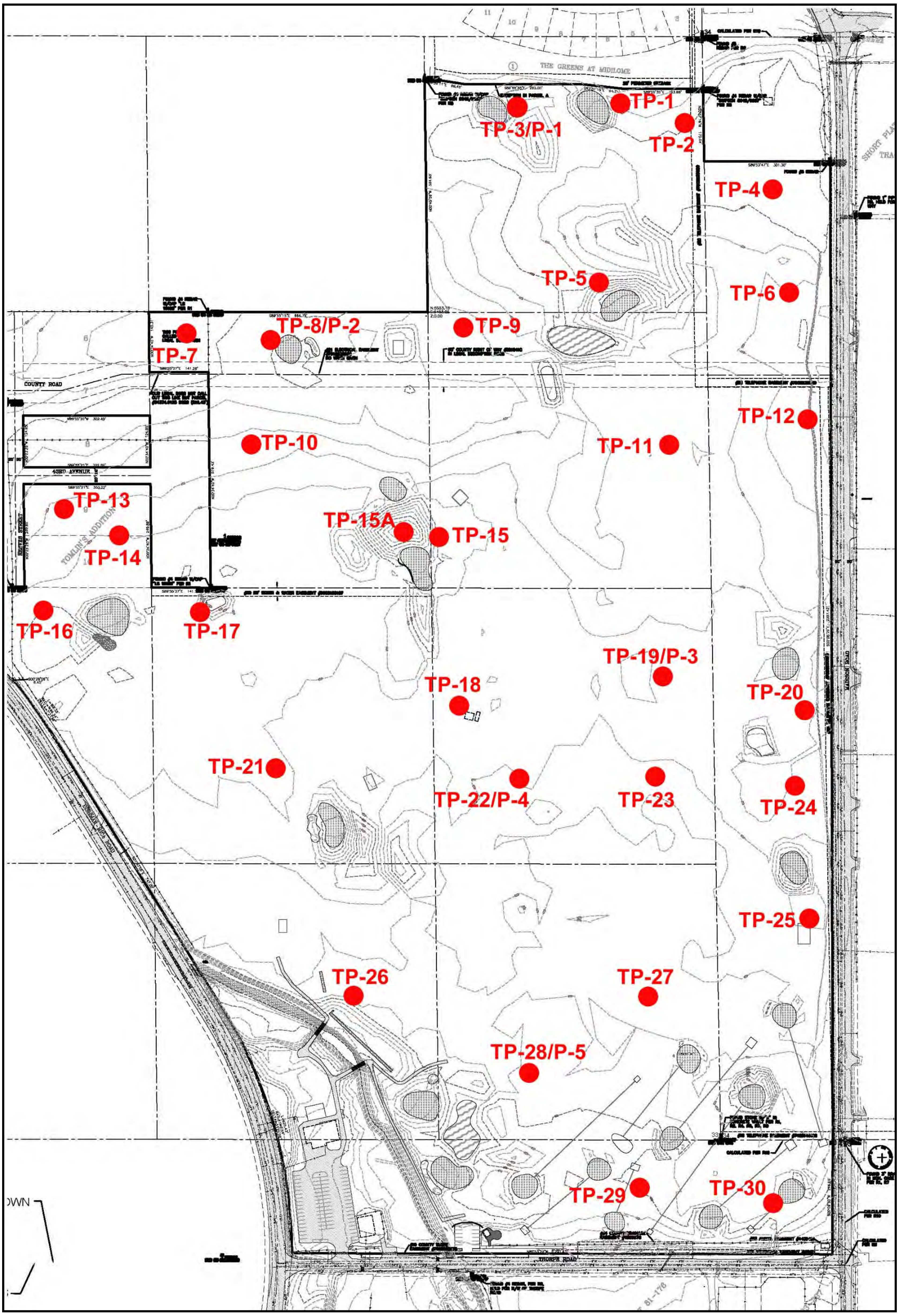
FIGURE 1

Site Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026 Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	December 30, 2013

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026 Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	December 30, 2013

FIGURE 3



Test Pit Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026 Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	December 30, 2013

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-1**
LOCATION: See Attached Test Pit Location Map
DATE: 12/2/13
SCALE: 1"=3'

ELEV.	DEPTH	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2007.4	0.0				
2006.4	1.0	ML	SILT, with roots, dark brown, moist. (Topsoil)		
2003.4	4.0	ML	SILT WITH SAND , tan, moist. (Alluvium)		
2000.9	6.5	SP-SM	POORLY GRADED SAND WITH SILT AND GRAVEL, medium to coarse grained, a trace of Cobbles , brown, moist. (Glacial Outwash)		
1992.4	15.0	SP	POORLY GRADED SAND WITH GRAVEL, coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-2**
LOCATION: See Attached Test Pit Location Map
DATE: 12/2/13
SCALE: 1"=3'

ELEV. 2004.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2003.4	1.5	ML	SILT, with roots, dark brown, moist. (Topsoil)		
1998.4	6.5	ML	SILT WITH SAND, tan, moist. (Alluvium)		
1992.9	12.0	GC-GM	SILTY CLAYEY GRAVEL WITH SAND , fine grained, brown, moist to wet. (Glacial Outwash)		
1989.9	15.0	SP	POORLY GRADED SAND WITH GRAVEL , medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA
BORING:	TP-3
LOCATION:	See Attached Test Pit Location Map
DATE:	12/2/13
SCALE:	1"=3'

ELEV. 2003.6	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2003.1	0.5	ML	SILT, with roots, dark brown, moist. (Topsoil)		
2001.6	2.0	ML	SILT, tan, moist. (Alluvium)		
1988.6	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING: **TP-4** LOCATION: See Attached Test Pit Location Map DATE: 12/2/13 SCALE: 1"=3'

ELEV. 2005.1	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.1	1.0	CL-ML	SILTY CLAY, with roots, dark brown to black, moist to wet. (Topsoil)		
2001.1	4.0	ML	SILT WITH SAND, tan, moist. (Alluvium)		
1999.1	6.0	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
1990.1	15.0	GW	WELL GRADED GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING: **TP-5** LOCATION: See Attached Test Pit Location Map DATE: 12/2/13 SCALE: 1"=3'

ELEV. 2004.6	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2003.6	1.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist to wet. (Topsoil)		
2002.6	2.0	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist to wet. (Glacial Outwash)		
1989.6	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-6**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2006.4	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.4	2.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist. (Topsoil)		
2002.4	4.0	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, light brown to brown, moist. (Glacial Outwash)		
1991.4	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-7**

LOCATION: See Attached Test Pit Location Map

DATE: 12/2/13

SCALE: 1"=3'

ELEV. 2010.4	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2009.4	1.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist to wet. (Topsoil)		
2008.4	2.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, brown, moist. (Glacial Outwash)		
		GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
2004.4	6.0	GP	POORLY GRADED GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
1995.4	15.0		End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-8**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2009.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2008.4	1.5	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, with roots, dark brown , moist to wet. (Topsoil)		
2004.9	5.0	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown , moist to wet. (Glacial Outwash)		
1994.9	15.0	GW	WELL GRADED GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	TP-9
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2008.3	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.8	1.5	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist. (Topsoil)		
2005.3	3.0	GP-GM	POORLY GRADED GRAVEL WITH SILT AND SAND, fine to coarse grained, a trace of Cobbles, brown , moist. (Glacial Outwash)		
1993.9	15.0	GW	WELL GRADED GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-10**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2006.3	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.3	1.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist. (Topsoil)		
2001.8	4.5	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
1993.9	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	TP-11
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2007.4	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.9	0.5	SM	SILTY SAND, medium to coarse grained, a trace of Gravel, with roots, dark brown , moist to wet. (Topsoil)		
2003.4	4.0	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist to wet. (Glacial Outwash)		
1992.4	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING: **TP-12** LOCATION: See Attached Test Pit Location Map DATE: 12/2/13 SCALE: 1"=3'

ELEV. 2005.1	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2003.6	1.5	SC	CLAYEY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , wet. (Topsoil)		
2000.6	4.5	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, with Cobbles, a trace of Boulders, light brown to dark brown, moist. (Glacial Outwash)		
1990.1	15.0	GP-GM	POORLY GRADED GRAVEL WITH SILT AND SAND, fine to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	TP-13
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2006.8	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.3	1.5	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist to wet. (Topsoil)		
2001.8	5.0	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, light brown, moist. (Glacial Outwash)		
1991.8	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, light brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA
BORING:	**TP-14**
LOCATION:	See Attached Test Pit Location Map
DATE:	12/2/13
SCALE:	1"=3'

ELEV. 2005.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.4	1.5	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, dark brown , moist to wet. (Topsoil)		
1999.9	6.0	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Cobbles, light brown, moist. (Glacial Outwash)		
1990.9	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-15**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2005.1	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2002.1	3.0	FILL	Silty Clayey Sand, fine to medium grained, a trace of Gravel, with roots, dark brown to black, wet.		
1998.1	7.0	SC	CLAYEY SAND WITH GRAVEL, fine to medium grained, brown, wet. (Glacial Outwash)		
1990.1	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-15A**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 1996.4	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
		SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, a trace of Cobbles, brown , moist. (Clacial Outwash)		
1981.4	15.0				
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	TP-16
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2005.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.9	1.0	FILL	Silt, with roots, dark brown , moist.		
1998.4	7.5	FILL	Silty Sand with Gravel, fine to coarse grained, with Cobbles, mixed with concrete, dark brown, moist to wet.		
1990.9	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-17**

LOCATION: See Attached Test Pit Location Map

DATE: 12/2/13

SCALE: 1"=3'

ELEV.	DEPTH	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.4	0.0				
2004.4	1.0	FILL	Silty Sand, fine to medium grained, a trace of Gravel, with roots, dark brown to black, wet.		
1999.4	6.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, brown, moist to wet. (Alluvium)		
1990.4	15.0	SW	WELL GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING: **TP-18** LOCATION: See Attached Test Pit Location Map DATE: 12/2/13 SCALE: 1"=3'

ELEV. 2006.1	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.1	1.0	SM	SILTY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
2002.1	4.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, light brown, moist. (Alluvium)		
1991.1	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-19**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/2/13	SCALE: 1"=3'

ELEV. 2006.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.4	1.5	SM	SILTY SAND, fine to medium grained, a trace of Gravel, with roots, black, wet. (Topsoil)		
2004.9	2.0	SM	SILTY SAND, fine to medium grained, a trace of Gravel, brown, moist. (Alluvium)		
2001.4	5.5	GM	SILTY GRAVEL WITH SAND, fine to coarse grained, a trace of Gravel, brown, moist. (Glacial Outwash)		
1991.9	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
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PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	**BORING:** **TP-20** **LOCATION:** See Attached Test Pit Location Map **DATE:** 12/2/13 **SCALE:** 1"=3'

ELEV. 2006.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.9	1.0	ML	SILT, with roots, dark brown, moist. (Topsoil)		
2000.9	6.0	ML	SILT WITH SAND, tan, moist. (Alluvium)		
1991.9	15.0	CL	LEAN CLAY, brown, wet. (Alluvium)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-21**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2006.4	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.4	2.0	SM	SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)		
1999.4	7.0	SC-SM	SILTY CLAYEY SAND, fine grained, brown , moist to wet. (Alluvium)		
1997.4	9.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
1995.4	11.0	SP-SM	POORLY GRADED SAND WITH SILT, fine grained, brown, moist. (Glacial Outwash)		
1991.4	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING: **TP-22** LOCATION: See Attached Test Pit Location Map DATE: 12/3/13 SCALE: 1"=3'

ELEV. 2007.5	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2005.5	2.0	SM	SILTY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
1999.5	8.0	SM	SILTY SAND, very fine to fine grained, brown , moist. (Alluvium)		
1992.5	15.0	SM	SILTY SAND, medium to coarse grained, a trace of Gravel, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-23**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2007.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2004.9	3.0	SC-SM	SILTY CLAYEY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
1994.4	13.5	CL	SANDY LEAN CLAY, brown , wet. (Alluvium)		
1992.9	15.0	SP-SM	POORLY GRADED SAND WITH SILT AND GRAVEL, medium to coarse grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-24**
LOCATION: See Attached Test Pit Location Map
DATE: 12/3/13 **SCALE:** 1"=3'

ELEV.	DEPTH	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.2	0.0	SC	CLAYEY SAND, fine grained, with roots, black, wet. (Topsoil)		
2003.2	3.0	SC	CLAYEY SAND, fine grained, brown , wet. (Alluvium)		
1991.2	15.0		End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-25**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2007.6	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.6	1.0	FILL	Silty Sand, fine to medium grained, with roots, dark brown to brown, moist. (Topsoil)		
2005.1	2.5	CL-ML	SILTY CLAY, with roots, black, moist-wet. (Buried Topsoil)		
1992.6	15.0	CL	SANDY LEAN CLAY, brown, wet. (Alluvium)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

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PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	TP-26
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2008.8	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.8	2.0	SM	SILTY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
2000.3	8.5	CL	SANDY LEAN CLAY, brown, wet. (Alluvium)		
1993.8	15.0	SC	CLAYEY SAND, fine grained, with seams and layers of Lean Clay and Poorly Graded Sand, brown, wet. (Alluvium)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

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PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-27**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2008.6	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2006.3	2.5	SM	SILTY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
2000.8	8.0	CL	LEAN CLAY WITH SAND, brown, wet. (Alluvium)		
1993.8	15.0	SM	SILTY SAND, fine grained, brown, moist to wet. (Alluvium)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
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PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA	BORING:	**TP-28**
		LOCATION:	See Attached Test Pit Location Map
		DATE: 12/3/13	SCALE: 1"=3'

ELEV. 2009.1	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2007.1	2.0	SM	SILTY SAND, fine to medium grained, with roots, black, moist to wet. (Topsoil)		
1999.1	10.0	SM	SILTY SAND, fine to medium grained, brown, moist to wet. (Alluvium)		
1994.1	15.0	SC	CLAYEY SAND, fine to medium grained, brown, wet. (Alluvium)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
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PROJECT: 2013-026
Preliminary Geotechnical Evaluation, Phase I
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

BORING: **TP-29**

LOCATION: See Attached Test Pit Location Map

DATE: 12/3/13 **SCALE:** 1"=3'

ELEV. 2009.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2007.9	2.0	CL	SANDY LEAN CLAY, with roots, black, wet. (Topsoil)		
2003.9	6.0	CL	SANDY LEAN CLAY, brown, wet. (Alluvium)		
2000.9	9.0	SM	SILTY SAND, fine to medium grained, brown, wet. (Alluvium)		
1994.9	15.0	SP	POORLY GRADED SAND, medium grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

LOG OF TEST PIT

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Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	2013-026 Preliminary Geotechnical Evaluation, Phase I Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane Valley, WA
BORING:	**TP-30**
LOCATION:	See Attached Test Pit Location Map
DATE:	12/3/13
SCALE:	1"=3'

ELEV.	DEPTH	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
2008.6	0.0				
2008.1	0.5	ML	SANDY SILT, with roots, dark brown, moist to wet. (Topsoil)		
2004.1	4.5	CL-ML	SANDY SILTY CLAY, brown, moist to wet. (Alluvium)		
1906.6	12.0	SM	SILTY SAND, fine to medium grained, with seams and layers of Lean Clay and Poorly Graded Sand below 8', brown, moist to wet. (Topsoil)		
1993.6	15.0	SP	POORLY GRADED SAND, fine to medium grained, brown, moist. (Glacial Outwash)		
			End of Test Pit Groundwater not encountered Test pit immediately backfilled.		

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Geotechnical Engineering and Consulting

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with >12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand
			SP	Poorly Graded Sand
		Sand (with >12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (low plasticity)
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Fat Clay
			OH	Organic Clay and Silt (med to high plasticity)
Highly Organic Soils			PT	Peat Muck

MODIFIERS

DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT

DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE

SIEVE SIZE	12"	3"	3/4"	4	10	40	200
GRAIN SIZE (INCHES)	12	3	0.75	0.19	0.079	0.0171	0.0029

Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

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Test Pit Permeability Test Results

Project Name: Painted Hills Golf Course Preliminary

Test Date: 12/18/2013

Project Number: 2013-026

Test Location: P-1 (TP-3)

Client: NAI Black

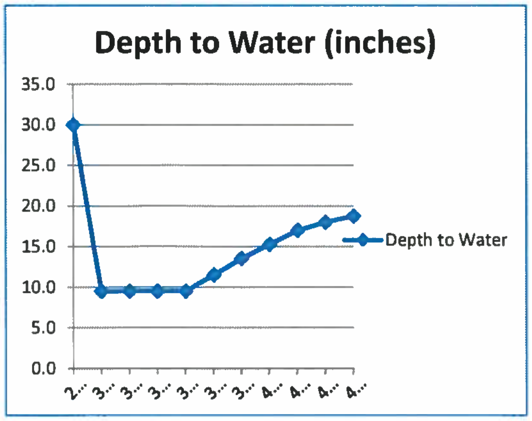
Depth: 1' - 3'

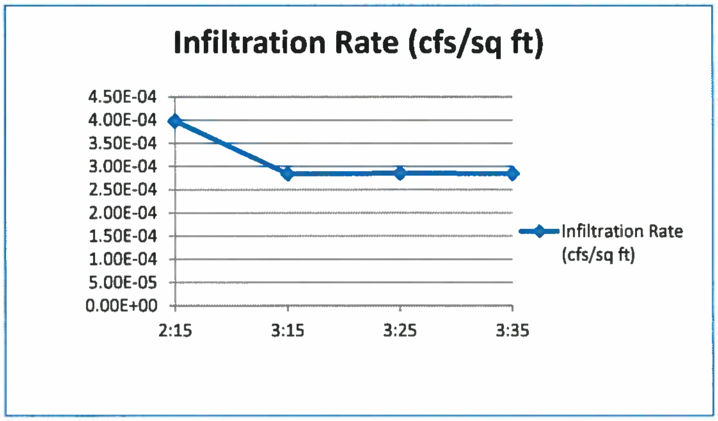
Average Test Pit Dimensions: Length (ft): 6.00 Width (ft): 2.63 Depth (ft): 2

Time	Elapsed Time (seconds)	Depth to Water (inches)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)	Infiltration Rate (cfs/ft^2)
2:15	0	30.0	453.21			
3:15	3600	9.5	518.01	64.80	1.80E-02	3.98E-04
3:25	600	9.5	525.71	7.70	1.28E-02	2.84E-04
3:35	600	9.5	533.44	7.73	1.29E-02	2.85E-04
3:45	600	9.5	541.15	7.71	1.28E-02	2.84E-04
3:50	300	11.5				
3:55	300	13.5				
4:00	300	15.3				
4:05	300	17.0				
4:10	300	18.0				
4:15	300	18.8				

Effec

Average Infiltration Rate: 2.84E-04





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Geotechnical Engineering and Consulting

Test Pit Permeability Test Results

Project Name: Painted Hills Golf Course Preliminary

Test Date: 12/18/2013

Project Number: 2013-026

Test Location: P-2 (TP-8)

Client: NAI Black

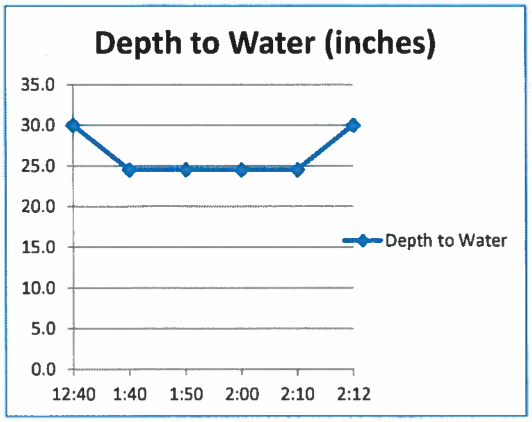
Depth: 1.5' - 3.5'

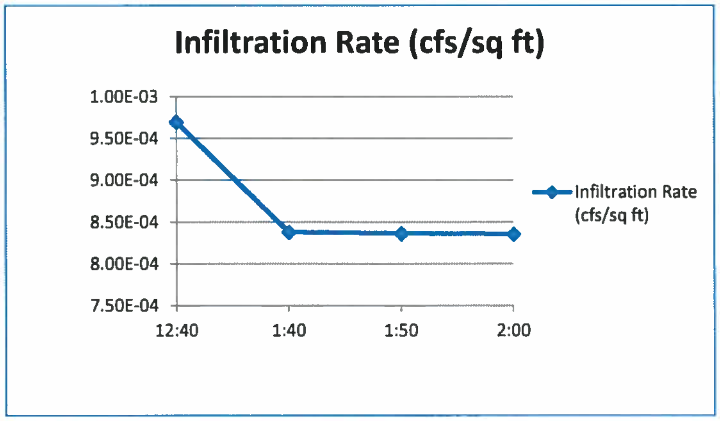
Average Test Pit Dimensions: Length (ft): 5.75 Width (ft): 2.63 Depth (ft): 2

Time	Elapsed Time (seconds)	Depth to Water (inches)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)	Infiltration Rate (cfs/ft^2)
12:40	0	30.0	339.46			
1:40	3600	24.5	418.94	79.48	2.21E-02	9.70E-04
1:50	600	24.5	430.38	11.44	1.91E-02	8.37E-04
2:00	600	24.5	441.80	11.42	1.90E-02	8.36E-04
2:10	600	24.5	453.21	11.41	1.90E-02	8.35E-04
2:12	120	30.0				

Effec

Average Infiltration Rate: 8.36E-04





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Test Pit Permeability Test Results

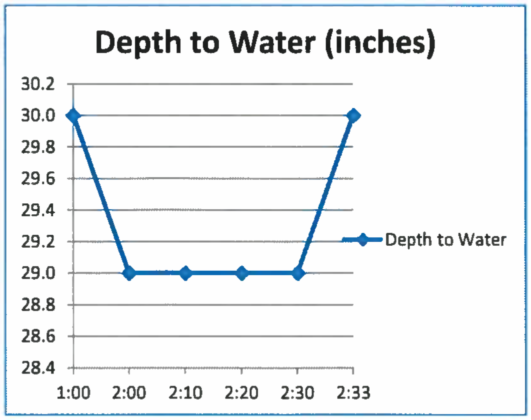
Project Name: Painted Hills Golf Course Preliminary
Test Date: 12/18/2013
Project Number: 2013-026
Test Location: P-3 (TP-19)
Client: NAI Black
Depth: 1' - 3'

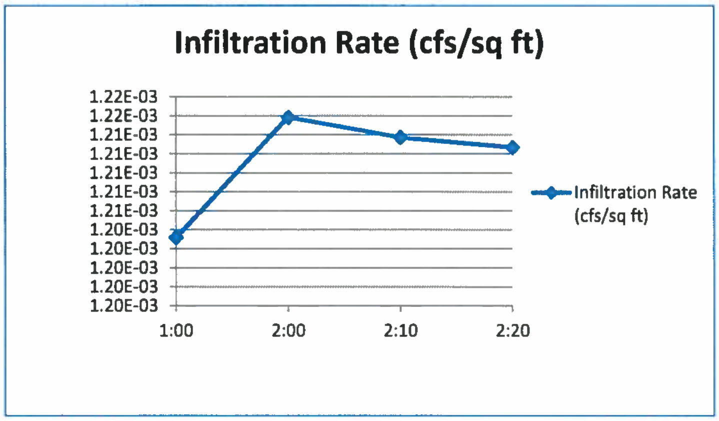
Average Test Pit Dimensions: Length (ft): 5.50 Width (ft): 2.63 Depth (ft): 2

Time	Elapsed Time (seconds)	Depth to Water (inches)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)	Infiltration Rate (cfs/ft^2)
1:00	0	30.0	246.55			
2:00	3600	29.0	314.95	68.40	1.90E-02	1.20E-03
2:10	600	29.0	326.47	11.52	1.92E-02	1.22E-03
2:20	600	29.0	337.97	11.50	1.92E-02	1.21E-03
2:30	600	29.0	349.46	11.49	1.91E-02	1.21E-03
2:33	180	30.0				

Effec

Average Infiltration Rate: 1.21E-03





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Test Pit Permeability Test Results

Project Name: Painted Hills Golf Course Preliminary

Test Date: 12/18/2013

Project Number: 2013-026

Test Location: P-4 (TP-22)

Client: NAI Black

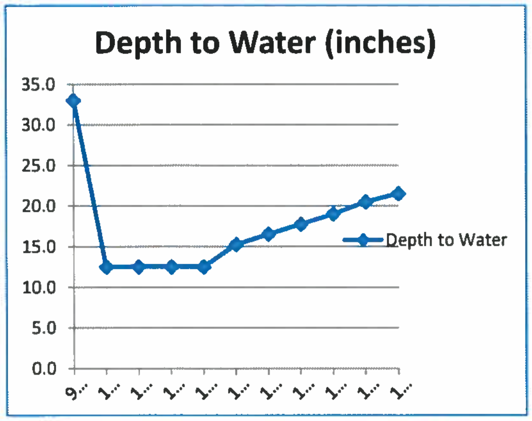
Depth: 2' - 4'

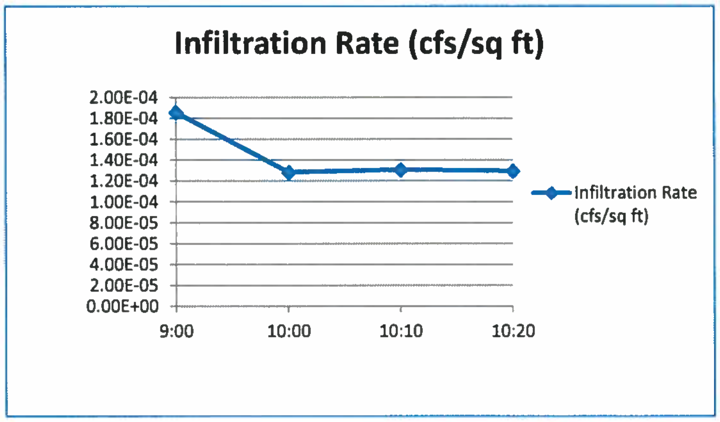
Average Test Pit Dimensions: Length (ft): 5.75 Width (ft): 2.50 Depth (ft): 2

Time	Elapsed Time (seconds)	Depth to Water (inches)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)	Infiltration Rate (cfs/ft^2)
9:00	0	33.0	208.24			
10:00	3600	12.5	236.65	28.41	7.89E-03	1.85E-04
10:10	600	12.5	239.92	3.27	5.45E-03	1.28E-04
10:20	600	12.5	243.25	3.33	5.55E-03	1.30E-04
10:30	600	12.5	246.55	3.30	5.50E-03	1.29E-04
10:35	300	15.3				
10:40	300	16.5				
10:45	300	17.8				
10:50	300	19.0				
10:55	300	20.5				
11:00	300	21.5				

Effec

Average Infiltration Rate: 1.29E-04





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Test Pit Permeability Test Results

Project Name: Painted Hills Golf Course Preliminary

Test Date: 12/18/2013

Project Number: 2013-026

Test Location: P-5 (TP-28)

Client: NAI Black

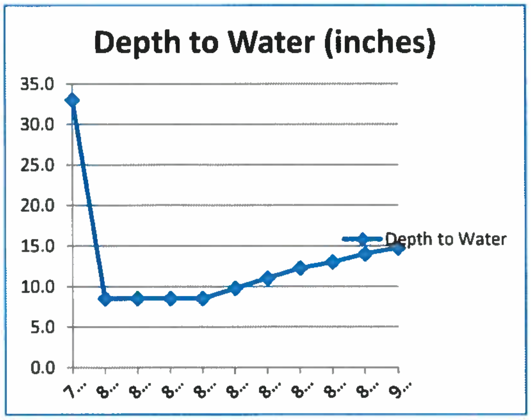
Depth: 2' - 4'

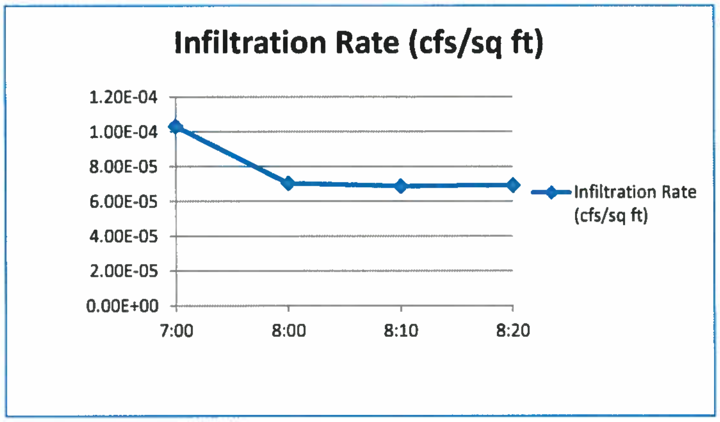
Average Test Pit Dimensions: Length (ft): 7.50 Width (ft): 2.54 Depth (ft): 2

Time	Elapsed Time (seconds)	Depth to Water (inches)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)	Infiltration Rate (cfs/ft^2)
7:00	0	33.0	178.46			
8:00	3600	8.5	200.75	22.29	6.19E-03	1.03E-04
8:10	600	8.5	203.28	2.53	4.22E-03	7.02E-05
8:20	600	8.5	205.75	2.47	4.12E-03	6.86E-05
8:30	600	8.5	208.24	2.49	4.15E-03	6.91E-05
8:35	300	9.8				
8:40	300	11.0				
8:45	300	12.3				
8:50	300	13.0				
8:55	300	14.0				
9:00	300	14.8				

Effec

Average Infiltration Rate: 6.93E-05



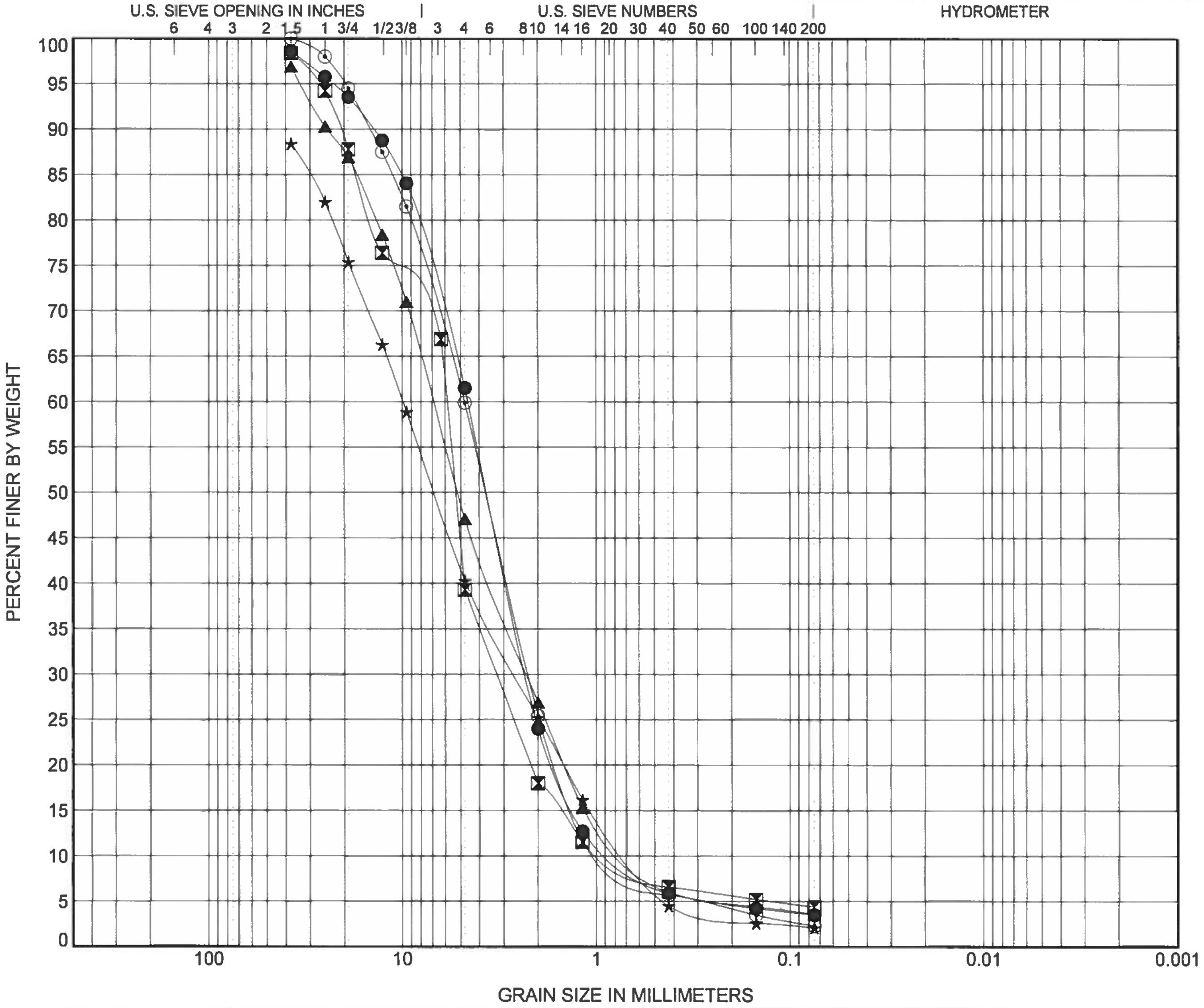


GN Northern
722 N. 16th Avenue, Suite 31
Yakima, WA 98902
Telephone: 509-248-9798
Fax: 509-248-4220

GRAIN SIZE DISTRIBUTION

CLIENT IPEC **PROJECT NAME** Painted Hills Golf Course

PROJECT NUMBER **PROJECT LOCATION**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	TP-3	10'-12'	POORLY GRADED SAND with GRAVEL(SP)				1.46	5.83
☒	TP-4	12'	WELL-GRADED GRAVEL with SAND(GW)				2.10	6.83
▲	TP-8	10'-12'	WELL-GRADED GRAVEL with SAND(GW)				1.15	10.47
★	TP-9	8'- 10'	WELL-GRADED GRAVEL with SAND(GW)				1.02	14.44
⊙	TP-11	10'-12'	POORLY GRADED SAND with GRAVEL(SP)				1.18	5.33

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-3	10'-12'	37.5	4.586	2.296	0.787	37.1	58.0	3.5	
☒	TP-4	12'	37.5	5.871	3.256	0.86	59.1	34.9	4.4	
▲	TP-8	10'-12'	37.5	6.905	2.284	0.659	49.8	43.5	3.6	
★	TP-9	8'-10'	37.5	9.919	2.633	0.687	48.1	38.2	2.1	
⊙	TP-11	10'-12'	37.5	4.765	2.244	0.895	40.1	57.6	2.3	

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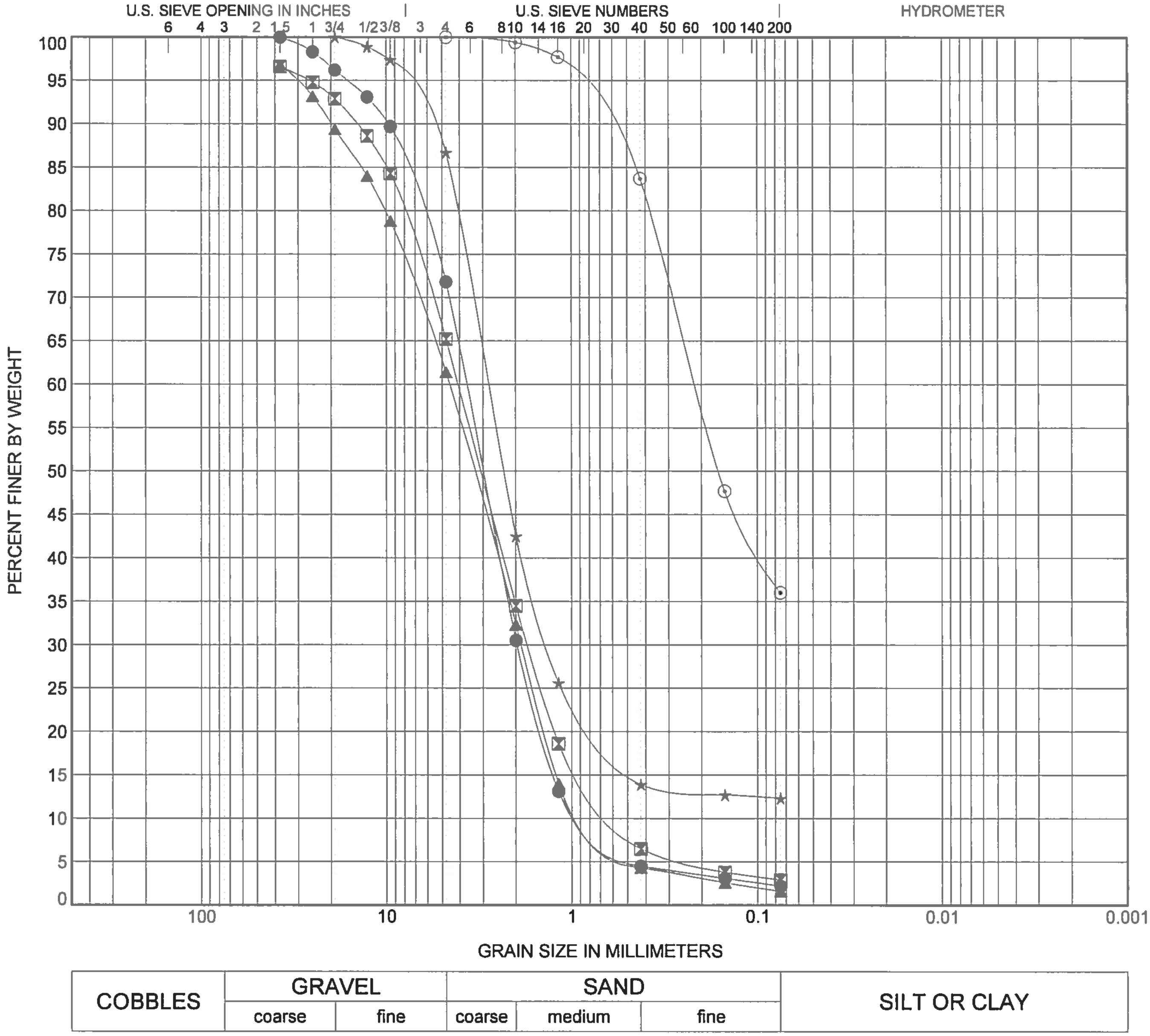
GRAIN SIZE DISTRIBUTION

CLIENT IPEC

PROJECT NAME Painted Hills Golf Course

PROJECT NUMBER

PROJECT LOCATION



BOREHOLE		DEPTH	Classification	LL	PL	PI	Cc	Cu
●	TP-13	10'-12'	POORLY GRADED SAND with GRAVEL(SP)				1.28	4.54
☒	TP-17	10'-12'	WELL-GRADED SAND with GRAVEL(SW)				1.27	7.18
▲	TP-19	10'-12'	POORLY GRADED SAND with GRAVEL(SP)				0.99	5.88
★	TP-22	10'-12'	SILTY SAND(SM)					
⊙	TP-27	9'-10'	SILTY SAND(SM)					

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-13	10'-12'	37.5	3.71	1.97	0.817	28.2	69.6	2.2	
☒	TP-17	10'-12'	37.5	4.103	1.723	0.571	31.4	62.3	2.9	
▲	TP-19	10'-12'	37.5	4.556	1.872	0.774	35.4	59.8	1.6	
★	TP-22	10'-12'	19	2.817	1.354		13.3	74.4	12.3	
⊙	TP-27	9'-10'	4.75	0.214			0.0	64.0	36.0	

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722 N. 16th Avenue, Suite 31
Yakima, WA 98902
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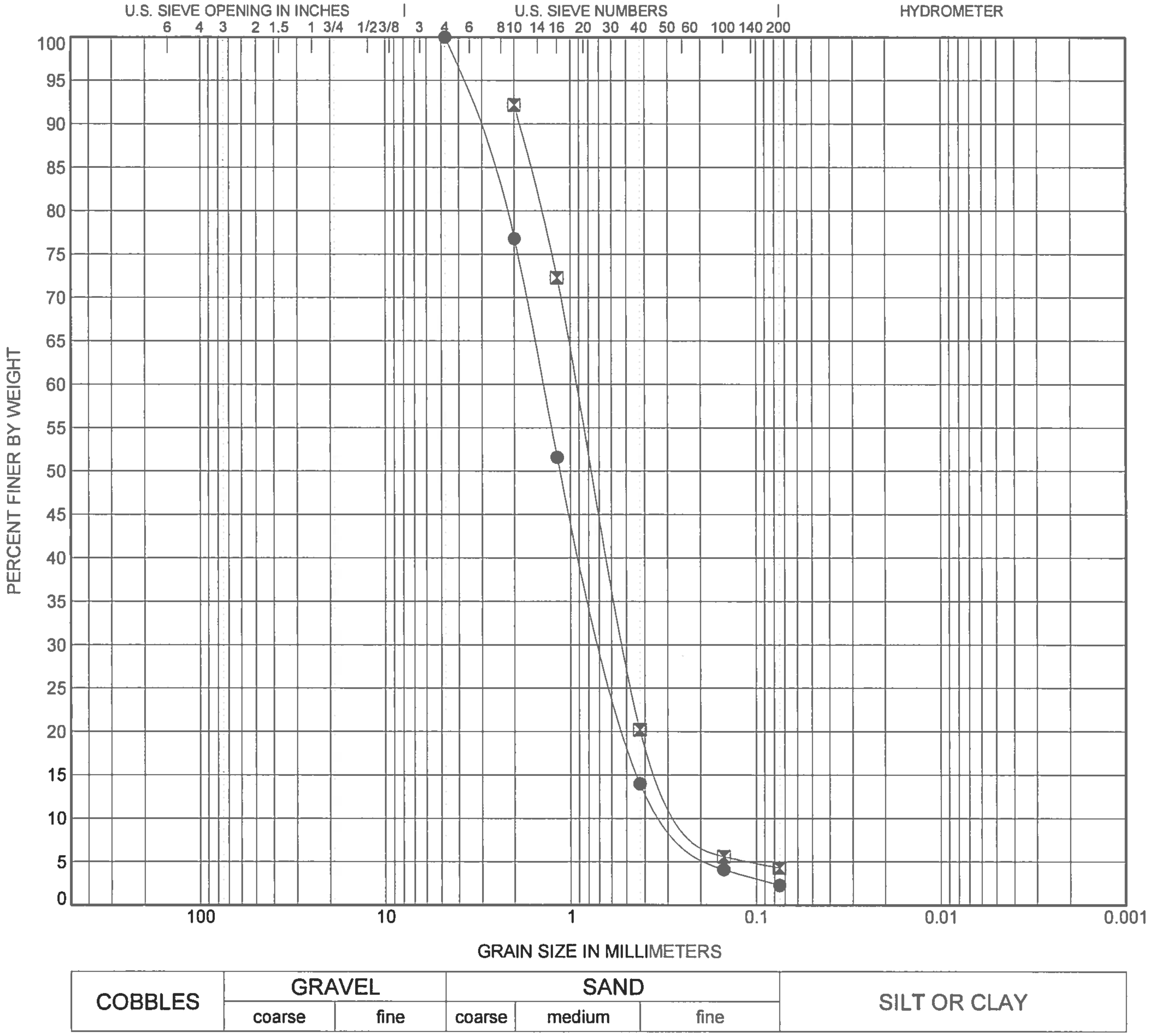
GRAIN SIZE DISTRIBUTION

CLIENT IPEC

PROJECT NAME Painted Hills Golf Course

PROJECT NUMBER

PROJECT LOCATION



BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● TP-29	10'-12'	POORLY GRADED SAND(SP)				1.10	5.04
☒ TP-30	14'-15'	POORLY GRADED SAND(SP)				1.39	4.52

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TP-29	10'-12'	4.75	1.407	0.656	0.279	0.0	97.7	2.3	
☒ TP-30	14'-15'	2	0.927	0.515	0.205		87.9	4.3	

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11115 E. Montgomery, Suite C
Spokane Valley, WA, 99206
Telephone: (509) 248-9798
Fax: (509) 248-4220

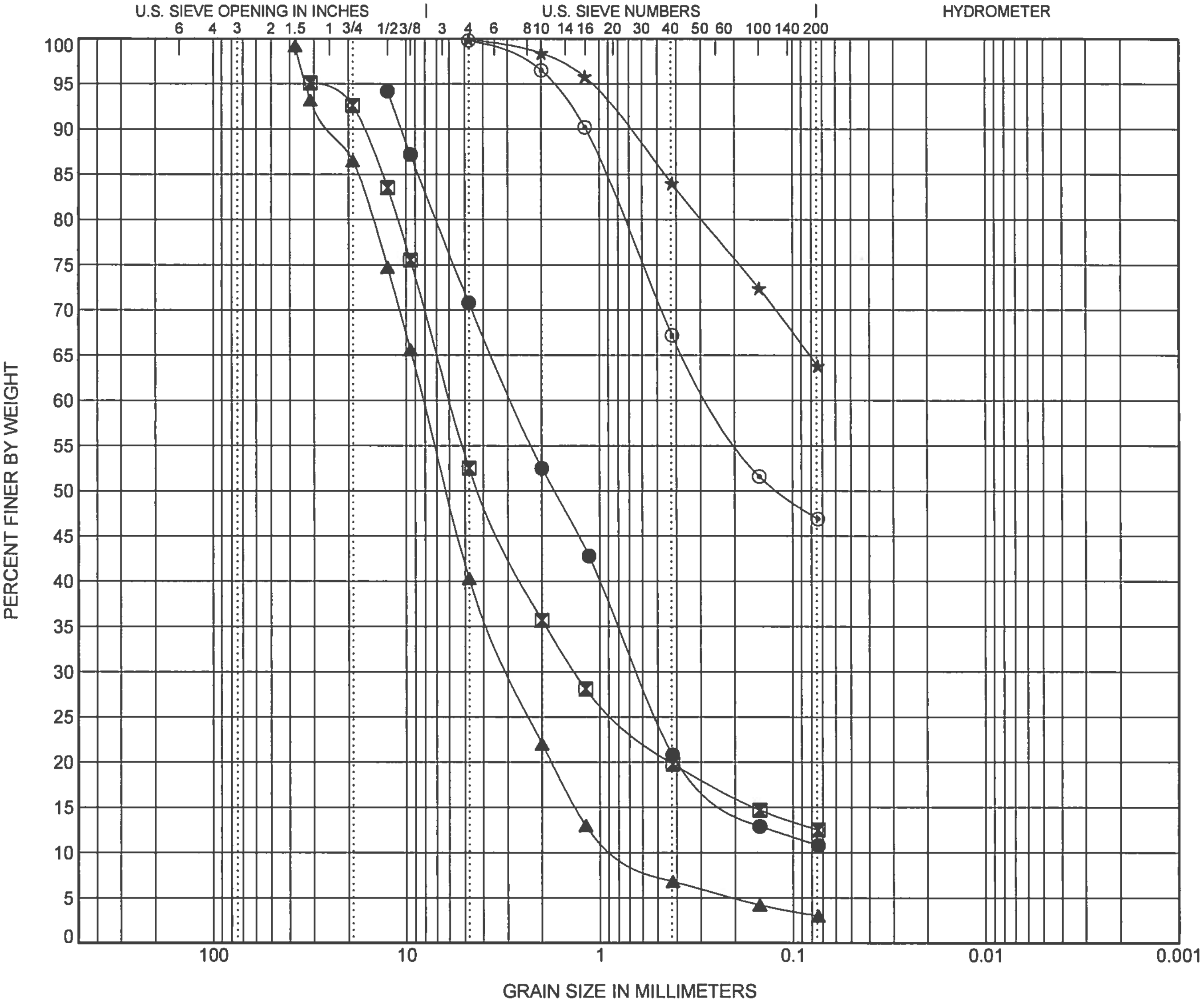
GRAIN SIZE DISTRIBUTION

CLIENT IPEC

PROJECT NAME Painted Hills Golf Course

PROJECT NUMBER 2013-026

PROJECT LOCATION 4403 South Dishman-Mica Road



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	TP-3	2.0	WELL-GRADED SAND with SILT and GRAVEL (SW-SM)				2.51	50.34
⊠	TP-8	2.0	SILTY SAND (SM) with GRAVEL					
▲	TP-19	2.0	WELL-GRADED GRAVEL with SAND(GW)				1.46	11.34
★	TP-22	3.0	SANDY SILT (ML)					
⊙	TP-28	3.0	SILTY SAND (SM)					

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-3	2.0	12.5	2.853	0.638		23.4	59.9	10.8	
⊠	TP-8	2.0	31.25	5.963	1.355		42.6	39.9	12.5	
▲	TP-19	2.0	37.5	8.153	2.922	0.719	58.9	37.2	3.0	
★	TP-22	3.0	4.76				0.0	35.9	64.0	
⊙	TP-28	3.0	4.76	0.26			0.0	52.8	47.0	

REPORT 2

Geotechnical Evaluation, Proposed Stormwater Pond, dated October 14, 2014

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

October 14, 2014
Project No. 14-086

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geotechnical Evaluation**
Proposed Stormwater Pond
Parcel No. 45343.9052
Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed a geotechnical evaluation for geotechnical evaluation at the above-referenced site in Spokane Valley, Washington. The purpose of our services is to evaluate the subsurface soil and groundwater conditions relative to use as a stormwater management facility as part of the Painted Hills golf course property stormwater management system. This report summarizes the results of our site investigation, engineering analyses and recommendations.

PROJECT DESCRIPTION

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed. To account for stormwater runoff volumes from the unnamed tributary along State Highway 27, you propose to use this parcel as a stormwater pond with drywells for subsurface infiltration.

AVAILABLE INFORMATION

We were provided a conceptual site plan for the project by Whipple Consulting Engineers, Inc. (WCE). This plan showed the proposed pond limits, proposed and existing ground surface elevation contours, and property lines. This plan was prepared by WCE and was not dated.

FIELD EVALUATION

Procedures

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) observed the excavation of four test pits at the site. The test pits were excavated on October 1, 2014 using a rubber-tired backhoe operated by an independent firm working under subcontract to IPEC. The geotechnical engineer from IPEC observed the test pit excavations and logged the surface and subsurface conditions. Ground surface elevations at the test pits were interpolated from the contours shown on the site plan.

The soils encountered in the test pits were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedures)". The samples were returned to our facility for review of the classification by a geotechnical engineer and laboratory testing.

Soils Encountered

The test pist encountered glacially deposited silty sand at the surface overlying poorly graded sands to the termination depths of the test pits.

Groundwater was not encountered in the test pits during or after excavation. Well log data in the vicinity of the site indicate that groundwater levels range from approximately 90 to 100 feet.

Geologic maps indicate the soils in this area consist primarily of glacially deposited sands and gravels. According to the Soil Survey of Spokane County, the site soils are classified as Urban land-Springdale, disturbed complex. These soils are described as somewhat excessively drained soils that formed in sandy and gravelly glaciofluvial deposits with minor amounts of volcanic ash and loess in the upper part. The native soils exposed in the test pits were consistent with the NRCS data.

Laboratory Testing

We performed grain size analysis tests on samples obtained from the test pits. The tests were performed in accordance with ASTM Method of Test D 6913. The results of the tests performed are attached to this report.

ANALYSIS AND RECOMMENDATIONS

Stormwater Recommendations

Based on the data obtained from the test pits, field permeability test, and laboratory tests performed, it is our opinion that swales and drywells would be suitable for infiltration of stormwater.

We estimated a design outflow rate for drywells using the results of the laboratory tests and the procedures described in the SRSM manual, Appendix 4A (Spokane 200 Method). The following table summarizes the results of the analysis.

Test Pit	**Depth (feet)**	**USCS Classification**	**Percent Fines**	**Normalized Outflow Rate (cfs/ft)**	**Recommended Design Drywell Outflow Rate (cfs)**	
					Type A	**Type B**
TP-1	10 – 12	SP	1.0	0.5	0.3	1.0
TP-2	10 – 12	SP	1.5	0.5	0.3	1.0
TP-3	10 – 12	SP	1.4	0.5	0.3	1.0
TP-4	10 – 12	SP	1.6	0.5	0.3	1.0

These recommended design outflow rates include a safety factor of 1.3 as required by the SRSM.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Figure 3, Test Pit Location Map
Logs of Test Pits TP-1 through TP-4
Descriptive Terminology
Laboratory Test Results

PAUL T NELSON
STATE OF WASHINGTON
37228
REGISTERED
PROFESSIONAL ENGINEER

10-14-14

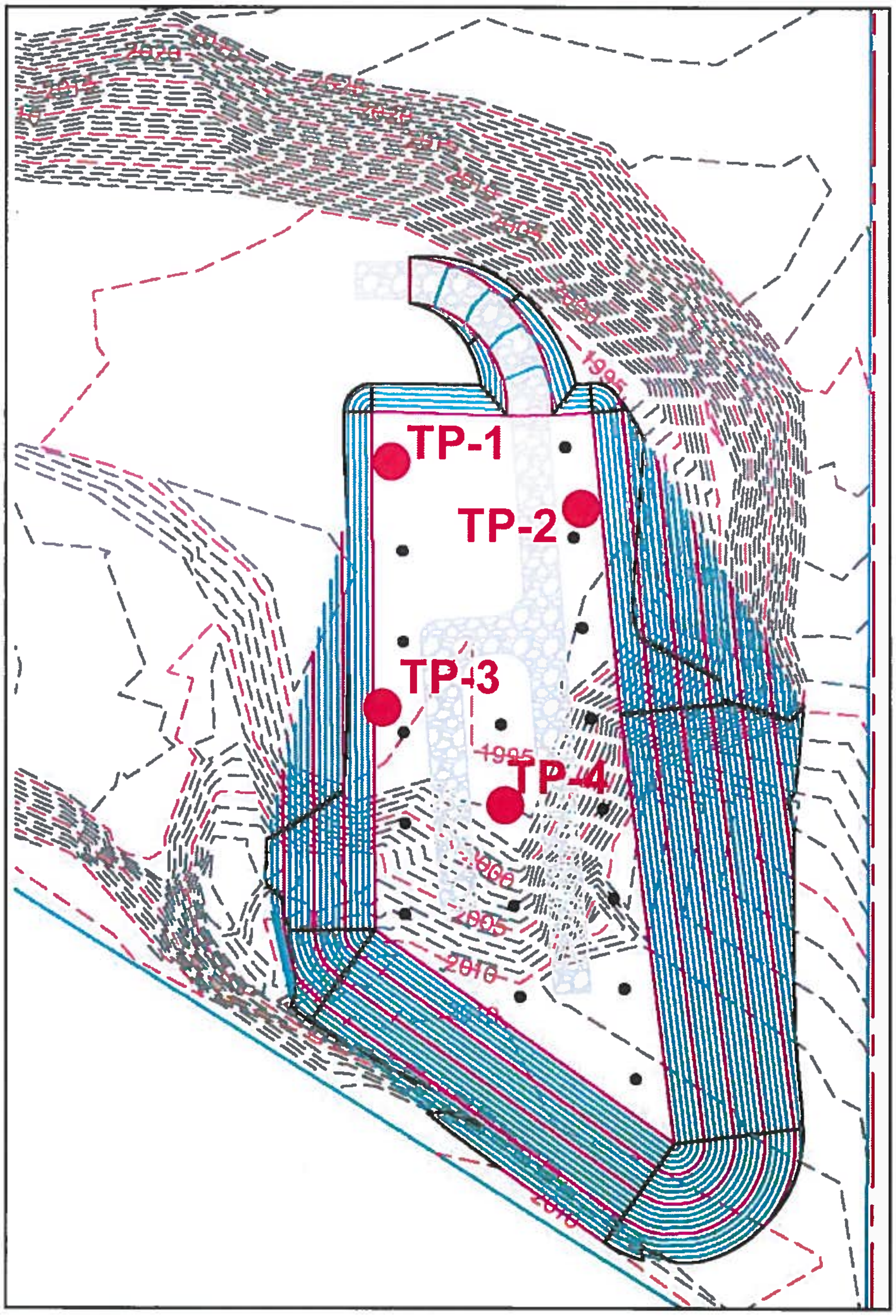
FIGURE 1

Site Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-086 Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA	October 9, 2014

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-086 Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA	October 9, 2014

FIGURE 3



Test Pit Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-086 Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA	October 9, 2014

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-086 Geotechnical Evaluation Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA
TEST PIT:	**TP-1**
LOCATION:	See Test Pit Location Map
DATE:	10/1/14
SCALE:	1"=2'

ELEV. 1994.5	DEPTH 0.0	ASTM D2487 Symbol	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
1993.5	1.0	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash)		
1979.5	15.0	SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, with Cobbles, brown, moist. (Glacial Outwash)		
			End of test pit. Groundwater not encountered. Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 14-086
Geotechnical Evaluation
Proposed Stormwater Pond
Parcel No. 45343.9052
Spokane County, WA

TEST PIT: **TP-2**

LOCATION: See Test Pit Location Map

DATE: 10/1/14

SCALE: 1"=2'

ELEV. 1994.5	DEPTH 0.0	ASTM D2487 Symbol	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
1993.0	1.5	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash)		
		SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, with Cobbles, brown, moist. (Glacial Outwash)		
1979.5	15.0		End of test pit. Groundwater not encountered. Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-086 Geotechnical Evaluation Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA	TEST PIT:	TP-3
		LOCATION:	See Test Pit Location Map
		DATE: 10/1/14	SCALE: 1"=2'

ELEV. 1995	DEPTH 0.0	ASTM D2487 Symbol	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
1994	1.0	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash)		
		SP	POORLY GRADED SAND WITH GRAVEL, medium to coarse grained, with Cobbles, brown, moist. (Glacial Outwash)		
1980	15.0		End of test pit. Groundwater not encountered. Test pit immediately backfilled.		

LOG OF TEST PIT

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-086 Geotechnical Evaluation Proposed Stormwater Pond Parcel No. 45343.9052 Spokane County, WA	TEST PIT:	**TP-4**
		LOCATION:	See Test Pit Location Map
		DATE: 10/1/14	SCALE: 1"=2'

ELEV. 1996	DEPTH 0.0	ASTM D2487 Symbol	DESCRIPTION OF MATERIALS	WL	TESTS OR NOTES
1995	1.0	SM	SILTY SAND WITH GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash)		
		SP	POORLY GRADED SAND WITH GRAVEL,medium to coarse grained, with Cobbles, brown, moist. (Glacial Outwash)		
1981	15.0		End of test pit. Groundwater not encountered. Test pit immediately backfilled.		

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

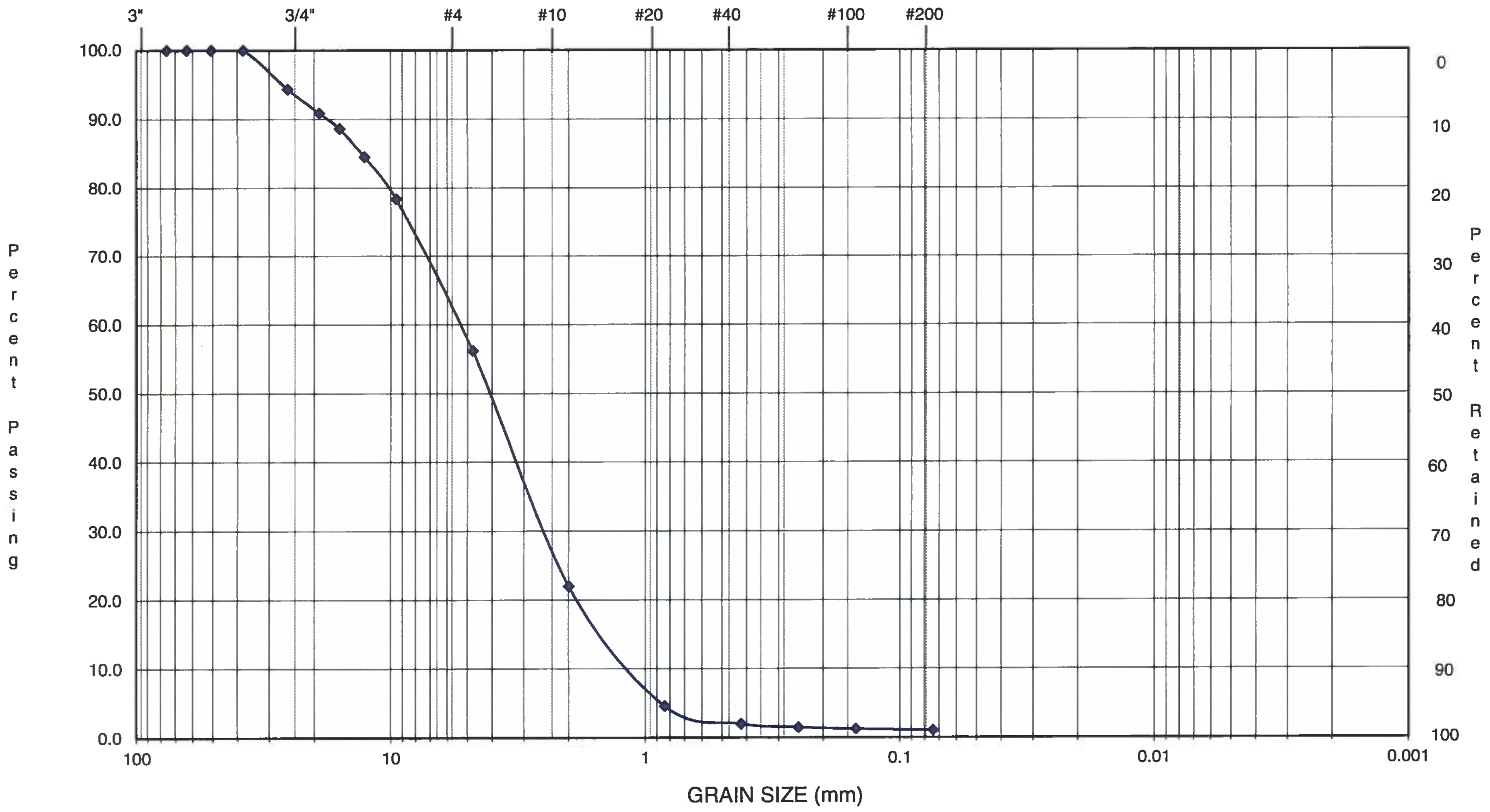
RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE			
COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION					
MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel	
			GP	Poorly Graded Gravel	
		Gravel (with >12% fines)	GM	Silty Gravel	
			GC	Clayey Gravel	
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand	
			SP	Poorly Graded Sand	
		Sand (with >12% fines)	SM	Silty Sand	
			SC	Clayey Sand	
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt	
			CL	Lean Clay	
			OL	Organic Silt and Clay (low plasticity)	
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt	
			CH	Fat Clay	
			OH	Organic Clay and Silt (med to high plasticity)	
Highly Organic Soils			PT	Peat	Muck

MODIFIERS	
DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT	
DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE							
SIEVE SIZE							
	12"	3"	3/4"	4	10	40	200
GRAIN SIZE (INCHES)							
	12	3	0.75	0.19	0.079	0.0171	0.0029
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	



UNIFIED SOIL CLASSIFICATION SYSTEM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	FINES

Sample Identification:
L14-039

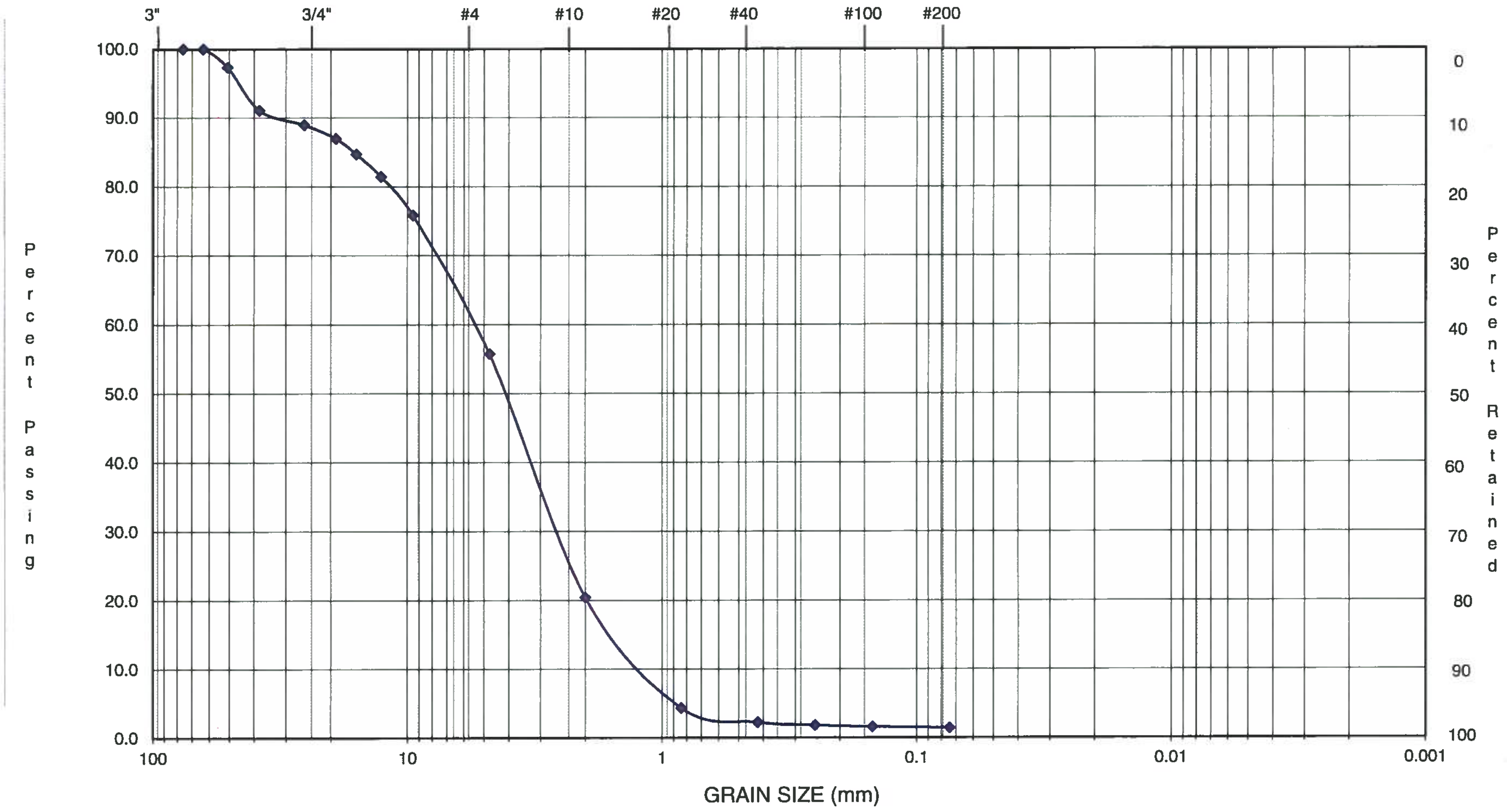
Sample Description:
SP Poorly Graded Sand with Gravel

Lab No. L14-039

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting
P.O Box 1566, Veradale, WA 99037 (509) 209-6262

GRAIN SIZE REPORT

Project: 40th Avenue Stormwater
Location: TP-1 @ 10-12'
Job No.: 14-086
Date: 10/1/2014



UNIFIED SOIL CLASSIFICATION SYSTEM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	FINES

Sample Identification: L14-040

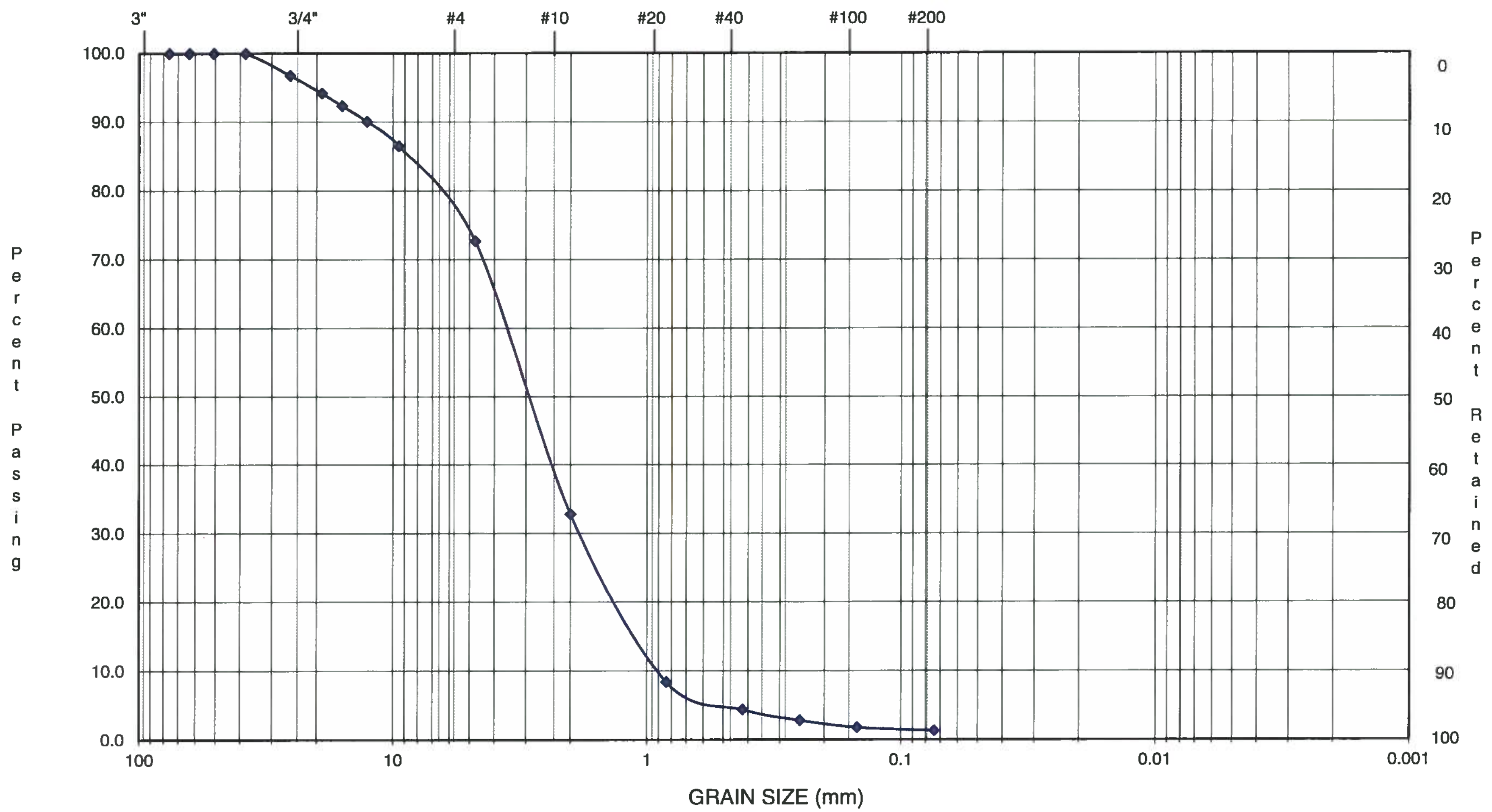
Sample Description: SP Poorly Graded Sand with Gravel

Lab No. L14-040

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting
P.O Box 1566, Veradale, WA 99037 (509) 209-6262

GRAIN SIZE REPORT

Project: 40th Avenue Stormwater
Location: TP-2 @ 10-12'
Job No.: 14-086
Date: 10/1/2014



UNIFIED SOIL CLASSIFICATION SYSTEM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	FINES

Sample Identification:
L14-041

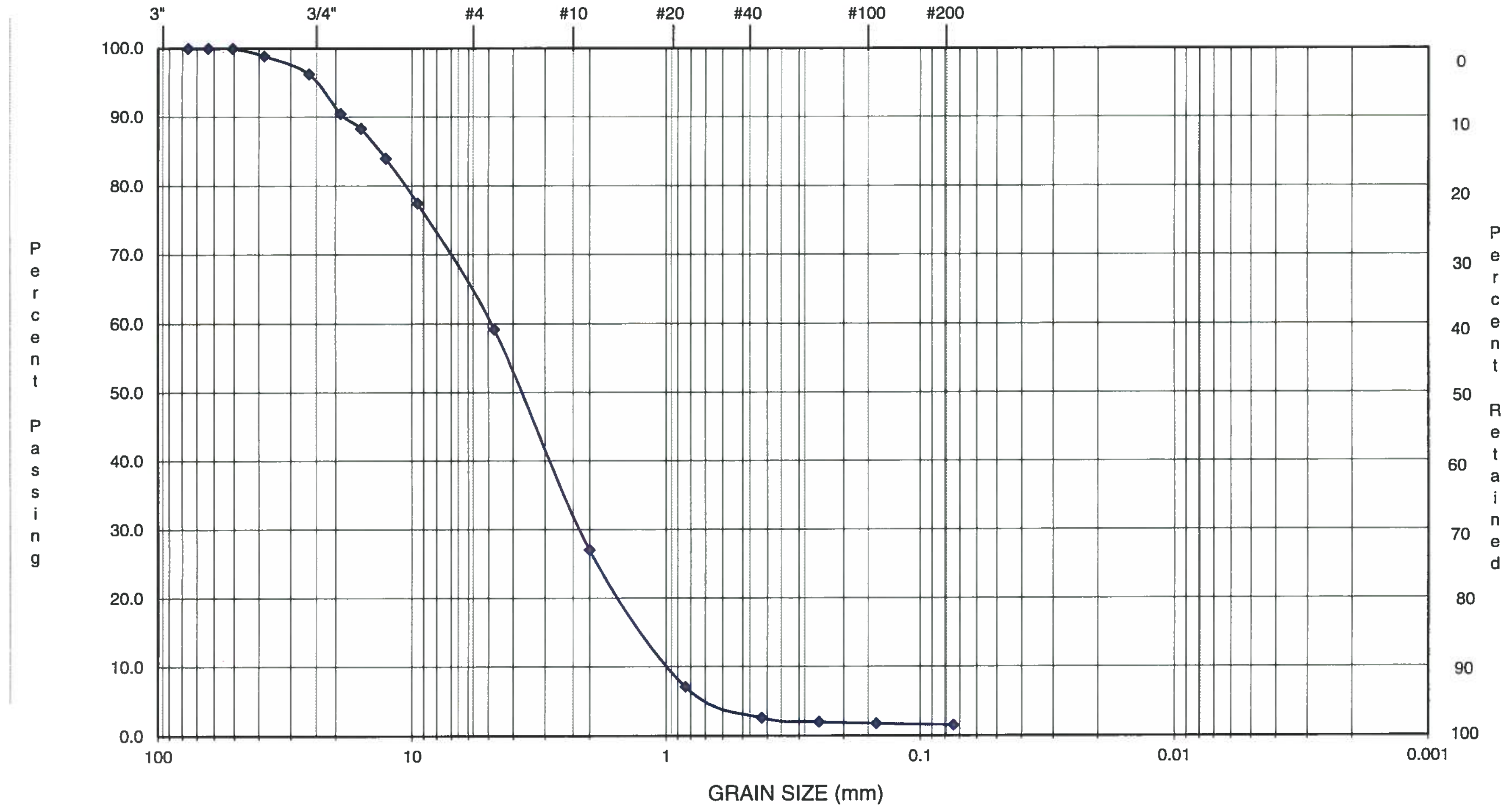
Sample Description:
SP Poorly Graded Sand with Gravel

Lab No. L14-041

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting
P.O Box 1566, Veradale, WA 99037 (509) 209-6262

GRAIN SIZE REPORT

Project: 40th Avenue Stormwater
Location: TP-3 @ 10-12'
Job No.: 14-086
Date: 10/1/2014



UNIFIED SOIL CLASSIFICATION SYSTEM	COARSE GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	FINES

Sample Identification:

L14-042

Sample Description:

SP Poorly Graded Sand with Gravel

Lab No. L14-042

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting
P.O Box 1566, Veradale, WA 99037 (509) 209-6262

GRAIN SIZE REPORT

Project: 40th Avenue Stormwater

Location: TP-4 @ 10-12'

Job No.: 14-086

Date: 10/1/2014

REPORT 3

Geo-hazard Evaluation, dated March 11, 2015

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

March 11, 2015
Project No. 14-053

RECEIVED
JUL 24 2015
SPOKANE VALLEY
COMMUNITY DEVELOPMENT

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geohazard Evaluation**
Painted Hills Preliminary Plat
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

As requested by Mr. Todd Whipple of Whipple Consulting Engineers, Inc. (WCE) on your behalf, we have completed a geohazard evaluation for the proposed Painted Hills Preliminary Plat at the above-referenced site in Spokane Valley, Washington. The purpose of the evaluation was to address the requirements of the Spokane County Critical Areas Ordinance.

According to the Spokane County Critical Areas Ordinance, geologically hazardous areas are defined as areas that exhibit a potential for erosion, landslide, or seismic hazards having one or more of the following characteristics:

- Slopes of 30 percent or greater.
- Soils identified by the Natural Resource Conservation Service (NRCS) as having a severe potential for erosion.
- Existing surface or groundwater hydraulic factors or changes in hydraulic factors caused by the proposed project that create a severe potential for erosion or landslide hazards.
- Areas that are historically prone to landslides or have alluvium, landslide deposits, or Latah Formation.
- Areas of uncompacted fill.
- Areas that are unstable as a result of rapid stream or stream bank erosion.

P.O. Box 1566, Veradale, WA 99037
Phone 509-209-6262

The Geologically Hazardous Areas Map dated January 12, 2007 indicate that the site may have alluvium present. This report summarizes the results of our site observations, opinions, and recommendations.

PROJECT DESCRIPTION

The plat encompasses eight parcels of land encompassing 99.5 acres, most of which was developed as a golf course with the remainder being undeveloped. The plat map indicates that the parcel will be divided into 578 single-family and/or multi-family lots of various sizes and two retail sites. Attached is a copy of the preliminary layout map for the site (see Figure 3).

The site is located at 4403 South Dishman-Mica Road in Spokane Valley, Washington. Specifically, the site is located in the southeast ¼ of Section 33 and the southwest ¼ of Section 34, Township 25 North, Range 44 East and the northeast ¼ of Section 4, Township 24 North, Range 44 East of the Willamette Meridian in Spokane Valley, Washington (see Figure 1, Site Location Map).

AVAILABLE INFORMATION

We were provided a copy of a preliminary site plan for the plat. The plan showed proposed lot lines, existing and proposed roadways, and property lines. This plan was prepared by WCE and was dated September 23, 2014.

In addition, Inland Pacific Engineering Company (IPEC) performed a preliminary geotechnical evaluation on the site in December 2013. The evaluation included excavation of 31 test pits at the site and field permeability testing. The results of the preliminary geotechnical evaluation are summarized in our "Preliminary Geotechnical Evaluation" report to you dated December 31, 2013.

IPEC also performed an evaluation of the levee along the east side of Chester Creek. This evaluation consisted of 6 soil borings and extensive laboratory testing of the site soils. The results of the evaluation are summarized in our "Geotechnical Evaluation" report to you dated February 12, 2015.

GENERAL SOIL CONDITIONS

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam, Narcisse silt loam, Endoaquolls and Fluvaquents, Phoebe ashy sandy loam, and Urban land-Springdale disturbed complex. The native soils encountered in the test pits were consistent with the NRCS data.

FIELD OBSERVATIONS

The site was visited multiple times by a geotechnical engineer between December 2, 2013 and February 20, 2015 to observe test pit excavation and/or soil borings. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

OPINIONS AND RECOMMENDATIONS

Based on the results of our previous site evaluations, field observations, geologic review, the available geotechnical data at the site, and our previous experience in the vicinity of the site, it is our opinion that the proposed development is feasible. It is our opinion that the potential for development problems associated with alluvium is low provided that good construction practices are implemented during construction.

Development and construction will increase the potential for erosion at the site. We recommend that good construction practices be implemented, including silt fences, erosion control berms, establishment of vegetation as rapidly as possible, retaining walls, and proper grading techniques. We recommend a maximum slope angle of 2:1 for temporary and/or permanent slopes.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

We appreciate the opportunity to provide our services to you. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
3-11-15

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Figure 3, Plat Map

FIGURE 1

<table>
<tr><th colspan="3">Site Location Map</th></tr>
<tr><td rowspan="2">IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting</td><td>Project No. 14-053</td><td rowspan="2">March 11, 2015</td></tr>
<tr><td>Geohazard Evaluation
Painted Hills Preliminary Plat
Spokane Valley, WA</td></tr>
</table>

FIGURE 2

NRCS Map

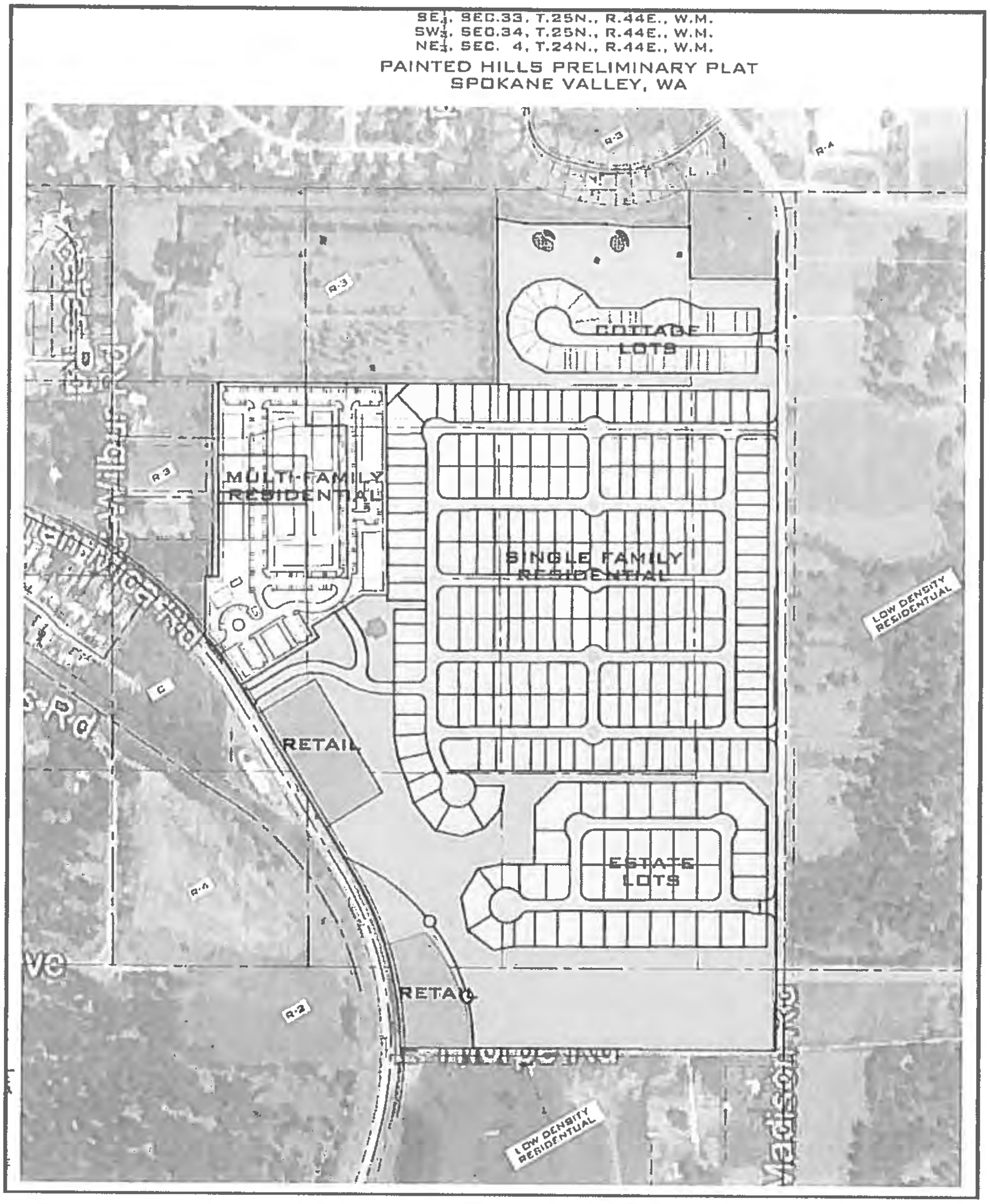
IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

Project No. 14-053

Geohazard Evaluation
Painted Hills Preliminary Plat
Spokane Valley, WA

March 11, 2015

FIGURE 3



Plat Map

IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-053 Geohazard Evaluation Painted Hills Preliminary Plat Spokane Valley, WA	March 11, 2015

REPORT 4

Levee Evaluation and Certification, 4403 South Dishman-Mica Road, dated February 12, 2015, revised August 29, 2016

GEOTECHNICAL EVALUATION
LEVEE EVALUATION AND CERTIFICATION
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037

February 12, 2015
Revised August 29, 2016

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

February 12, 2015
Project No. 14-037

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geotechnical Evaluation**
Chester Creek Levee Certification
4403 South Dishman-Mica Road
Spokane County, WA

Dear Mr. Walker:

We have completed the geotechnical evaluation for the Chester Creek levee Certification at the above-referenced site in Spokane, Washington. The purpose of evaluation was to evaluate the existing levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

We appreciate the opportunity to provide our services to you on this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

Attachment: Geotechnical Evaluation Report

GEOTECHNICAL EVALUATION
LEVEE EVALUATION AND CERTIFICATION
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037

February 12, 2015
Revised August 29, 2016

Prepared for:

NAI Black
Spokane, Washington

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

TABLE OF CONTENTS

Project No. 14-037
Levee Evaluation and Certification
4403 South Dishman-Mica Road
Spokane County, Washington

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page

1.0 INTRODUCTION

1.1 Project Description

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed.

1.2 Purpose

The purpose of our services is to evaluate the existing levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

1.3 Scope

Our services were requested by Mr. Bryan Walker of NAI Black. Mr. Walker authorized us to proceed on February 24, 2014. The scope of work agreed upon consisted of the following:

- review of existing geotechnical data and reports for the development, if available
- drill 6 penetration test borings at the site to a depth of 25 feet,
- performing laboratory tests on samples obtained from the test pits,
- classifying the soils and preparing boring logs, and
- submitting a geotechnical report containing logs of the borings, results of our field investigation and laboratory testing, and our analyses, opinions, and recommendations relative to the conformance of the existing levee to FEMA standards.

1.4 Available Information

We were provided a topographic survey for the project site by WCE. This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013.

We also performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

In conjunction with this evaluation, West Consultants, Inc. (WEST) has been contracted by NAI Black to provide a FEMA Conditional Letter of Map Revision submittal (CLOMR). They have provided Inland Pacific Engineering Company (IPEC) water surface elevations and velocity output from their revised RAS model to assist us in our evaluation.

1.5 Locations and Elevations

The borings were drilled at or near locations selected by us. The boring locations are shown on the Boring Location Map in Appendix A. The borings were staked by Whipple Consulting Engineers, Inc. (WCE). Ground surface elevations at the borings were provided by WCE.

2.0 RESULTS

2.1 Logs

Log of Boring sheets indicating the vertical sequence of soils and materials encountered and groundwater observations are included in Appendix B. The strata changes were inferred from the changes in the penetration test samples and auger cuttings brought to the surface. Please note that the depths shown as changes between the strata are only approximate. The changes are likely transitions and the depths of changes vary between the borings. Geologic origins for each stratum are based on the soil type, available geologic maps, previous geotechnical reports for this and adjacent sites, and available common knowledge of the depositional history of the site.

2.2 Site Conditions

The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner. The existing levee is on the east side of Chester Creek between Thorpe Road and Dishman-Mica Road. The creek side of the levee is typically at a 2.3:1 to 3:1 (H:V) slope. The land side of the levee is also at a 3:1 slope from the Dishman-Mica Road bridge to approximately 300 feet southeast. Between this point and Thorpe Road, the land side slope is much less and, in some areas, relatively level with the crest.

2.3 Soils

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Narcisse silt loam and Endoaquolls and Fluvaquents. The native soils encountered in the borings were consistent with the NRCS data.

The borings typically encountered existing fill or "possible fill" in the upper 9 to 12 feet (it was considered "possible fill" because it did not appear to be native soil, but no indicator, such as debris, etc., was found to confirm our opinion). Below the fill or "possible fill", the borings encountered water-deposited silty to clayey sands and/or poorly graded sands to their termination depths. Boring B-1 encountered alluvial lean clay below the 18-foot depth. Borings B-2, B-3, and B-5 encountered layers of lean to silty clay embedded in the sands at various depths.

2.4 Penetration Resistances

Penetration resistances (N-values) in the fill or "possible fill" ranged from 2 to 23 blows per foot (BPF) and averaged 11 BPF. Penetration resistances in the sands ranged from 3 to 19 BPF and averaged 10 BPF, indicating that these soils were very loose to medium dense, but were typically loose. Penetration resistances in the clays ranged from 2 to 6 BPF indicating that these soils were soft to medium in consistency.

2.5 Groundwater

Groundwater was not encountered in Borings B-1 and B-2 during or immediately after drilling. Boring B-1 was left open for 2 days and groundwater was not observed at that time. Groundwater was encountered in the remaining borings at depths ranging from 7.5 to 18 feet after drilling and/or up to 1 day later. These depths correspond to elevations ranging from 1996.9 to 2007.2. These observed levels are generally below the level of Chester Creek.

Based on our experience in the vicinity of the site, along with numerous test pits excavated on the site previously, it is our opinion that this portion of the creek is the beginning of the recharge section as evidenced by the typical lack of water in the creek further downstream. Also, the test pits previously excavated at the site east of the levee did not encounter groundwater. Well log data in the vicinity of the site indicate that groundwater is typically 50 to 80 feet below the surface.

2.6 Laboratory Testing

We obtained soil samples from the borings during our site investigation. The tests performed included the following:

1. ASTM D 6913, Sieve Analysis
2. ASTM D 4318, Atterberg Limits'
3. ASTM D 5084, Permeability
4. ASTM D 3080, Direct Shear
5. ASTM D 4767, Consolidated-Undrained Triaxial Compression

These tests were used to aid in classifying the soils and in the engineering analyses and formulation of engineering opinions and recommendations. The tests were performed by outside laboratories subcontracted to Inland Pacific Engineering Company (IPEC). The tests were performed by Budinger & Associates, Inc. and GN Northern, Inc. Attached are data sheets summarizing the tests performed.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 History

The levee was constructed in the early 1990's by the golf course property owner. As such, design plans or as-built drawings are not available. However, an as-built survey was completed by WCE in 2014.

3.2 Freeboard

We were provided 100-year flood elevations by WEST. They provided us a plan view of the levee with flood elevations at 5 locations starting at the bridge on Thorpe Road and ending at the bridge on Dishman-Mica Road. The elevations ranged from 2012.1 at Thorpe Road to 2010.4 at Dishman-Mica Road. Please refer to the WEST report for a complete summary of the floodplain analysis.

According to 44 CFR Section 65.10(b)(1), an additional 1 foot of freeboard is required within 100 feet of bridge structures. This will require the top of the levee to be at elevation 2016.1 at the Thorpe Road bridge and extending 100 feet north. Since the existing levee is at elevation 2015 in this area, it will be necessary to raise this portion of the levee to meet the minimum freeboard requirements. This will also be necessary at and between the pedestrian bridges near the middle of the levee alignment. At these bridges, the top of the levee will need to be raised to elevation 2015.1 south of the southern pedestrian bridge to elevation 2014.8 north of the northern pedestrian bridge. The freeboard requirement for the Dishman-Mica Road bridge is adequate.

3.3 Closures

There are no penetrations of the levee so closure devices are not required.

3.4 Embankment Protection

The levee is currently grass-covered for erosion protection. We evaluated the erosion protection for the creek side of the levee using the results of the HEC-RAS analysis by WEST. They provided flow velocities for the 100 and 500-year flood events. The flow velocities are shown in the following table.

River Station	100-year Channel Velocity (ft/sec)	500-year Channel Velocity (ft/sec)
21500	Thorpe Road	
21482.42	6.9	7.1
21456.36	2.4	2.5
21231.71	2.5	2.6
21013.79	3.4	3.5
20975.95	2.9	3.0
20970	Pedestrian Bridge	
20967.18	2.8	2.9
20928.94	2.0	2.0
20895.90	1.9	1.9
20868.07	1.9	2.0
20838.54	2.2	2.3
20830	Pedestrian Bridge	
20828.27	2.0	2.1
20779.14	2.4	2.4
20554.71	3.2	3.3
20492.77	1.4	1.5
20450	Dishman-Mica Road	

As shown in the table, the average flow velocity is typically less than 3 feet per second. At these velocities, it is our opinion that the vegetative erosion protection is adequate given the age of the levee and that no significant erosion is visible. We did note, however, that vegetation is not present below and adjacent to the pedestrian bridge abutments. We recommend that the levee slopes at these locations be protected with erosion matting or rip rap. We also recommend erosion matting or rip rap from the Thorpe Road bridge to River Station 21600 due to higher flow velocity. Also, all trees on or adjacent to the levee on the levee side of the creek will need to be removed.

3.5 Embankment and Foundation Stability

We evaluated the embankment and foundation stability for conditions described in EM 1110-2-1913, “Design and Construction of Levees, by the US Corps of Engineers dated April 30, 2000, Chapter 6. We analyzed the levee embankment for the following cases:

1. CASE I, End of construction.
2. CASE II: Sudden drawdown.
3. CASE III: Steady state seepage from full flood stage.

We performed slope stability analyses for each case. We analyzed the levee embankment with 2.3:1 slopes. This configuration is considered to have the lowest factor of safety. For our analyses, we used XSTABL software which is based on a software program developed at Purdue University.

For these cases, we calculated the minimum factors of safety as shown in the following table.

CASE	Minimum Factor of Safety
I	1.58
II	1.50
III	1.55

For stability, a minimum factor of safety of 1.5 is generally considered acceptable. Based on this analysis, it is our opinion that the levee will be stable with respect to global slope stability provided the recommendations of this report are followed.

3.6 Settlement

The average depth of fill is approximately 10 feet. This would result in a loading increase of approximately 1,250 pounds per square foot (psf) on the bearing soils. Based on the data obtained from the borings, the levee was constructed above loose to medium dense sands. Settlement in these soils would have occurred shortly after construction. Also, given the age of the levee, it is our opinion that significant additional long term settlement will not occur.

We did analyze the silty clay layer encountered in Boring B-5 with a 1-foot raise in grade should it be necessary to maintain minimum freeboard. For our analysis, we used a unit weight of 125 pounds per cubic foot (pcf) for the embankment fill soils and a compression index of 0.15 for the silty clay and assumed total saturation of the clay layer. Based on these parameters, we estimated the additional settlement to be less than 0.35 inches or 0.03 feet.

3.7 Interior Drainage

Interior drainage systems have been designed by WCE. We understand that these systems will include detention ponds with multiple drywells to control flood waters and infiltrate them into the ground. Please refer to the WCE report for a comprehensive description of the interior drainage system.

3.8 Operation Plans

The Operation Plan is provided in Appendix D.

3.9 Maintenance Plan

The Maintenance Plan is provided in Appendix D.

3.10 Certification

Based on the historical data obtained, the results of the borings and laboratory tests performed, and the available geologic data, we certify that, to the best of our knowledge, that the Chester Creek levee has been constructed in accordance with sound engineering principles and will provide reasonable protection from the 100-year and 500-year floods and meets the requirements of 44 CFR 65.10 provided the recommendations of this report are followed.

4.0 PROCEDURES

4.1 Excavation and Sampling

The borings were completed between April 7 and 10, 2014 using a tracked drill rig operated by an independent firm working under subcontract to IPEC. A geotechnical engineer from our firm continuously observed the borings and logged the surface and subsurface conditions. After we logged the borings, they were abandoned in accordance with state requirements.

4.2 Soil Classification

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedures)".

5.0 GENERAL RECOMMENDATIONS

5.1 Basis of Recommendations

The analyses and recommendations submitted in this report are based on the data obtained from the borings performed at the locations indicated on the Boring Location Map in Appendix A. It should be recognized that the explorations performed for this evaluation reveal subsurface conditions only at discreet locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

5.2 Groundwater Fluctuations

We made water level observations in the borings at the times and conditions stated on the boring logs. These data were interpreted in the text of this report. The period of observation was relatively short and fluctuation in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

5.3 Use of Report

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

5.4 Level of Care

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

5.5 Professional Certification

This report was prepared by me or under my direct supervision and I am a duly registered engineer under the laws of the State of Washington.

Paul T. Nelson, P.E.
Principal Engineer

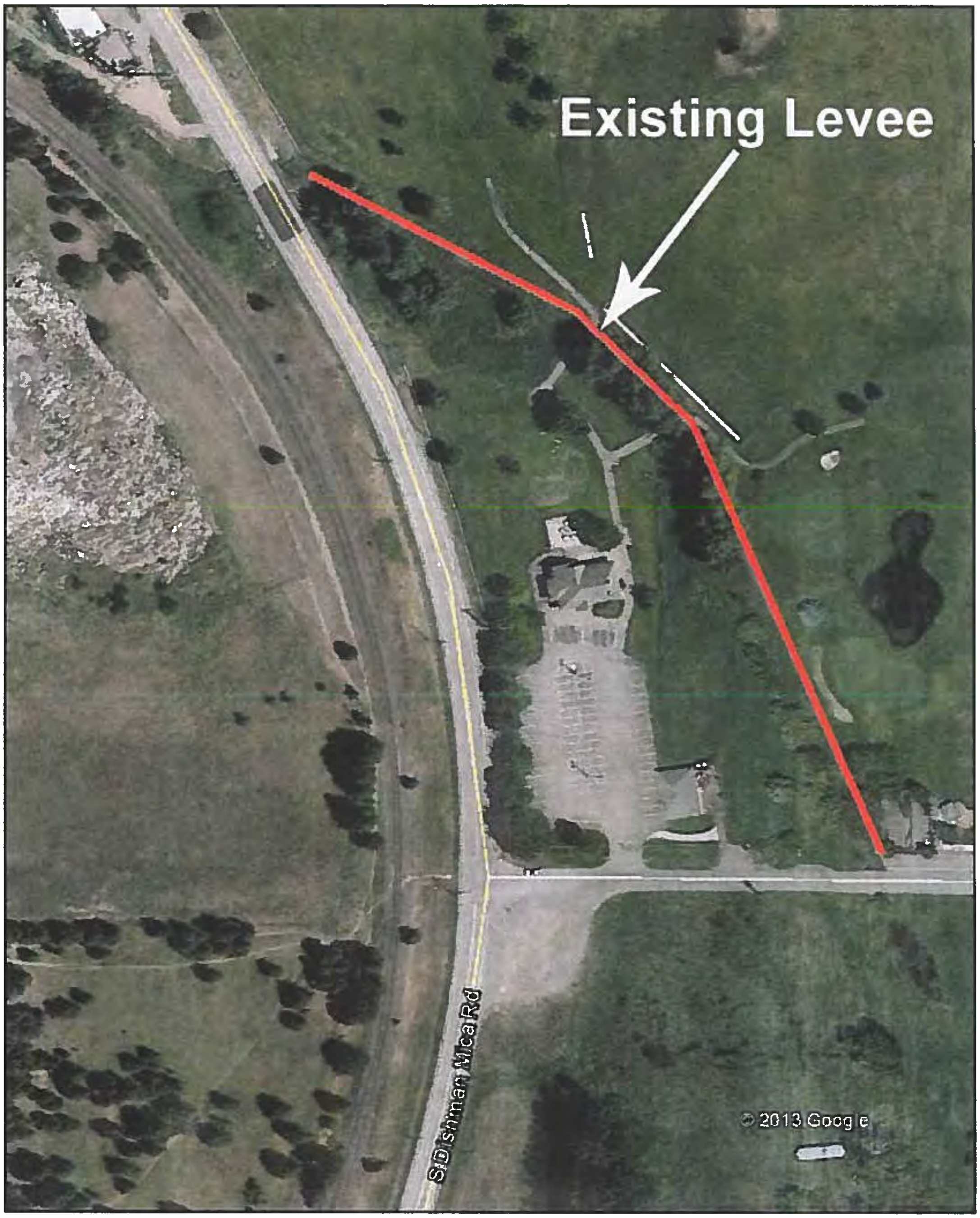
PAUL T NELSON
37228

2-12-15

APPENDIX A

SITE LOCATION MAP, NRCS MAP, TEST PIT LOCATION MAP

FIGURE 1

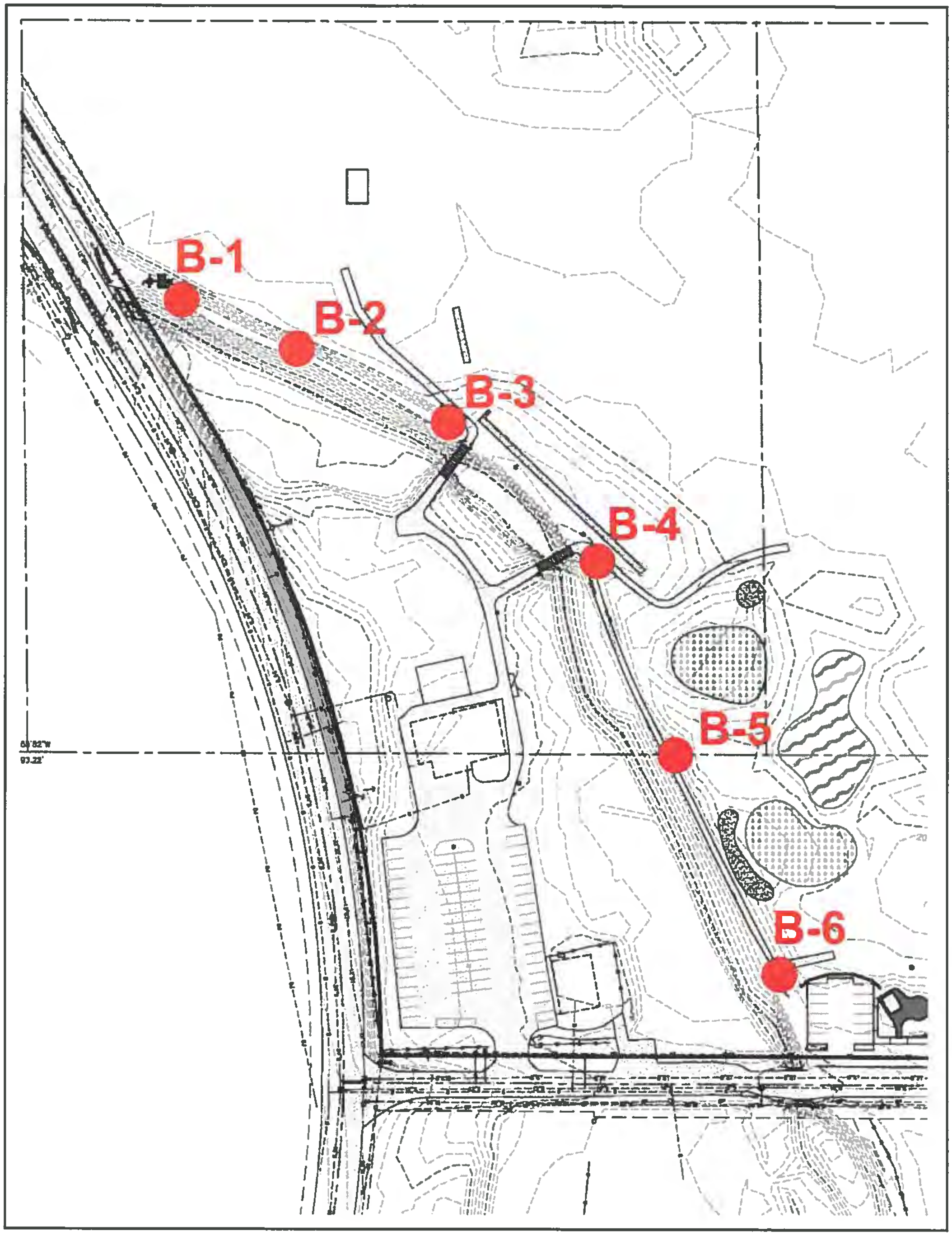


<table>
<tr><th colspan="3">Site Location Map</th></tr>
<tr><td rowspan="2">IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting</td><td>Project No. 14-037</td><td rowspan="2">March 10, 2014</td></tr>
<tr><td>Painted Hills Golf Course Levee
4403 South Dishman-Mica Road
Spokane Valley, WA</td></tr>
</table>

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037 Painted Hills Golf Course Levee 4403 South Dishman-Mica Road Spokane Valley, WA	March 10, 2014

FIGURE 3



Boring Location Map

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037 Painted Hills Golf Course Levee 4403 South Dishman-Mica Road Spokane Valley, WA	March 10, 2014

APPENDIX B

LOGS OF TEST PITS, DECRIPTIVE TERMINOLOGY

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-037 Levee Evaluation and Certification Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane County, WA	BORING:	**B-1**
		LOCATION:	See Boring Location Map
		DATE: 4/7/14	SCALE: 1"=4'

ELEV. 2015.5	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2014.0	1.5	FILL	Silty Sand, fine to medium grained, with roots, dark brown, moist.			
2007.5	18.0	FILL	Sandy Silt, gray-brown to brown, moist.	14 12 7		
2004.5	11.0	FILL	Poorly Graded Sand, fine to medium grained, gray-brown to brown, moist.	10		
1997.5	18.0	SC-SM	SILTY CLAYEY SAND, fine to medium grained, brown, moist to wet, medium dense. (Alluvium)	14		
1990.5	25.0	CL	LEAN CLAY, brown, wet, medium. (Alluvium)	6		Thinwall sample from 21'-23' Thinwall sample from 23'-25'
			End of Boring. Groundwater not encountered with 24' of hollow-stem auger in the ground. Groundwater not encountered immediately after withdrawal. Groundwater not encountered 2 days after withdrawal. Boring then grouted to surface.			

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Xerox WorkCentre 7556 PS, SMM

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-037 Levee Evaluation and Certification Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane County, WA
BORING:	B-2
LOCATION:	See Boring Location Map
DATE:	4/7/14
SCALE:	1"=4'

ELEV. 2015.2	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2013.7	1.5	FILL	Clayey Sand, fine to medium grained, with roots, dark brown, wet.			
2005.2	10.0	FILL	Silty Sand, fine to medium grained, dark brown, moist to wet.	3 4 4		
2003.2	12.0	SC-SM	SILTY CLAYEY SAND, fine grained, brown, wet, very loose. (Alluvium)	3		
1994.7	20.5	SP	POORLY GRADED SAND, fine to medium grained, brown, water-bearing, loose. (Alluvium)	8 7		
1992.2	23.0	CL	LEAN CLAY, brown, wet. (Alluvium)	Thinwall sample from 21'-23'		
1991.2	24.0	SM	SILTY SAND, fine grained, brown, water-bearing. (Alluvium)			
1989.7	25.5	SP	POORLY GRADED SAND, fine to medium grained, brown, water-bearing, medium dense. (Alluvium)	13		
			End of Boring. Groundwater not encountered with 24' of hollow-stem auger in the ground. Groundwater not encountered immediately after withdrawal. Boring then grouted to surface.			

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 14-037
Levee Evaluation and Certification
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane County, WA

BORING: **B-3**
LOCATION: See Boring Location Map
DATE: 4/7/14
SCALE: 1"=4'

ELEV. 2014.6	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2013.1	1.5	FILL	Clayey Sand, fine to medium grained, with roots, black, wet.			
2009.6	5.0	FILL	Silty Sand, fine to medium grained, dark brown, moist.	8		
2004.6	10.0	FILL	Poorly Graded Sand, fine to medium grained, brown, moist.	5 23		
2002.6	12.0	CL	SANDY LEAN CLAY, brown, wet, medium. (Alluvium)	6		
1989.1	25.5	SC	CLAYEY SAND, fine to medium grained, with seams of Poorly Graded Sand, brown, wet to water-bearing, loose to medium dense. (Alluvium)	7 13 14		
			End of Boring. Groundwater down 10.5' with 24' of hollow-stem auger in the ground. Groundwater down 10.5' immediately after withdrawal. Boring then grouted to surface.			

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT:	14-037 Levee Evaluation and Certification Painted Hills Golf Course Property 4403 South Dishman-Mica Road Spokane County, WA
BORING:	**B-4**
LOCATION:	See Boring Location Map
DATE:	4/8/14
SCALE:	1"=4'

ELEV. 2014.9	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2010.9	4.0	FILL	Silty to Silty Clayey Sand, fine to medium grained, with roots, dark gray, moist.	18		
2005.9	9.0	FILL	Silty Sand, fine grained, brown to gray, moist.	14 15		
2000.9	14.0	SP-SM	POORLY GRADED SAND WITH SILT, fine to medium grained, moist, medium dense. (Alluvium)	13		
1996.9	18.0	SC	CLAYEY SAND, fine to medium grained, brown, wet, loose. (Alluvium)	7		Thinwall sample from 16'-18'
1989.4	25.5	SP-SM	POORLY GRADED SAND WITH SILT, fine to medium grained, brown, water-bearing, medium dense. (Alluvium)	19 17		
			End of Boring. Groundwater down 19' with 24' of hollow-stem auger in the ground. Groundwater down 19' immediately after withdrawal. Groundwater down 18' 1 day after withdrawal. Boring then grouted to surface.			

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Xerox WorkCentre 7556 PS_SMM

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 14-037
Levee Evaluation and Certification
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane County, WA

BORING: **B-5**
LOCATION: See Boring Location Map
DATE: 4/10/14
SCALE: 1"=4'

ELEV.	DEPTH	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2014.6	0.0					
2014.1	0.5	FILL	Silty Sand, fine to medium grained, with roots, dark brown, moist.			
2010.6	4.0	FILL	Clayey Sand, fine grained, dark-gray to gray brown, moist to wet.	3		
2007.6	7.0	FILL	Silty Sand, fine to mediun grained, dark brown, moist to wet.	6		
2005.6	9.0	CL-ML	SANDY SILTY CLAY, brown, wet, soft. (Alluvium)	2		
1997.6	17.0	SC-SM	SILTY CLAYEY SAND, fine grained, with/seams of Poorly Graded Sand, brown, wet to water bearing, loose to very loose. (Alluvium)	5 3		Thinwall sample from 11'-13'
1989.1	25.5	SP	POORLY GRADED SAND, fine to medium grained, brown, water-bearing, loose to medium dense. (Alluvium)	8 16		
			End of Boring. Groundwater down 17.5' with 24' of hollow-stem auger in the ground. Groundwater down 8.5' immediately after withdrawal. Groundwater down 8.5' 3 hours after withdrawal. Boring then grouted to surface.			

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Xerox WorkCentre 7556 PS SMM

LOG OF BORING

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

PROJECT: 14-037
Levee Evaluation and Certification
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane County, WA

BORING: **B-6**

LOCATION: See Boring Location Map

DATE: 4/10/14

SCALE: 1"=4'

ELEV. 2014.7	DEPTH 0.0	ASTM D2487 SYMBOL	DESCRIPTION OF MATERIALS	N	WL	TESTS OR NOTES
2013.7	1.0	FILL	Silty Sand, very fine to medium grained, with roots, dark brown, moist.			
2010.7	4.0	FILL	Silty Sand, fine to medium grained, gray-brown, moist.	4		
2007.7	7.0	SC	Clayey Sand, very fine to fine grained, dark gray, wet. (Possible Fill)	4		
2002.7	12.0	SM	SILTY SAND, fine to medium grained, brown-gray, wet to water-bearing, very loose. (Possible Fill)	2 3		Thinwall sample from 11'-12'
1996.7	18.0	SM	SILTY SAND, fine to medium grained, brown, water-bearing, medium dense. (Alluvium)	8		
1989.2	25.5	SP	POORLY GRADED SAND, fine to medium grained, with seams of Clayey Sand, brown, water-bearing, loose. (Alluvium)	8 8		
			End of Boring. Groundwater down 22.5' with 24' of hollow-stem auger in the ground. Groundwater down 7.5' immediately after withdrawal. Boring then grouted to surface.			

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Xerox WorkCentre 7556 PS, SMM

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with >12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand
			SP	Poorly Graded Sand
		Sand (with >12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (low plasticity)
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Fat Clay
			OH	Organic Clay and Silt (med to high plasticity)
Highly Organic Soils			PT	Peat Muck

MODIFIERS

DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT

DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE

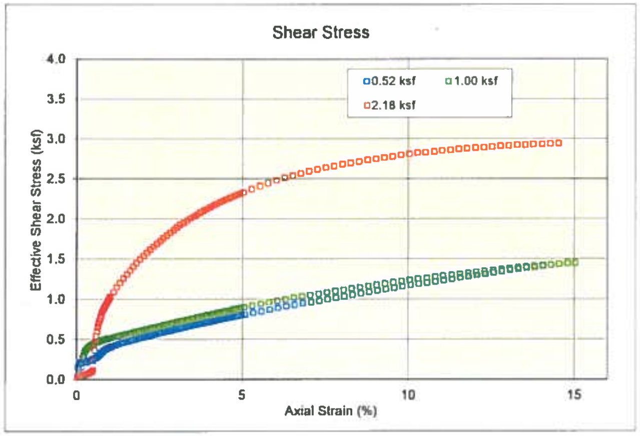
SIEVE SIZE							
	12"	3"	3/4"	4	10	40	200
GRAIN SIZE (INCHES)							
	12	3	0.75	0.19	0.079	0.0171	0.0029
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

APPENDIX C

LABORATORY TEST RESULTS

Report of CU Triaxial Shear Test

ASTM D4767-11



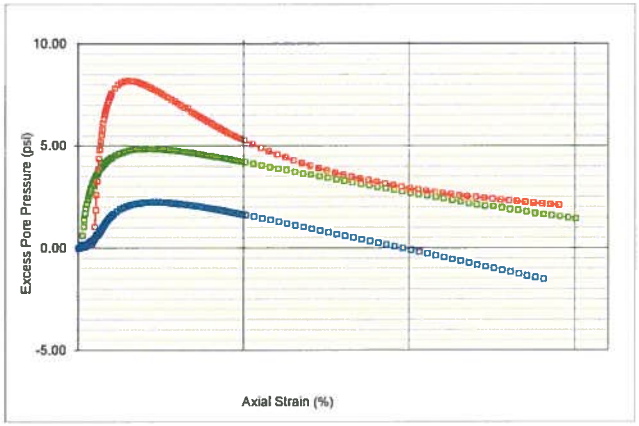
Laboratory Number: 14-0268
Sample Number: B1 21'-23'
Sample Description: Brown Clay
Sample Source: Shelby 2.8" Tube

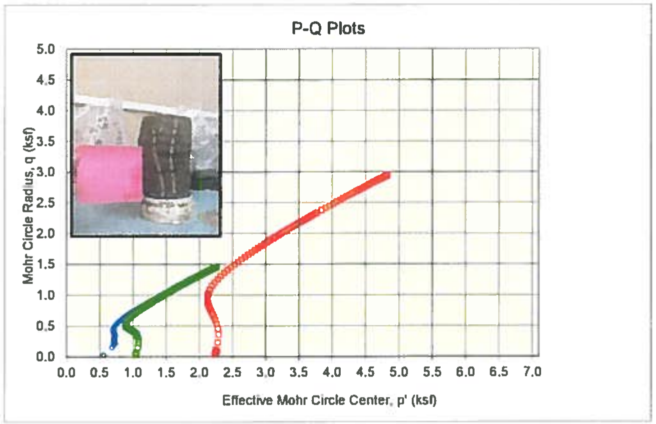
Shear rate 2.67%/hour

	0.52 ksf	1.00 ksf	2.18 ksf
Initial dry unit weight (pcf)	109.0	111.9	124.4
Initial Wc (%)	25.5%	23.2%	12.9%
Final dry unit weight (pcf)	110.1	114.8	127.5
Final Wc (%)	19.6%	17.6%	16.3%

Consolidation Stress (ksf)	Peak Failure Stress p (ksf)	q (ksf)
0.52	2.25	1.47
1.00	2.25	1.46
2.18	4.82	2.95

Above values are effective stresses



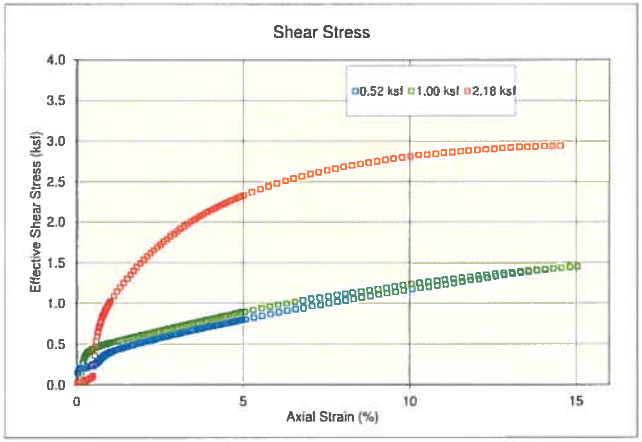


Budinger
& Associates
1101 North Fancher Road
Spokane Valley WA 99212

TRIAXIAL SHEAR TEST RESULTS
Project: Painted Hills Levee
Location: 4403 S Dishman-Mica Rd, Spokane Valley, WA
Project Number: L14183

Report of CU Triaxial Shear Test

ASTM D4767-11

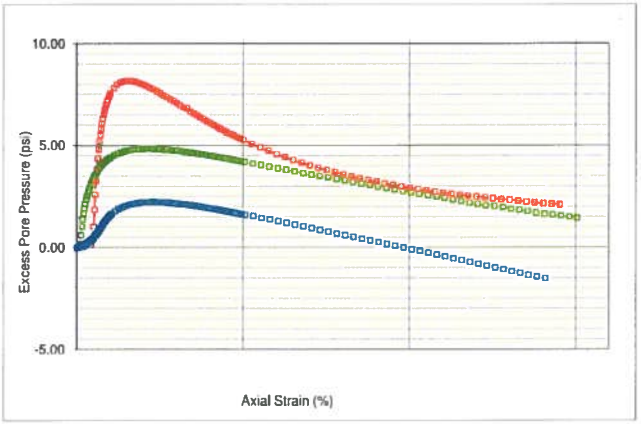


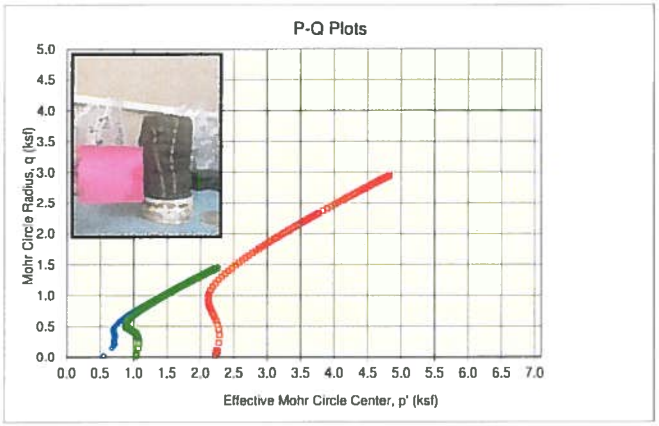
Laboratory Number: 14-0271
Sample Number: B4 @ 16'-18'
Sample Description: Brown Clay
Sample Source: Shelby 2.8" Tube

	0.52 ksf	1.00 ksf	2.18 ksf
Shear rate 2.67%/hour			
Initial dry unit weight (pcf)	109.0	111.9	124.4
Initial Wc (%)	25.5%	23.2%	12.9%
Final dry unit weight (pcf)	110.1	114.8	127.5
Final Wc (%)	19.6%	17.6%	16.3%

Consolidation Stress (ksf)	Peak Failure Stress p (ksf)	q (ksf)
0.52	2.25	1.47
1.00	2.25	1.46
2.18	4.82	2.95

Above values are effective stresses



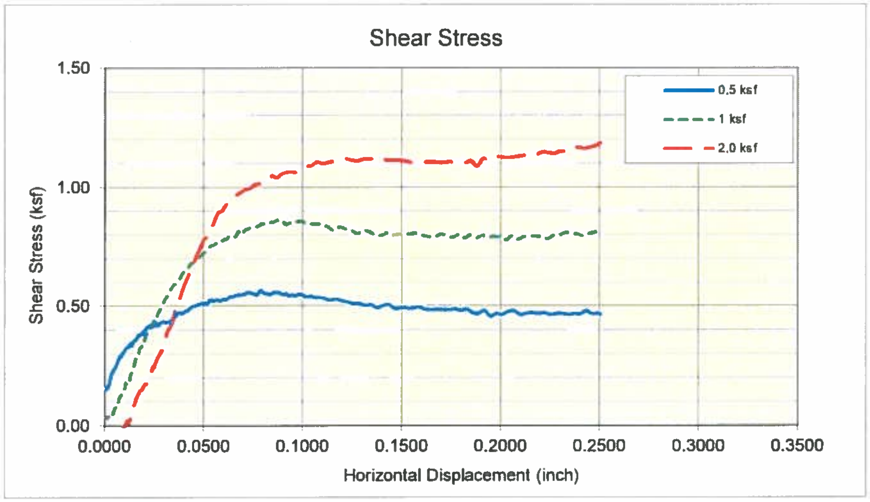


Budinger
& Associates
1101 North Fancher Road
Spokane Valley, WA 99212

TRIAXIAL SHEAR TEST RESULTS
Project: Painted Hills Levee
Location: 4403 S Dishman-Mica Rd, Spokane Valley, WA
Project Number: L14183

Report of Direct Shear Test

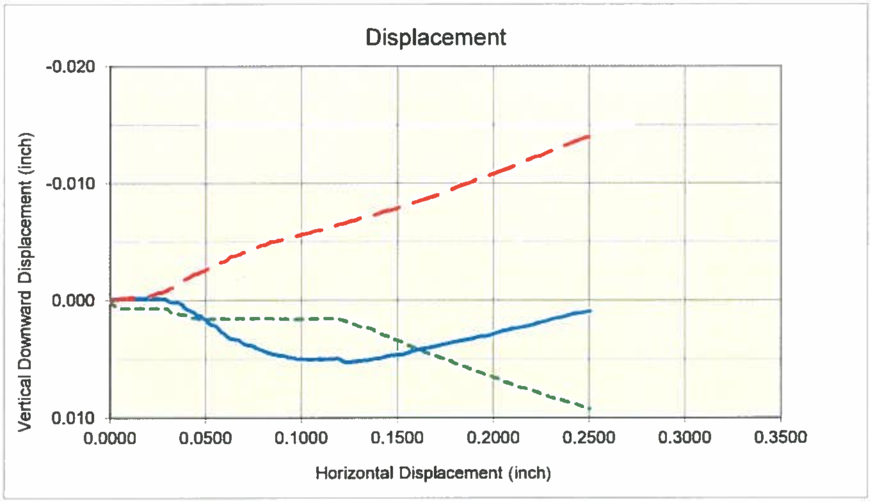
ASTM D3080

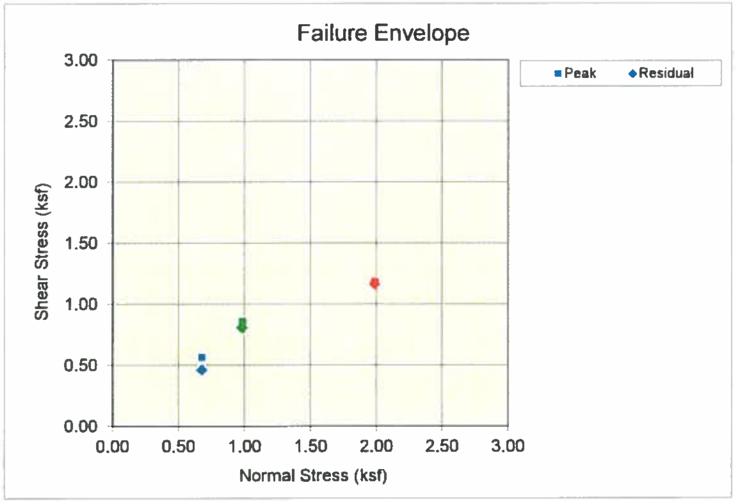


Laboratory Number:	14-0268
Sample Number:	B1 21-23 feet
Sample Description:	Brown Clay
Sample Source:	Shelby 2.8 inch tube

Shear rate .015 in./min.

	0.5 ksf	1 ksf	2.0 ksf
Initial dry unit weight (pcf)	97.5	80.0	92.0
Initial Wc (%)	22.6%	35.2%	30.0%
Final Wc (%)	27.0%	32.7%	36.2%
Normal Stress (ksf)	0.68	0.98	1.98
Peak Shear Stress (ksf)	0.57	0.86	1.19
Residual Failure Stress (ksf)	0.47	0.81	1.17





Budinger & Associates

DIRECT SHEAR TEST RESULTS
Project: Painted Hills Levee
Location: 4403 S Dishman-Mica Rd, Spokane Valley, WA
Project Number: L14183

ASTM D 5084
Permeability (Flexible Wall) Test Data Results

Project No.: L14183
Sample ID: B6 @ 11'-12'
Tested By: TB
Sampled By: B&A
Laboratory No: 14-0273

Project Location: Painted Hills Levee
Sample Description: silt with some sand
Initial Dry Density: 112.7 pcf
Final Moisture Content: 19.7%
Date Tested: 5/8/14

Remolded
X Undisturbed

System Constant, C 0.906 (cm^2)

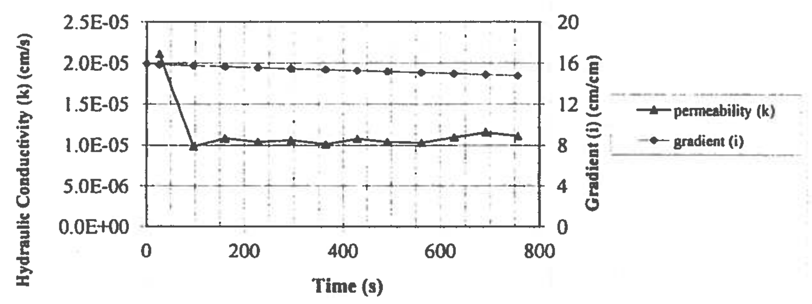
Chamber	42.0
Upper	39.0
Lower	41.0
Test gradient	14.3

$a_{\text{influent burrett}}$ 0.906 cm^2
Final Length, L_f 9.860 cm
Final Area, A_f 40.496 cm^2

Date	Time (s)	Temp		Burette Readings		Incremental Flow			Head Difference[1]	Gradient	Prelimnary[2]	ASTM Falling Head Final[3]	ASTM Constant Head
		°C	R_T	Upper V_U(t) (cc)	Lower V_L(t) (cc)	Inflow (lower) (cc)	Outflow (upper) (cc)	Ratio In/Out	h (t) (cm)		kA/L (cm^2/sec)	k_{20} (x10$^{'}$) (cm/sec)	k (cm/sec)
5/8/14	0	21	0.980	19.5	2.7				157.5	15.98			
	26	21	0.980	19.0	3.0	0.3	0.5	0.6	156.7	15.90	8.9E-05	2.1E-05	2.4E-05
	96	21	0.980	18.5	3.5	0.5	0.5	1.0	155.7	15.79	4.1E-05	9.9E-06	1.1E-05
	160	21	0.980	18.0	4.0	0.5	0.5	1.0	154.7	15.69	4.6E-05	1.1E-05	1.2E-05
	227	21	0.980	17.5	4.5	0.5	0.5	1.0	153.7	15.59	4.4E-05	1.0E-05	1.2E-05
	293	21	0.980	17.0	5.0	0.5	0.5	1.0	152.7	15.49	4.5E-05	1.1E-05	1.2E-05
	363	21	0.980	16.5	5.5	0.5	0.5	1.0	151.7	15.39	4.2E-05	1.0E-05	1.1E-05
	429	21	0.980	16.0	6.0	0.5	0.5	1.0	150.7	15.29	4.5E-05	1.1E-05	1.2E-05
	491	21	0.980	15.5	6.4	0.4	0.5	0.8	149.8	15.20	4.4E-05	1.0E-05	1.2E-05
	561	21	0.980	15.0	6.9	0.5	0.5	1.0	148.8	15.09	4.3E-05	1.0E-05	1.2E-05
	627	21	0.980	14.5	7.4	0.5	0.5	1.0	147.8	14.99	4.6E-05	1.1E-05	1.2E-05
	690	21	0.980	14.0	7.9	0.5	0.5	1.0	146.8	14.89	4.9E-05	1.2E-05	1.3E-05
	756	21	0.980	13.5	8.4	0.5	0.5	1.0	145.8	14.79	4.7E-05	1.1E-05	1.3E-05
											k_{avg}= last 4	1.1E-05 cm/s	cm/s

Permeant liquid: standard water

Run 1 Permeability & Gradient vs Time



GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Northern, Inc.

Project: Painted Hills
Client: IPEC
Material:
Source: B1 @ 5' & 7.5' (combined)

Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 335

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	99.9%		
#8	98.5%		
#10	97.8%		
#16	94.0%		
#20			
#30	85.2%		
#40	80.2%		
#50	75.9%		
#60			
#80			
#100	68.2%		
#200	61.3%		

Sieve Analysis Data: ASTM D422, D1140

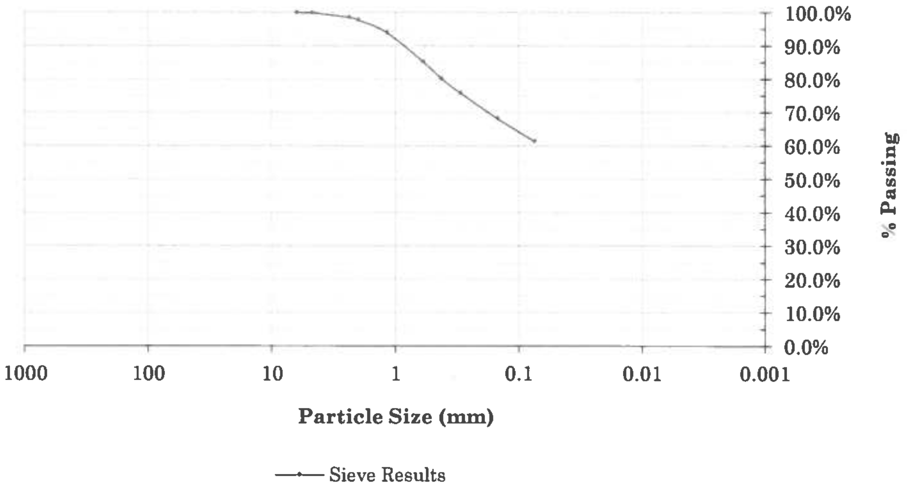
Fineness Modulus:
% Gravel: 0.09
% Sand: 38.60
% Silt & Clay: 61.31
Moisture Content: 8.8%

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ =
$D_{30\ (mm)}$=
$D_{10\ (mm)}$=

C_u=
C_c=

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Project:	Painted Hills	**Date Received:**	5/15/2014
Client:	IPEC	**Job #:**	S14-033
Material:		**W.O. #:**	
Source:	B2 @ 5'	**Lab #:**	336

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	99.4%		
#8	95.3%		
#10	93.7%		
#16	87.6%		
#20			
#30	77.8%		
#40	73.1%		
#50	69.3%		
#60			
#80			
#100	64.7%		
#200	61.3%		

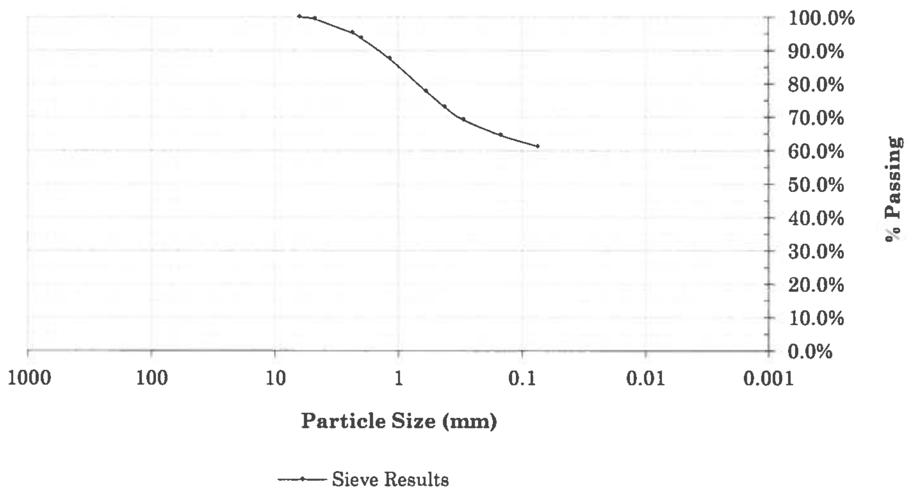
Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:	
% Gravel:	0.58
% Sand:	38.13
% Silt & Clay:	61.29
Moisture Content:	11.4%

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ =
$D_{30\ (mm)}$ =
$D_{10\ (mm)}$ =
C_u =
C_c =

Grain Size Distribution



Reviewed by: ____________________ **Date:** 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Northern, Inc.

Project: Painted Hills
Client: IPEC
Material:
Source: B2 @ 15'
Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 337

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	99.1%		
#8	94.3%		
#10	92.1%		
#16	80.6%		
#20			
#30	54.2%		
#40	42.5%		
#50	33.0%		
#60			
#80			
#100	21.7%		
#200	18.2%		

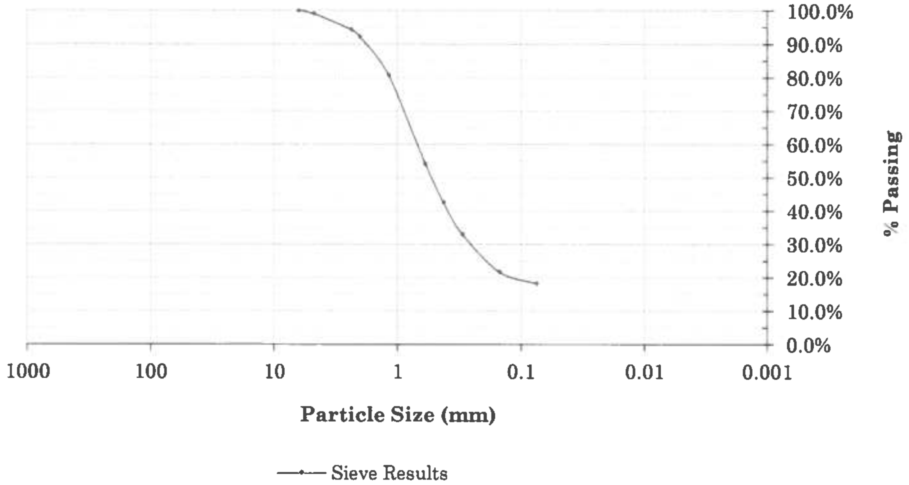
Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:
% Gravel: 0.89
% Sand: 80.93
% Silt & Clay: 18.18
Moisture Content:

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ =
$D_{30\ (mm)}$ =
$D_{10\ (mm)}$ =
C_u =
C_c =

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

GN Northern, Inc.

Project: Painted Hills
Client: IPEC
Material:
Source: B3 @ 15'
Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 338

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	99.2%		
#8	95.0%		
#10	93.3%		
#16	86.4%		
#20			
#30	73.5%		
#40	66.3%		
#50	59.4%		
#60			
#80			
#100	46.4%		
#200	40.4%		

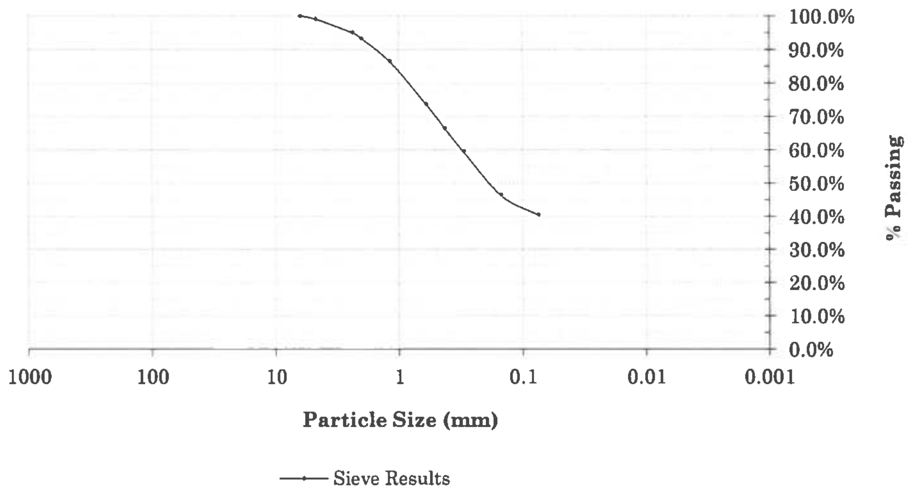
Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:	
% Gravel:	0.84
% Sand:	58.80
% Silt & Clay:	40.36
Moisture Content:	14.2%

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ =
$D_{30\ (mm)}$=
$D_{10\ (mm)}$=
C_u=
C_c=

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Northern, Inc.

Project:	Painted Hills	**Date Received:**	5/15/2014
Client:	IPEC	**Job #:**	S14-033
Material:		**W.O. #:**	
Source:	B4 @ 5'	**Lab #:**	339

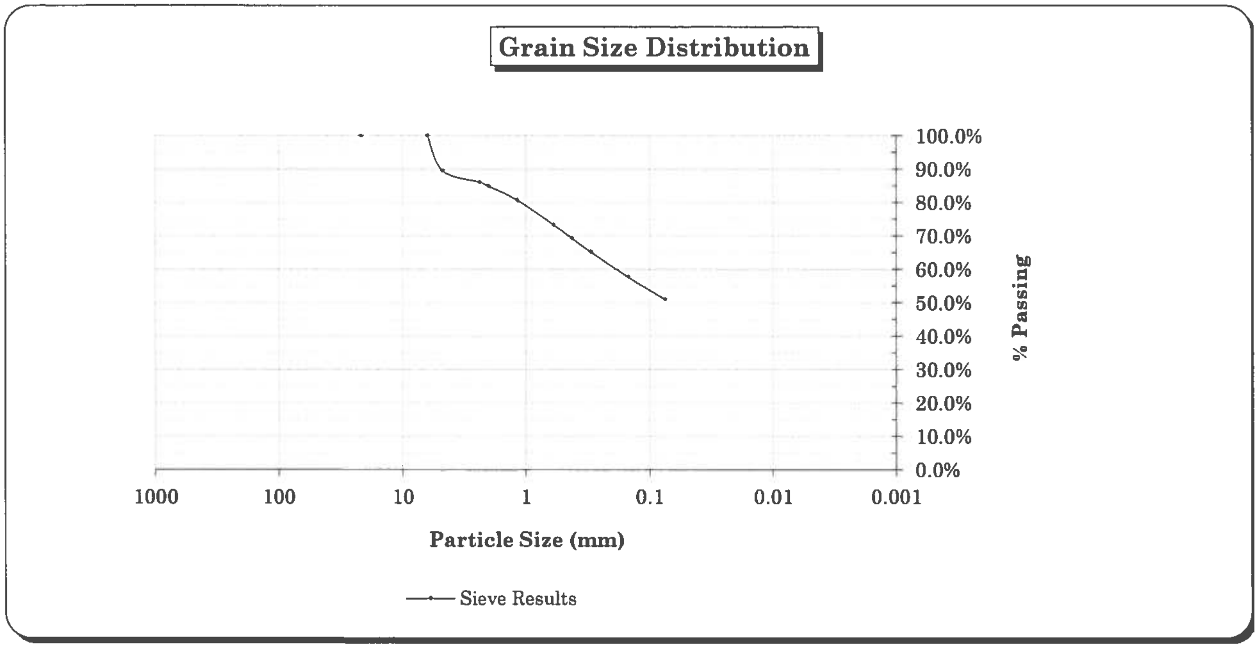
Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	89.5%		
#8	86.1%		
#10	84.9%		
#16	80.8%		
#20			
#30	73.3%		
#40	69.3%		
#50	65.3%		
#60			
#80			
#100	57.8%		
#200	51.0%		

Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:	
% Gravel:	10.52
% Sand:	38.47
% Silt & Clay:	51.01
Moisture Content:	12.5%

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ = C_u=
$D_{30\ (mm)}$= C_c=
$D_{10\ (mm)}$=



Reviewed by: ____________________ **Date:** 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Northern, Inc.

Project: Painted Hills
Client: IPEC
Material:
Source: B4 @ 10'
Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 340

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	98.2%		
#8	89.4%		
#10	86.7%		
#16	74.3%		
#20			
#30	47.6%		
#40	36.6%		
#50	28.8%		
#60			
#80			
#100	21.1%		
#200	18.1%		

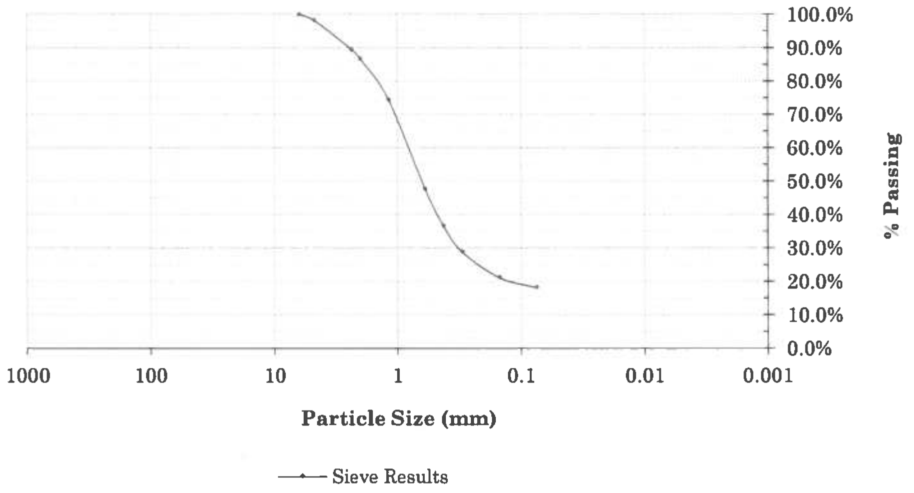
Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:
% Gravel: 1.76
% Sand: 80.15
% Silt & Clay: 18.09
Moisture Content:

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\,(mm)}$ =
$D_{30\,(mm)}$=
$D_{10\,(mm)}$=
C_u=
C_c=

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Project: Painted Hills
Client: IPEC
Material:
Source: B4 @ 15'

Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 337

Sieve Size	Percent Passing	Specifications Minimum	Specifications Maximum
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"	100.0%		
#4	98.9%		
#8	93.0%		
#10	90.4%		
#16	76.5%		
#20			
#30	44.3%		
#40	30.1%		
#50	18.7%		
#60			
#80			
#100	4.9%		
#200	0.6%		

Sieve Analysis Data: ASTM D422, D1140

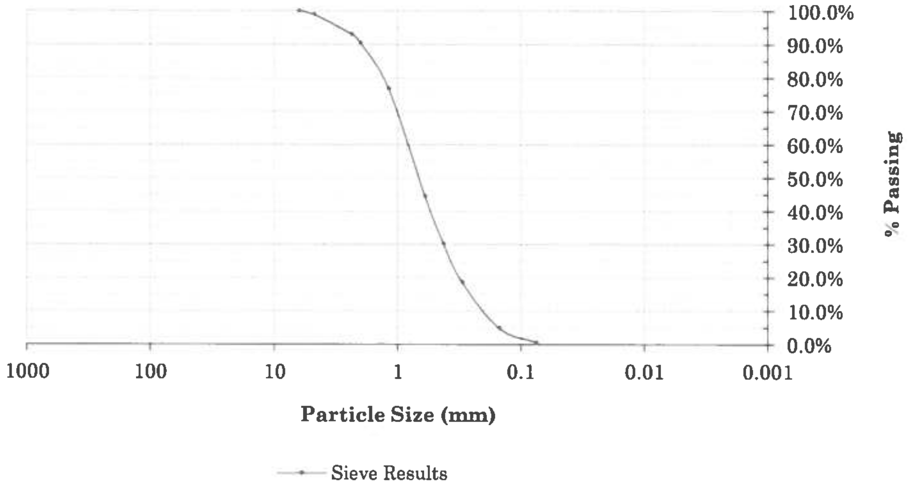
Fineness Modulus:
% Gravel: 1.10
% Sand: 98.30
% Silt & Clay: 0.60
Moisture Content:

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ =
$D_{30\ (mm)}$ =
$D_{10\ (mm)}$ =

C_u =
C_c =

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
11115 E. Montgomery Ave., Suite C
Spokane Valley, WA 99206

LABORATORY SIEVE ANALYSIS

Project: Painted Hills
Client: IPEC
Material:
Source: B4 @ 20'
Date Received: 5/15/2014
Job #: S14-033
W.O. #:
Lab #: 341

	Percent	Specifications	
Sieve Size	**Passing**	**Minimum**	**Maximum**
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
1/4"			
#4	70.1%		
#8	68.7%		
#10	67.8%		
#16	60.6%		
#20			
#30	37.1%		
#40	29.3%		
#50	25.0%		
#60			
#80			
#100	20.6%		
#200	18.6%		

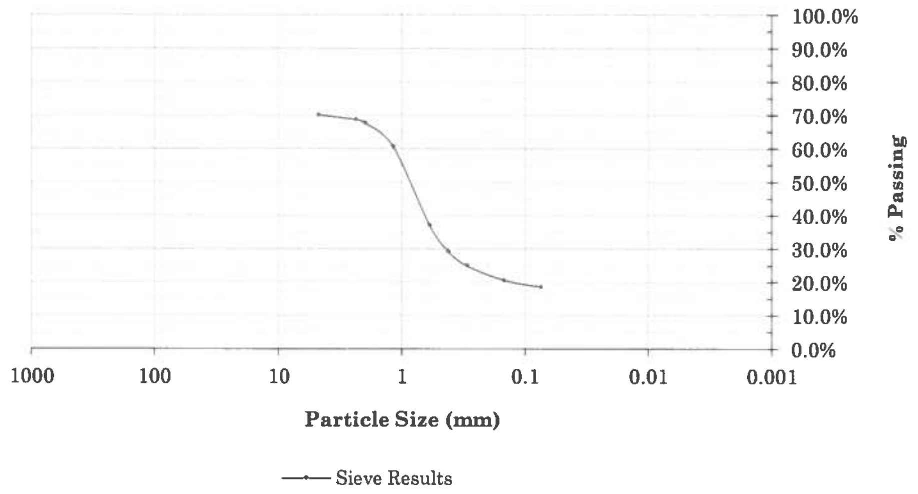
Sieve Analysis Data: ASTM D422, D1140

Fineness Modulus:	
% Gravel:	
% Sand:	51.56
% Silt & Clay:	18.57
Moisture Content:	12.1%

Coefficient of Uniformity Cu, and Curvature Cc

$D_{60\ (mm)}$ = C_u=
$D_{30\ (mm)}$= C_c=
$D_{10\ (mm)}$=

Grain Size Distribution



Reviewed by: ____________________

Date: 6/30/2014

GN Northern, Inc.
Consulting Engineers Environmental Scientists Construction Materials Testing

Project: Painted Hills
Client: IPEC
GN Job #: S14-033
IPEC Job #: 14-037

200 Wash / ASTM D1140

Sample Location / ID	% Retained	% Passing
B6@ 15’	56.7%	43.3%
B4@5’	50.7%	49.3%
B2@5’	48.4%	61.6%
B4@10’	85%	14.8%
B3@15’	70.6%	29.4%
B6@5’	42.7%	57.3%

REMARKS:

REVIEWED BY: Karl A. Harmon
Karl A. Harmon, LEG, PE

722 N 16th Avenue, Suite 31
Yakima WA 98902
509/248-9798
509/248-4220 Fax

2618 W Kennewick Ave
Kennewick WA 99336
509/734-9320
509/734-9321 Fax

11115 E. Montgomery Suite C
Spokane Valley WA 99206
509-893-9400
877-258-9211 Fax

315 Oak St Suite 201
Hood River OR 97031
541/387-3387

81006 HWY 395
Hermiston OR 97838
541/564-0991

Visit our website at www.gnnorthern.com
Email: gnnorthern@gnnorthern.com

APPENDIX D

OPERATION AND MAINTENANCE MANUAL

CHESTER CREEK LEVEE

OPERATION & MAINTENANCE MANUAL

FOR

LEVEE OPERATION AND MAINTENANCE

Chester Creek Homeowners Association

IPEC Project No. 14-037

FEBRUARY 2015

By

Inland Pacific Engineering Company
3012 North Sullivan Road
Building S-5, Suite C
Spokane Valley, WA 99216

CHESTER CREEK LEVEE
OPERATION & MAINTENANCE MANUAL

1.00 PURPOSE

This Operations and Maintenance manual is intended to provide general operations and maintenance guidelines for the Chester Creek levee located at 4403 South Dishman-Mica Road in Spokane County, Washington. The Homeowners Association will maintain the drainage facilities. This includes general maintenance for the levee whether in or out of Spokane County public road rights-of-ways. Implementation of these guidelines will ensure that the levee will function as required by 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

2.00 INTRODUCTION

The Chester Creek levee is on the east side of Chester Creek between Thorpe Road and Dishman-Mica Road. The creek side of the levee is typically at a 2.3:1 to 3:1 (H:V) slope. The land side of the levee is also at a 3:1 slope from the Dishman-Mica Road bridge to approximately 300 feet southeast. Between this point and Thorpe Road, the land side slope is much less and, in some areas, relatively level with the crest. The levee was constructed by the previous landowner for the development of the golf course on the property. We believe the levee was constructed in the early 1990's by the property owner.

The operation and maintenance of the levee is required to ensure that the levee certification obtained and future or on-going FEMA requirements are met.

3.00 GENERAL OPERATION AND MAINTENANCE

3.10 Operation – During flood periods, the levee should be patrolled to locate possible sand boils, unusual wetness of the landward slope, or levee breaches. The inspector may look for indications of sliding or sloughing, that scouring action is not occurring, that no reaches might be overtopped, and that no other conditions exist that might adversely affect the integrity of the levee.

- Boils – A boil is a condition where enough pressure is produced by high water levels so that water is piped through or under the levee with sufficient velocity to carry earthen materials to the landward side of the levee. If not controlled, these particles of earthen materials will be eroded from within the levee, causing subsidence to the levee section. The continuation of this process may result in a break in the levee, allowing flood waters to flow over the crest or through the levee.
- Scour – Careful observation should be made of the creek-side slope of the levee to detect potential erosion due to current action. Careful observation at the locations of bridge structures should be made. In general, current velocities in Chester Creek are not expected to cause significant scouring.
- Levee Topping – If the anticipated high water level will exceeds the top elevation of

the levee, steps should be taken to provide emergency topping to raise the levee grade above forecasted water levels. These steps could include sandbagging or hauling additional fill to raise the levee height.

A post-flood assessment of the levee should be completed within 24 hours of the event. The assessment should document any damage to the levee caused by flood waters. Any repairs necessary should then be completed after review and evaluation of options.

3.20 Maintenance – Maintenance activities for the levee are described in this section. Below is a maintenance description for each of the elements affecting levee performance.

- Inspections – Levee inspection should include a visual inspection of the levee at a minimum of every 12 months for signs of erosion or settlement. Preferably, the inspection should be completed in the fall prior to the rainy season. The inspections should include the following:
    - Unusual settlement, sloughing, or material loss of grade.
    - Caving on both the creekside and landside of the levee which might affect stability of the levee section.
    - Seepage or saturated areas that may be occurring.
    - Drainage in the creek is in good working condition, facilities are not being clogged.
    - Crown of levee is shaped to drain properly.
    - Unauthorized vehicles on the levee.
    - Rodent damage along the levee.
- Erosion Protection – The levee vegetation is a grass cover. The grass should be mowed to a minimum height no shorter than 3 inches. The last mowing should occur to allow for the grass to grow to 8-10 inches for winter protection and extend out 15 feet from the toe of the levee.

  No trees should be growing on the levee or in the creek channel. No excavations, structures, or other obstructions should be on the levee or levee easement.

  Remove accumulation of drift, grass clippings, or other objectionable materials from the levee side slopes and/or crest.

Attached is a checklist for the annual or post-flood inspection.

CHESTER CREEK LEVEE
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WA

LEVEE CHECKLIST

Date: ____

Item	Location and Description	Action
Has levee settled or lost cross section?		
Has stream action caused any levee slope washing or scouring?		
Has there been any seepage or saturated areas?		
Has vegetation been maintained?		
Have weeds been removed? Dates?		
Condition of any riprap?		
Have there been any authorized or unauthorized encroachments?		
Have burrowing animals been exterminated/removed and the levee repaired?		
Is the creek channel free of obstructions and/or debris?		
Are there any areas where the creek is affecting the levee slopes?		
Has there been any recent high water events?		
Miscellaneous conditions: ______________________ ______________________		

Note: Use additional sheets as necessary.

Signed:______________________________

Title:_______________________________

REPORT 5

Proposed Levee, 4403 South Dishman-Mica Road, dated July 17, 2015

GEOTECHNICAL EVALUATION
PROPOSED LEVEE
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037A

July 17, 2015

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

July 17, 2015
Project No. 14-037A

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geotechnical Evaluation**
Proposed Levee
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

We have completed the geotechnical evaluation for the proposed new levee at the above-referenced site in Spokane Valley, Washington. The purpose of evaluation was to provide design recommendations for the proposed levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

We appreciate the opportunity to provide our services to you on this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

Attachment: Geotechnical Evaluation Report

P.O. Box 1566, Veradale, WA 99037
Phone 509-209-6262

GEOTECHNICAL EVALUATION
PROPOSED LEVEE
4403 SOUTH DISHMAN-MICA ROAD
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037A

July 17, 2015

Prepared for:

NAI Black
Spokane, Washington

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

TABLE OF CONTENTS

Project No. 14-037A
Proposed Levee
4403 South Dishman-Mica Road
Spokane County, Washington

1.0 INTRODUCTION

1.1 Project Description

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed. Because the existing Dishman-Mica roadway embankment is not considered a FEMA certified levee, a new levee will be constructed along the east side of the roadway.

1.2 Purpose

The purpose of our services is to provide design recommendations for the proposed levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

1.3 Scope

Our services were requested by Mr. Bryan Walker of NAI Black. Mr. Walker authorized us to proceed on April 28, 2015. The scope of work agreed upon consisted of the following:

- review of existing geotechnical data and reports for the development, if available
- drill 6 penetration test borings at the site to a depth of 15 feet,
- performing laboratory tests on samples obtained from the test pits,
- classifying the soils and preparing boring logs, and
- submitting a geotechnical report containing logs of the borings, results of our field investigation and laboratory testing, and our analyses, opinions, and recommendations relative to levee design and construction for conformance to FEMA standards.

1.4 Available Information

We were provided a topographic survey for the project site by WCE. This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013.

We performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

In addition, we performed a geotechnical evaluation for the existing levee on the property to evaluate conformance to the FEMA standard. The results of that evaluation are summarized in our Geotechnical Evaluation report dated February 12, 2015.

In conjunction with this evaluation, West Consultants, Inc. (WEST) has been contracted by NAI Black to provide a FEMA Conditional Letter of Map Revision submittal (CLOMR). They have provided Inland Pacific Engineering Company (IPEC) water surface elevations and velocity output from their revised RAS model to assist us in our evaluation.

1.5 Locations and Elevations

The borings were drilled at or near locations selected by us. The boring locations are shown on the Boring Location Map in Appendix A. The borings were staked by Whipple Consulting Engineers, Inc. (WCE). Ground surface elevations at the borings were provided by WCE.

2.0 RESULTS

2.1 Logs

Log of Boring sheets indicating the vertical sequence of soils and materials encountered and groundwater observations are included in Appendix B. The strata changes were inferred from the changes in the penetration test samples and auger cuttings brought to the surface. Please note that the depths shown as changes between the strata are only approximate. The changes are likely transitions and the depths of changes vary between the borings. Geologic origins for each stratum are based on the soil type, available geologic maps, previous geotechnical reports for this and adjacent sites, and available common knowledge of the depositional history of the site.

2.2 Site Conditions

The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner. The existing levee is on the east side of Chester Creek between Thorpe Road and Dishman-Mica Road. The new levee will extend from the north end of the existing levee north and west along Dishman-Mica Road.

2.3 Soils

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Narcisse silt loam and Endoaquolls and Fluvaquents. The native soils encountered in the borings were consistent with the NRCS data.

Boring B-2 encountered existing fill in the upper 6 feet. The fill consisted of silty clay over silty sand. The remaining borings encountered 6 inches to 4 feet of topsoil at the surface. Below the topsoil or existing fill, the borings generally encountered water-deposited silty to clayey sands and/or poorly graded sands to their termination depths. Boring B-5 encountered alluvial lean clay between the 9 and 12-foot depth. Boring B-6 encountered lean below the 7-foot depth.

2.4 Penetration Resistances

Penetration resistances (N-values) in the existing fill were 12 and 13 blows per foot (BPF). Penetration resistances in the silts and sands ranged from 7 to 37 BPF and averaged 19 BPF, indicating that these soils were loose to dense, but were typically medium dense. Penetration resistances in the clays ranged from 10 to 40 BPF indicating that these soils were rather stiff to hard in consistency.

2.5 Groundwater

Groundwater was not encountered in any boring during or immediately after drilling. Groundwater is believed to currently exist at some depth below the termination depths of the borings. Based on our experience in the vicinity of the site, along with numerous test pits excavated previously on the site along with borings performed on the existing levee, it is our opinion that the portion of the creek along the existing levee is the beginning of the recharge section as evidenced by the typical lack of water in the creek further downstream. Also, the test pits previously excavated at the site east of the levee did not encounter groundwater. Well log data in the vicinity of the site indicate that groundwater is typically 50 to 80 feet below the surface.

2.6 Laboratory Testing

We obtained soil samples from the borings during our site investigation. The tests performed included the following:

1. ASTM D 6913, Sieve Analysis
2. ASTM D 4318, Atterberg Limits’

These tests were used to aid in classifying the soils and in the engineering analyses and formulation of engineering opinions and recommendations. Attached are data sheets summarizing the tests performed.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Discussion

Based on the data obtained from the recent and previous borings and/or test pits, it is our opinion that a new levee can be constructed adjacent to the Dishman-Mica Road that conforms to the FEMA standard. The following sections provide recommendations for construction of a levee that meets the standard based on EM 1110-2-1913, “Design and Construction of Levees, by the US Corps of Engineers dated April 30, 2000. Certification of the levee can be completed after construction has been completed.

3.2 Site Preparation

We recommend that any existing topsoil, root zone, and existing fill be excavated and removed from the levee footprint area. After these soils have been removed, we recommend surface compacting the exposed soils prior to placing structural fill for the embankment. Structural fill should be placed in 6- to 8-inch-thick loose lifts at or near optimum moisture content and compacted to a minimum of 92 percent of the maximum dry density determined in accordance with ASTM D 1557 (modified Proctor).

In areas where structural fill is placed on the existing Dishman-Mica Road embankment, we recommend that the fill be benched into the slope. We recommend a maximum bench height of 4 feet and a minimum bench width equal to twice the bench height. At this time, we recommend a maximum slope angle of 3:1 (H:V) for permanent slopes excavated in the native soils or embankment fills using the native soils as structural fill.

The site soils which will be reused as backfill or fill are likely to be dry of optimum moisture content. These soils may require wetting to achieve adequate compaction. Backfills and fills should be placed in thin lifts not exceeding 6 to 8 inches. Most of the on-site native soils and much of the existing fill can be used as structural fill provided particles larger than six inches and all debris are removed.

We recommend in-place density tests be performed on all embankment fill placed. We recommend at least one test for every 100 cubic yards of fill placed in the levee embankment with at least one test for every 2 feet of fill placed.

If site grading and construction are anticipated during cold weather, we recommend that good winter construction practices be observed. All snow and ice should be removed from excavated and fill areas prior to additional earthwork or construction. No fill should be placed on soils which have frozen or contain frozen material. Frozen soils should not be used as backfill or fill.

3.3 Freeboard

We were provided 100-year flood elevations by WEST. They provided us a plan view of the levee with flood elevations at 6 locations starting at the existing levee at the bridge on Dishman-Mica Road and ending at the northwest corner of the property near Wilbur Road. The elevations ranged from 2010.4 at the existing levee to 2008.1 at the north end. Please refer to the WEST report for a complete summary of the floodplain analysis.

According to 44 CFR Section 65.10(b)(1), an additional 1 foot of freeboard is required within 100 feet of bridge structures. The freeboard requirement for the Dishman-Mica Road bridge is adequate.

3.4 Closures

There are no penetrations of the levee proposed so closure devices are not required.

3.5 Embankment Protection

The levee will tie in to the Dishman-Mica Road embankment along its entire length which will provide creekside erosion protection to the top of the roadway embankment. For those portions of the levee above this elevation (if needed), it is our opinion that vegetative cover (grasses) would be suitable based on the flow velocities provided by WEST.

3.6 Embankment and Foundation Stability

We recommend that the new levee be constructed with maximum 3:1 (H:V) slopes for stability. We recommend a minimum crown width of 8 feet. We recommend that the levee embankment materials consist of a granular soil having 10 to 30 percent by weight passing a 200 sieve to reduce the permeability and limit seepage. We have assumed that on-site soils will be used as borrow to construct the embankment.

We evaluated the embankment and foundation stability for conditions described in EM 1110-2-1913, “Design and Construction of Levees, by the US Corps of Engineers dated April 30, 2000, Chapter 6. We analyzed the levee embankment for the following cases:

1. CASE I, End of construction.
2. CASE II: Sudden drawdown.
3. CASE III: Steady state seepage from full flood stage.

We performed slope stability analyses for each case. We analyzed the levee embankment with 3:1 slopes. For our analyses, we used XSTABL software which is based on a software program developed at Purdue University.

For these cases, we calculated the minimum factors of safety as shown in the following table.

CASE	Minimum Factor of Safety
I	2.45
II	1.86
III	2.15

For stability, a minimum factor of safety of 1.5 is generally considered acceptable. Based on this analysis, it is our opinion that the levee will be stable with respect to global slope stability provided the recommendations of this report are followed.

3.7 Settlement

The average depth of fill will be approximately 5 to 6 feet. This would result in a loading increase of approximately 750 pounds per square foot (psf) on the bearing soils. Based on the data obtained from the borings, the levee will be constructed above loose to medium dense sands or sandy silts. Settlement in these soils will generally occur shortly after construction.

Given the stiff condition of the clays at depth, we do not anticipate any significant settlement in these layers. We did analyze the lean clay layer encountered in Boring B-5 with a 6-foot raise in grade to maintain minimum freeboard. For our analysis, we used a unit weight of 125 pounds per cubic foot (pcf) for the embankment fill soils and a compression index of 0.06 for the lean clay and assumed total saturation of the clay layer. Based on these parameters, we estimated the settlement to be less than 0.5 inches.

3.8 Interior Drainage

Interior drainage systems have been designed by WCE. We understand that these systems will include detention ponds with multiple drywells to control flood waters and infiltrate them into the ground. Please refer to the WCE report for a comprehensive description of the interior drainage system.

3.9 Operation Plans

The Operation Plan will be prepared as part of the final levee certification.

3.10 Maintenance Plan

The Maintenance Plan will be prepared as part of the final levee certification.

4.0 PROCEDURES

4.1 Drilling and Sampling

The borings were completed on May 21, 2015 using a truck-mounted drill rig operated by an independent firm working under subcontract to IPEC. A geotechnical engineer from our firm continuously observed the borings and logged the surface and subsurface conditions. After we logged the borings, they were abandoned in accordance with state requirements.

4.2 Soil Classification

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, “Description and Identification of Soils (Visual-Manual Procedures)”.

5.0 GENERAL RECOMMENDATIONS

5.1 Basis of Recommendations

The analyses and recommendations submitted in this report are based on the data obtained from the borings performed at the locations indicated on the Boring Location Map in Appendix A. It should be recognized that the explorations performed for this evaluation reveal subsurface conditions only at discreet locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

5.2 Groundwater Fluctuations

We made water level observations in the borings at the times and conditions stated on the boring logs. These data were interpreted in the text of this report. The period of observation was relatively short and fluctuation in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

5.3 Use of Report

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

5.4 Level of Care

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

5.5 Professional Certification

This report was prepared by me or under my direct supervision and I am a duly registered engineer under the laws of the State of Washington.

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
7-17-15

APPENDIX A

SITE LOCATION MAP, NRCS MAP, BORING LOCATION MAP

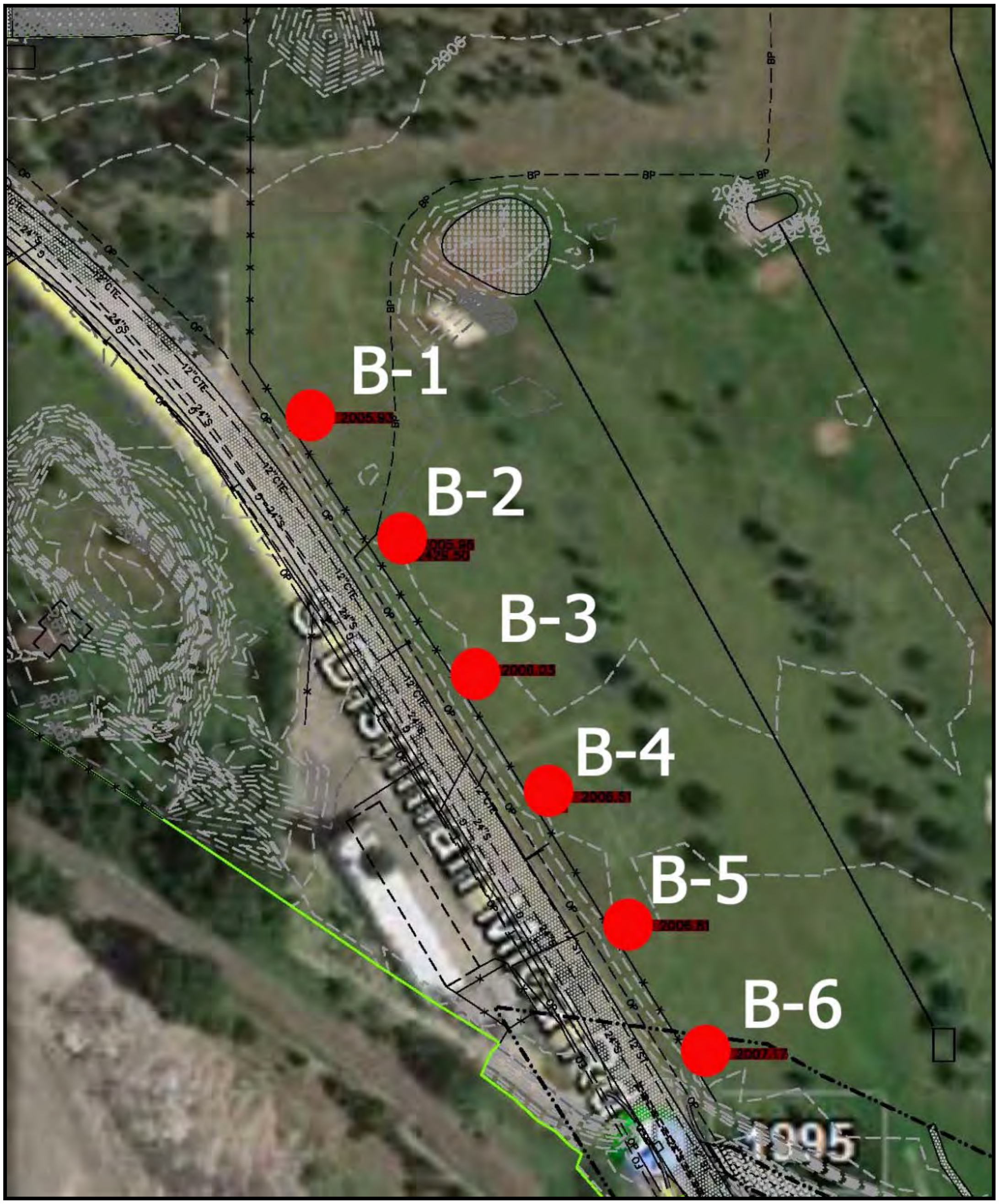
FIGURE 1

Site Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037A Proposed Levee 4403 South Dishman-Mica Road Spokane Valley, WA	July 17, 2015

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037A Proposed Levee 4403 South Dishman-Mica Road Spokane Valley, WA	July 17, 2015

FIGURE 3



Boring Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037A	July 17, 2015
	Proposed Levee 4403 South Dishman-Mica Road Spokane Valley, WA	

APPENDIX B

LOGS OF BORINGS, DECRIPTIVE TERMINOLOGY

Inland Pacific Engineering Company
3012 North Sullivan Road, Suite C
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Telephone: 509-209-6262
Fax: 509-290-5734

BORING NUMBER B-1

CLIENT NAI Black

PROJECT NAME Painted Hills New Levee

PROJECT NUMBER 14-037A

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 5/21/15 **COMPLETED** 5/21/15

GROUND ELEVATION 2005.9 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SC) CLAYEY SAND, fine grained, with roots, dark gray, moist to wet. (Topsoil)										
			SS		8-10 (18)							
		(SC) CLAYEY SAND, fine grained, brown, moist to wet, medium dense. (Alluvium)										
5			SS		3-10 (13)							
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, with seams of Clayey Sand, brown, moist, medium dense to dense. (Alluvium)										
			SS		10-15 (25)							
10			SS		17-18 (35)							
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)										
15			SS		14-8 (22)			11				7

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

IPEC

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Fax: 509-290-5734

BORING NUMBER B-2

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Painted Hills New Levee

PROJECT NUMBER 14-037A

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 5/21/15 **COMPLETED** 5/21/15

GROUND ELEVATION 2006 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(CL-ML) FILL: Sandy Silty Clay, with roots, dark brown, moist to wet.										
			SS		6-6 (12)							
		(SM) FILL: Silty Sand, fine to medium grained, a trace of Gravel, brown mixed with dark brown, moist.										
5			SS		7-6 (13)							
		(SP-SM) POORLY GRADED SAND with SILT and GRAVEL, fince to coarse grained, brown, moist, medium dense to dense. (Glacial Outwash)										
			SS		8-9 (17)			9				7
10			SS		11-14 (25)							
15			SS		15-22 (37)							

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

IPEC

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BORING NUMBER B-3

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Painted Hills New Levee

PROJECT NUMBER 14-037A

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 5/21/15 **COMPLETED** 5/21/15

GROUND ELEVATION 2006 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(ML) SANDY SILT, with roots, dark brown, moist. (Topsoil)										
			SS		5-6 (11)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, medium dense. (Glacial Outwash)										
5			SS		9-17 (26)							
			SS		11-12 (23)			7				7
10			SS		7-9 (16)			7				5
15			SS		11-8 (19)							

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

IPEC

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Fax: 509-290-5734

BORING NUMBER B-4

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Painted Hills New Levee

PROJECT NUMBER 14-037A

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 5/21/15 **COMPLETED** 5/21/15

GROUND ELEVATION 2006.5 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SC) CLAYEY SAND, very fine to fine grained, with roots, dark brown, moist to wet. (Topsoil)										
			SS		4-5 (9)							
		(ML) SANDY SILT, brown, moist to wet, loose. (Alluvium)										
5			SS		3-4 (7)			39	45	36	9	74
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, with seams of Sandy Lean Clay, brown, moist to wet, loose. (Alluvium)	SS		5-3 (8)							
		(SC) CLAYEY SAND, fine grained, with seams of Poorly Graded Sand, brown, moist to wet, medium dense. (Alluvium)										
10			SS		15-11 (26)							
		(SP-SM) POORLY GRADED SAND with SILT and GRAVEL, medium to coarse grained, moist, medium dense. (Glacial Outwash)										
15			SS		7-8 (15)			6				6

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

IPEC

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BORING NUMBER B-5

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Painted Hills New Levee

PROJECT NUMBER 14-037A

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 5/21/15 **COMPLETED** 5/21/15

GROUND ELEVATION 2006.8 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

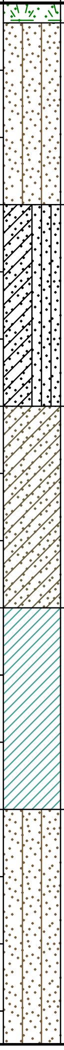
AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered



DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SC) CLAYEY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, very fine to fine grained, brown to dark brown, moist, loose. (Alluvium)	SS		3-3 (6)							
5		(SC-SM) SILTY CLAYEY SAND, fine grained, brown, moist to wet, medium dense. (Alluvium)	SS		6-7 (13)							
		(SC) CLAYEY SAND, fine grained, brown, wet, loose. (Alluvium)	SS		4-6 (10)							
10		(CL) LEAN CLAY. brown, wet, very stiff. (Alluvium)	SS		5-6 (11)			22	31	17	14	
15		(SM) SILTY SAND, fine grained, with seams of Poorly Graded Sand, brown, wet, medium dense. (Alluvium)	SS		10-11 (21)							

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

Inland Pacific Engineering Company
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BORING NUMBER B-6

PAGE 1 OF 1

CLIENT NAI Black
PROJECT NAME Painted Hills New Levee
PROJECT NUMBER 14-037A
PROJECT LOCATION 4403 South Dishman-Mica Road
DATE STARTED 5/21/15 **COMPLETED** 5/21/15
GROUND ELEVATION 2007.2 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Not encountered
LOGGED BY SLN **CHECKED BY** PTN
AT END OF DRILLING --- Not encountered
NOTES
AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
			SS		7-7 (14)							
		(SP) POORLY GRADED SAND, medium grained, brown, moist, loose. (Alluvium)										
5			SS		3-6 (9)							
		(CL) LEAN CLAY with SAND, brown, wet, rather stiff to hard. (Alluvium)	SS		5-11 (16)			19	26	18	8	76
10			SS		5-5 (10)							
15			SS		21-19 (40)							

End of boring.

Groundwater not encountered with 14 feet of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal.

Bore hole then grouted.

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse- Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with >12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand
			SP	Poorly Graded Sand
		Sand (with >12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine- Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (low plasticity)
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Fat Clay
			OH	Organic Clay and Silt (med to high plasticity)
Highly Organic Soils			PT	Peat Muck

MODIFIERS

DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT

DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE

SIEVE SIZE							
12"	3"	3/4"	4	10	40	200	
GRAIN SIZE (INCHES)							
12	3	0.75	0.19	0.079	0.0171	0.0029	
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

APPENDIX C

LABORATORY TEST RESULTS

IPEC

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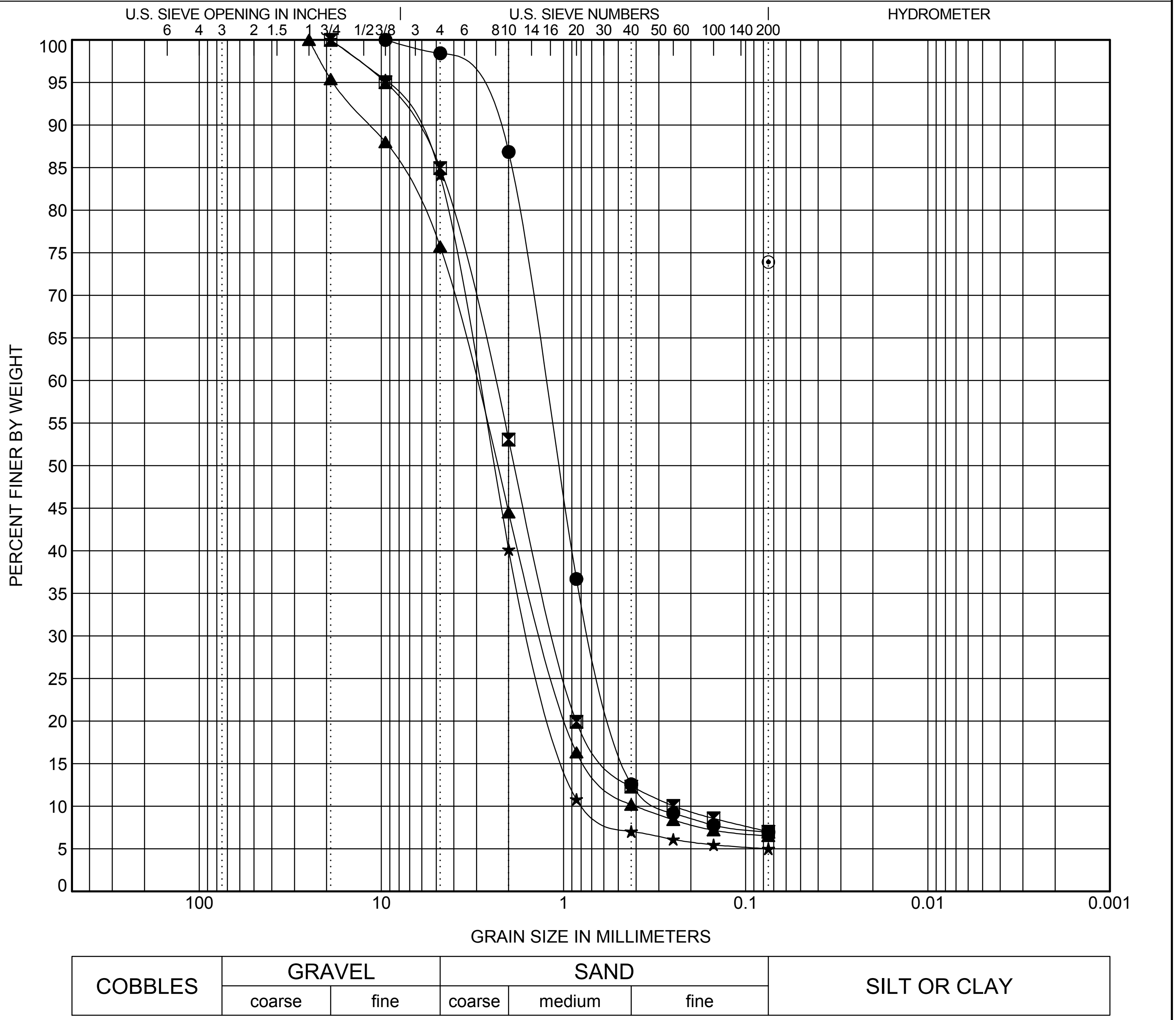
Fax: 509-290-5734

GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Painted Hills New Levee
PROJECT NUMBER 14-037A
PROJECT LOCATION 4403 South Dishman-Mica Road



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-1**	**15.0**	**SP-SM Poorly Graded Sand with Silt**				**1.36**	**4.44**
⊠	**B-2**	**7.5**	**SP-SM Poorly Graded Sand with Silt and Gravel**				**2.05**	**9.80**
▲	**B-3**	**7.5**	**SP-SM Poorly Graded Sand with Silt and Gravel**				**1.34**	**7.63**
★	**B-3**	**10.0**	**SP Poorly Graded Sand with Gravel**				**1.02**	**4.03**
⊙	**B-4**	**5.0**	**ML Silt**	**45**	**36**	**9**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-1**	**15.0**	**9.5**	**1.265**	**0.701**	**0.285**	**1.6**	**91.5**	**7.0**	
⊠	**B-2**	**7.5**	**19**	**2.414**	**1.103**	**0.246**	**15.1**	**77.9**	**7.0**	
▲	**B-3**	**7.5**	**25**	**3.072**	**1.288**	**0.403**	**24.3**	**69.2**	**6.5**	
★	**B-3**	**10.0**	**19**	**2.956**	**1.488**	**0.734**	**15.9**	**79.1**	**5.0**	
⊙	**B-4**	**5.0**	**0.075**						**73.9**	

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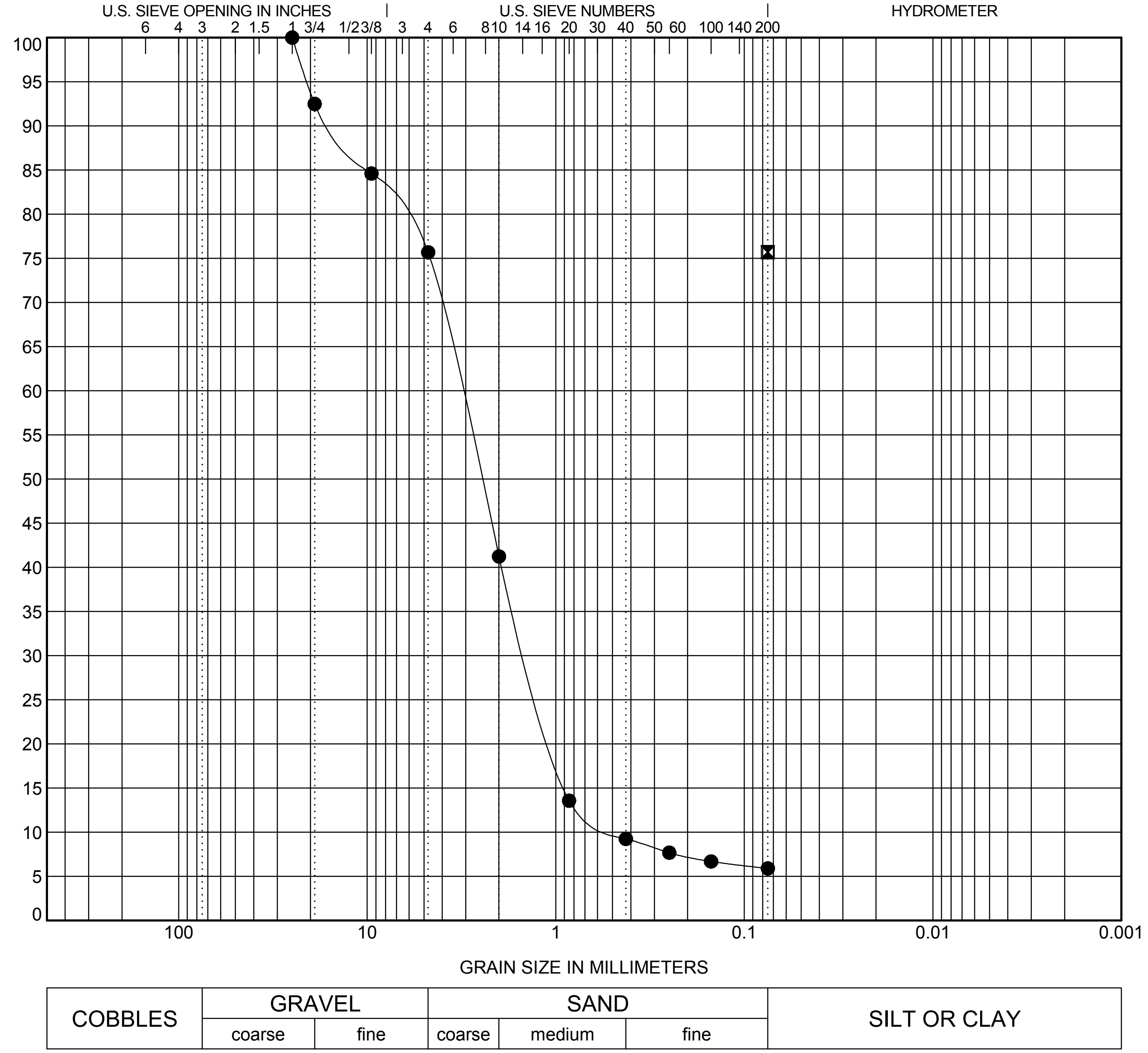
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Painted Hills New Levee
PROJECT NUMBER 14-037A
PROJECT LOCATION 4403 South Dishman-Mica Road



BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **B-4**	**15.0**	**SP-SM Poorly Graded Sand with Silt and Gravel**				**1.30**	**6.67**
☒ **B-6**	**7.5**	**CL Lean Clay with Sand**	**26**	**18**	**8**		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B-4**	**15.0**	**25**	**3.204**	**1.413**	**0.48**	**24.3**	**69.8**	**5.9**	
☒ **B-6**	**7.5**	**0.075**						**75.7**	

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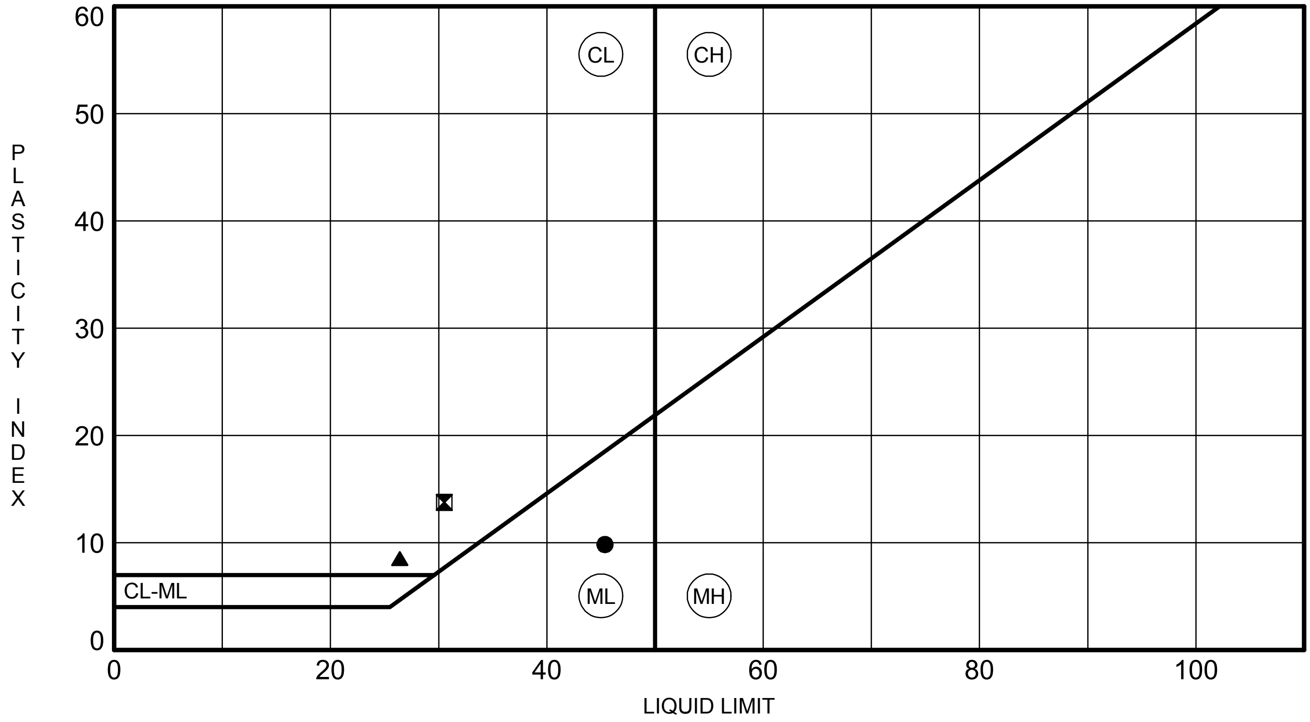
ATTERBERG LIMITS' RESULTS

CLIENT NAI Black
PROJECT NAME Painted Hills New Levee
PROJECT NUMBER 14-037A
PROJECT LOCATION 4403 South Dishman-Mica Road



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-4**	**5.0**	**45**	**36**	**9**	**74**	**ML Silt**
☒	**B-5**	**10.0**	**31**	**17**	**14**		**CL Lean Clay**
▲	**B-6**	**7.5**	**26**	**18**	**8**	**76**	**CL Lean Clay with Sand**

ATTERBERG LIMITS - GINT STD US LAB.GDT - 7/17/15 14:22 - J:_IPEC PROJECTS_2014 PROJECTS\14-037A PAINTED HILLS NEW LEVEE\GINT\14-037A PAINTED HILLS NEW LEVEE.GPJ

REPORT 6

Geotechnical Evaluation, Phase 2, dated July 23, 2016

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

July 23, 2015
Project No. 2013-026A

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geotechnical Evaluation Phase 2**
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed the Phase 2 geotechnical evaluation for the Painted Hills Golf Course property at the above-referenced site in Spokane Valley, Washington. The purpose of the Phase 2 evaluation is to assess subsurface soil and groundwater conditions to assist your civil engineer, Whipple Consulting Engineers, Inc. (WCE) in evaluating stormwater management alternatives relative to potential future development. This report summarizes the results of our field investigation, laboratory testing, engineering analyses, and our opinions and recommendations for stormwater management.

PROJECT DESCRIPTION

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. We have assumed that stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. This Phase 2 evaluation is intended to identify areas where subsurface infiltration of stormwater may be feasible due to the presence of suitable soils at depth.

AVAILABLE INFORMATION

We were provided a topographic survey for the project site by WCE. This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

In addition, we performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

We also performed a geotechnical evaluation for certification of the existing levee along Chester Creek in April 2014. The results of that evaluation are summarized in our Geotechnical Evaluation dated February 12, 2015.

FIELD EVALUATION

Procedures

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) observed the drilling of 10 penetration test borings at the site. The borings were drilled between July 1 and 13, 2015 using a truck-mounted drill operated by an independent firm working under subcontract to IPEC. A geotechnical engineer from IPEC observed the borings and logged the surface and subsurface conditions. After we logged the borings, they were abandoned in accordance with state requirements. Ground surface elevations at the borings were provided by WCE.

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, “Description and Identification of Soils (Visual-Manual Procedures)”. The samples were returned to our facility for review of the classification by a geotechnical engineer and laboratory testing.

Soils Encountered

In general, the borings encountered 1 to 3 feet of topsoil at the surface. However, Borings B-4 and B-5 encountered “possible fill” in the upper 6 feet (it was considered “possible fill” because it did not appear to be native soil, but no indicator, such as buried topsoil, debris, etc., was found to confirm our opinion). Below the topsoil or “possible fill”, the borings generally encountered alluvial lean clay, silty to clayey sand, and poorly graded sands to depths ranging from 6 to 21 feet, but were typically in the upper 10 to 12 feet. Below the fill, topsoil, and alluvial soils, the borings encountered glacially deposited sands to their termination depths.

Penetration resistances (N-values) in the “possible fill” were 9 and 16 blows per foot (BPF). Penetration resistances in the sands ranged from 3 to 62 BPF and averaged 26 BPF, indicating that these soils were very loose to very dense, but were typically medium dense. A penetration resistance of 14 BPF was recorded in the clay indicating that this soil was stiff in consistency.

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam, Narcisse silt loam, Endoaquolls and Fluvaquents, Phoebe ashy sandy loam, and Urban land-Springdale disturbed complex. The native soils encountered in the borings were consistent with the NRCS data.

Groundwater was encountered in all the borings at depths ranging from 11 to 47 feet. The following table summarizes the groundwater depths and approximate elevations.

Boring Number	**Depth to Groundwater (feet)**	**Approximate Groundwater Elevation**
B-1	36	1970
B-2	30	1976
B-3	47	1960
B-4	31	1975
B-5	46	1962
B-6	28	1981
B-7	31	1977
B-8	36	1973
B-9	11	2000
B-10	27	1981

The observed water levels indicate that the groundwater levels drop generally from south to north with higher levels near Chester Creek. These water levels are generally consistent with the observed levels in the borings performed on the Chester Creek levee and is consistent with our opinion that this portion of the creek is the beginning of the recharge section as evidenced by the typical lack of water in the creek further downstream along with dropping groundwater levels away from the creek. Fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made.

ANALYSIS, OPINIONS, AND RECOMMENDATIONS

Based on the data obtained from the borings, previous test pits, field permeability tests, and laboratory tests performed, it is our opinion that subsurface infiltration of stormwater is feasible. The most promising layers are the glacial sands and gravels. These soils would be suitable for infiltration using standard drywells. In areas where the alluvial soils are deeper, use of gravel galleries in addition to drywells would be feasible. However, the shallow groundwater encountered in Boring B-9 would restrict the depth of a gravel gallery.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
7-23-15

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Figure 3, Boring Location Map
Logs of Borings B-1 through B-10
Descriptive Terminology
Laboratory Test Results

FIGURE 1

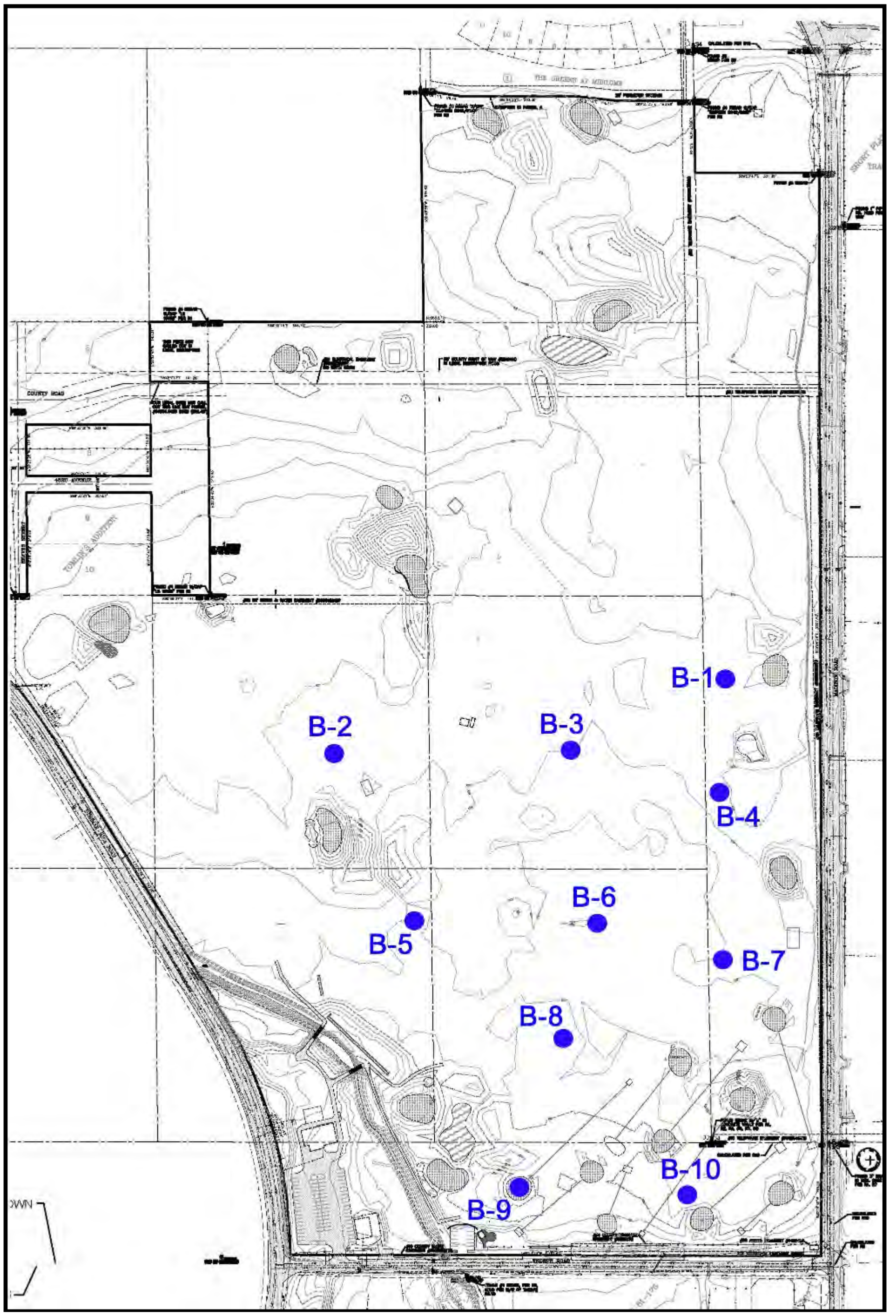
Site Location Map

IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026A Painted Hills Phase 2 4403 South Dishman-Mica Road Spokane Valley, WA	July 23, 2015

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026A	July 23, 2015
	Painted Hills Phase 2 4403 South Dishman-Mica Road Spokane Valley, WA	

FIGURE 3



Boring Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 2013-026A	July 23, 2015
	Painted Hills Phase 2 4403 South Dishman-Mica Road Spokane Valley, WA	

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BORING NUMBER B-1

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/2/15 **COMPLETED** 7/2/15

GROUND ELEVATION 2006 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

▼ **AT END OF DRILLING** 36.00 ft / Elev 1970.00 ft

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(ML) SILT, with roots, dark brown, moist. (Topsoil)										
		(CL) LEAN CLAY, brown, wet, stiff. (Alluvium)										
5			☒ SS		6-8 (14)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, medium dense to dense. (Glacial Outwash)										
10			☒ SS		13-12 (25)							
15			☒ SS		17-14 (31)							
20			☒ SS		16-15 (31)							
		(SP) POORLY GRADED SAND, fine to medium grained, a trace of Gravel, brown, moist to 36', then water-bearing, medium dense to dense. (Glacial Outwash)										
25			☒ SS		10-10 (20)							
30			☒ SS		11-12 (23)							

(Continued Next Page)

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BORING NUMBER B-1

PAGE 2 OF 2

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
		(SP) POORLY GRADED SAND, fine to medium grained, a trace of Gravel, brown, moist to 36', then water-bearing, medium dense to dense. (Glacial Outwash) *(continued)*										
35			☒ SS		13-15 (28)							
		▼										
40			☒ SS		11-13 (24)							
45			☒ SS		17-21 (38)							
		(SM) SILTY SAND, very fine to fine grained, brown, wet, medium dense. (Alluvium)										
50			☒ SS		8-8 (16)							

End of boring.

Groundwater not encountered with 49' of hollow-stem auger in the ground.

Groundwater at 36' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-2

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA
DATE STARTED 7/10/15 **COMPLETED** 7/13/15
GROUND ELEVATION 2005.9 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 30.00 ft / Elev 1975.90 ft
LOGGED BY SLN **CHECKED BY** PTN
▼ **AT END OF DRILLING** 39.00 ft / Elev 1966.90 ft
NOTES
AFTER DRILLING --- Not encountered (cave-in)

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)										
5			SS		16-14 (30)							
		(SW) WELL GRADED SAND with GRAVEL, medium to coarse grained, brown, moist to 30'. then water-bearing, medium dense to very dense. (Glacial Outwash)										
10			SS		6-8 (14)							
15			SS		9-8 (17)							
20			SS		7-9 (16)							
25			SS		9-9 (18)			7				4
30		▽	SS		10-15 (25)							

(Continued Next Page)

BORING NUMBER B-2

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
		(SW) WELL GRADED SAND with GRAVEL, medium to coarse grained, brown, moist to 30'. then water-bearing, medium dense to very dense. (Glacial Outwash) *(continued)*										
35			☒ SS		31-18 (49)							
		▼										
40			☒ SS		25-19 (44)							
45			☒ SS		29-26 (55)							
50			☒ SS		22-16 (38)							

End of boring.

Groundwater at 30' with 34' of hollow-stem auger in the ground.

Groundwater at 39' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater not encountered to cave-in depth of 27' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-3

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA
DATE STARTED 7/2/15 **COMPLETED** 7/2/15
GROUND ELEVATION 2007 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Not encountered
LOGGED BY PTN **CHECKED BY** PTN
▼ **AT END OF DRILLING** 47.00 ft / Elev 1960.00 ft
NOTES
AFTER DRILLING --- Not encountered (cave-in)

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
		(SC) CLAYEY SAND, fine to medium grained, dark brown to brown, moist to wet, loose to medium dense. (Alluvium)										
5			☒ SS		3-3 (6)							
10			☒ SS		7-8 (15)							
		(SP) POORLY GRADED SAND, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)										
15			☒ SS		9-12 (21)							
20			☒ SS		24-27 (51)							
		(SP) POORLY GRADED SAND, fine to medium grained, a trace of Gravel, brown, water-bearing, medium dense. (Glacial Outwash)										
25			☒ SS		14-8 (22)							
30			☒ SS		8-13 (21)							

(Continued Next Page)

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BORING NUMBER B-3

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SP) POORLY GRADED SAND,fine grained, brown, moist, dense to medium dense. (Glacial Outwash)										
35			☒ SS		16-16 (32)							
40			☒ SS		15-14 (29)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, with seams of Silty Sand, brown, moist to water-bearing, very dense to dense. (Glacial Outwash)										
45			☒ SS		29-23 (52)							
		▼										
50			☒ SS		21-20 (41)							

End of boring.

Groundwater at 47' with 49' of hollow-stem auger in the ground.

Groundwater not encountered to cave-in depth of 19' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-4

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA
DATE STARTED 7/6/15 **COMPLETED** 7/6/15
GROUND ELEVATION 2006.1 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
∇ **AT TIME OF DRILLING** 31.00 ft / Elev 1975.10 ft
LOGGED BY DD **CHECKED BY** PTN
AT END OF DRILLING --- Not encountered (cave-in)
NOTES
▼ **AFTER DRILLING** 45.00 ft / Elev 1961.10 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
5	▩	(SC-SM) SILTY CLAYEY SAND, fine grained, brown, moist. (Possible Fille)	☒ SS		7-9 (16)							
10	▨	(SC) CLAYEY SAND, fine to medium grained, with seams of Lean Clay, brown, moist to wet, loose. (Alluvium)	☒ SS		5-5 (10)							
15		(SW-SM) WELL GRADED SAND with SILT, medium to coarse grained, brown, moist, medium dense. (Alluvium)	☒ SS		11-13 (24)			10				9
20		(SM) SILTY SAND, very fine to fine grained, with seams of Clayey Sand, brown, wet, loose. (Alluvium)	☒ SS		3-2 (5)							
25		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 31', then water-bearing, medium dense to very dense. (Glacial Outwash)	☒ SS		7-7 (14)							
30		∇	☒ SS		6-9 (15)							

(Continued Next Page)

BORING NUMBER B-4

PAGE 2 OF 2

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 31', then water-bearing, medium dense to very dense. (Glacial Outwash) *(continued)*										
35			SS		12-16 (28)							
40			SS		50							
45		▼	SS		4-11 (15)							
50			SS		23-35 (58)							

End of boring.

Groundwater at 31' with 34' of hollow-stem auger in the ground.

Groundwater at 45' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater not encountered to cave-in depth of 30' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

BORING NUMBER B-5

PAGE 1 OF 2

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/1/15 **COMPLETED** 7/1/15

GROUND ELEVATION 2008.1 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY DD **CHECKED BY** PTN

▼ **AT END OF DRILLING** 46.00 ft / Elev 1962.10 ft

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine grained, brown, moist. (Possible Fill)										
5			SS		4-5 (9)							
		(SC) CLAYEY SAND, fine grained, brown, moist, very loose. (Alluvium)										
10			SS		1-2 (3)							
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, loose to medium dense. (Glacial Outwash)										
15			SS		1-8 (9)							
20			SS		8-11 (19)							
25			SS		9-10 (19)			17				7
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 46', then water-bearing, loose to very deense. (Glacial Outwash)										
30			SS		16-21 (37)							

(Continued Next Page)

BORING NUMBER B-5

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 46', then water-bearing, loose to very deense. (Glacial Outwash) *(continued)*										
35			SS		14-15 (29)							
40			SS		19-22 (41)							
45			SS		15-17 (32)							
		▼										
50			SS		27-35 (62)							

End of boring.

Groundwater at 46' with 49' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-6

PAGE 1 OF 2

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/7/15 **COMPLETED** 7/7/15

GROUND ELEVATION 2009.1 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

∇ **AT TIME OF DRILLING** 44.50 ft / Elev 1964.60 ft

LOGGED BY DD **CHECKED BY** PTN

▼ **AT END OF DRILLING** 44.50 ft / Elev 1964.60 ft

NOTES

⊻ **AFTER DRILLING** 28.00 ft / Elev 1981.10 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine grained, with seams of Clayey Sand, brown, moist, medium dense. (Alluvium)										
5			SS		6-7 (13)							
10			SS		7-7 (14)							
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, loose to medium dense. (Glacial Outwash)										
15			SS		5-10 (15)							
20			SS		6-7 (13)			15				6
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 25', then water-bearing, medium dense to dense. (Glacial Outwash)										
25			SS		8-11 (19)							
		⊻										
30			SS		10-11 (21)							

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BORING NUMBER B-6

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CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist to 25', then water-bearing, medium dense to dense. (Glacial Outwash) *(continued)*										
35			☒ SS		13-15 (28)							
40			☒ SS		12-13 (25)							
	▼											
45			☒ SS		19-22 (41)							
50			☒ SS		22-19 (41)							

End of boring.

Groundwater at 44.5' with 49' of hollow-stem auger in the ground.

Groundwater at 28' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-7

PAGE 1 OF 2

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PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/10/15 **COMPLETED** 7/10/15

GROUND ELEVATION 2007.6 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

▽ **AT TIME OF DRILLING** 34.00 ft / Elev 1973.60 ft

LOGGED BY SLN **CHECKED BY** PTN

▼ **AT END OF DRILLING** 31.00 ft / Elev 1976.60 ft

NOTES

▼ **AFTER DRILLING** 37.00 ft / Elev 1970.60 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine grained, with seams of Lean Clay, brown, moist to wet, loose. (Alluvium)										
5			☒ SS		2-5 (7)							
10			☒ SS		4-6 (10)							
		(SM) SILTY SAND, very fine to fine grained, brown, moist, medium dense. (Alluvium)										
15			☒ SS		8-11 (19)							
		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)										
20			☒ SS		9-8 (17)			18				6
25			☒ SS		7-10 (17)							
30			☒ SS		10-11 (21)							
	▼											

(Continued Next Page)

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BORING NUMBER B-7

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PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
	∇	(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash) *(continued)*										
35			SS		11-15 (26)							
	▼											
40			SS		12-15 (27)							
45			SS		12-25 (37)							
50			SS		12-32 (44)							

End of boring.

Groundwater at 34' with 34' of hollow-stem auger in the ground.

Groundwater at 37' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater at 31' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-8

PAGE 1 OF 2

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PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/7/15 **COMPLETED** 7/7/15

GROUND ELEVATION 2009.3 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

∇ **AT TIME OF DRILLING** 43.00 ft / Elev 1966.30 ft

LOGGED BY DD **CHECKED BY** PTN

▼ **AT END OF DRILLING** 36.00 ft / Elev 1973.30 ft

NOTES

▼ **AFTER DRILLING** 47.00 ft / Elev 1962.30 ft

DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0	(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
	(SM) SILTY SAND, fine to medium grained, brown, moist, medium dense. (Alluvium)										
5		SS		11-11 (22)							
	(SP) POORLY GRADED SAND, fine to medium grained, brown, moist, medium dense. (Alluvium)										
10		SS		6-5 (11)							
	(SM) SILTY SAND, fine to medium grained, with seams of Clayey Sand, brown, moist to wet, medium dense. (Alluvium)										
15		SS		8-10 (18)							
	(SW-SM) WELL GRADED SAND with SILT, fine to medium grained, brown, moist, medium dense. (Glacial Outwash)										
20		SS		8-10 (18)							
25		SS		9-9 (18)							
30		SS		10-11 (21)			18				10

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BORING NUMBER B-8

CLIENT NAI Black
PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SW-SM) WELL GRADED SAND with SILT, fine to medium grained, brown, moist, medium dense. (Glacial Outwash) *(continued)*										
35			☒ SS		10-9 (19)							
		▼ (SP) POORLY GRADED SAND, medium to coarse grained, brown, water-bearing, medium dense to dense. (Glacial Outwash)										
40			☒ SS		13-17 (30)							
		▽										
45			☒ SS		18-32 (50)							
		▼										
50			☒ SS		19-25 (44)							

End of boring.

Groundwater at 43' with 44' of hollow-stem auger in the ground.

Groundwater at 47' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater at 36' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-9

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DATE STARTED 7/8/15 **COMPLETED** 7/8/15

GROUND ELEVATION 2010.6 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

▽ **AT TIME OF DRILLING** 15.00 ft / Elev 1995.60 ft

LOGGED BY SLN **CHECKED BY** PTN

▼ **AT END OF DRILLING** 11.00 ft / Elev 1999.60 ft

NOTES

▼ **AFTER DRILLING** 41.00 ft / Elev 1969.60 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine grained, brown, moist, loose. (Alluvium)										
5			SS		4-6 (10)							
		(SC-SM) SILTY CLAYEY SAND, very fine to fine grained, brown, wet, loose. (Alluvium)										
10			SS		4-5 (9)							
	▼	(SP) POORLY GRADED SAND, fine to medium grained, brown, moist to 15', then water-bearing, medium dense to dense. (Glacial Outwash)										
15	▽		SS		6-9 (15)							
20			SS		9-9 (18)							
25			SS		12-11 (23)							
30			SS		12-15 (27)							

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BORING NUMBER B-9

PAGE 2 OF 2

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PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SP) POORLY GRADED SAND, fine to medium grained, brown, moist to 15', then water-bearing, medium dense to dense. (Glacial Outwash) *(continued)*										
35			☒ SS		18-30 (48)							
		(SP) POORLY GRADED SAND, medium to coarse grained, a trace of Gravel, brown, moist, dense. (Glacial Outwash)										
40			☒ SS		20-25 (45)							
		▼										
45			☒ SS		26-24 (50)							
50			☒ SS		21-26 (47)							

End of boring.

Groundwater at 15' with 19' of hollow-stem auger in the ground.

Groundwater at 41' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater at 11' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-10

PAGE 1 OF 2

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PROJECT NAME Pinted Hills Phase 2
PROJECT NUMBER 2013-026A
PROJECT LOCATION Spokane Valley, WA
DATE STARTED 7/8/15 **COMPLETED** 7/8/15
GROUND ELEVATION 2008.4 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 28.00 ft / Elev 1980.40 ft
LOGGED BY SLN **CHECKED BY** PTN
▼ **AT END OF DRILLING** 27.00 ft / Elev 1981.40 ft
NOTES
▼ **AFTER DRILLING** 48.00 ft / Elev 1960.40 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SP) POORLY GRADED SAND, medium to coarse grained, brown, moist, medium dense. (Alluvium)										
5			SS		5-6 (11)							
		(SM) SILTY SAND, fine grained, brown, moist, loose. (Alluvium)										
10			SS		4-5 (9)							
		(SW-SM) WELL GRADED SAND with SILT, fine to medium grained, brown, moist, medium dense. (Glacial Outwash)										
15			SS		9-9 (18)			19				9
20			SS		8-8 (16)							
25			SS		11-15 (26)							
		▼										
		▽										
30			SS		11-15 (26)							

(Continued Next Page)

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BORING NUMBER B-10

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PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
		(SW-SM) WELL GRADED SAND with SILT, fine to medium grained, brown, moist, medium dense. (Glacial Outwash) *(continued)*										
35			SS		13-14 (27)							
40			SS		21-25 (46)							
45			SS		21-23 (44)							
	▼											
50			SS		19-20 (39)							

End of boring.

Groundwater at 28' with 29' of hollow-stem auger in the ground.

Groundwater at 48' with 49' of hollow-stem auger in the ground 3 days later.

Groundwater at 27' immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel	
			GP	Poorly Graded Gravel	
		Gravel (with >12% fines)	GM	Silty Gravel	
			GC	Clayey Gravel	
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand	
			SP	Poorly Graded Sand	
		Sand (with >12% fines)	SM	Silty Sand	
			SC	Clayey Sand	
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt	
			CL	Lean Clay	
			OL	Organic Silt and Clay (low plasticity)	
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt	
			CH	Fat Clay	
			OH	Organic Clay and Silt (med to high plasticity)	
Highly Organic Soils			PT	Peat	Muck

MODIFIERS	
DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT	
DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE

SIEVE SIZE							
12"	3"	3/4"	4	10	40	200	
GRAIN SIZE (INCHES)							
12	3	0.75	0.19	0.079	0.0171	0.0029	
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

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GRAIN SIZE DISTRIBUTION

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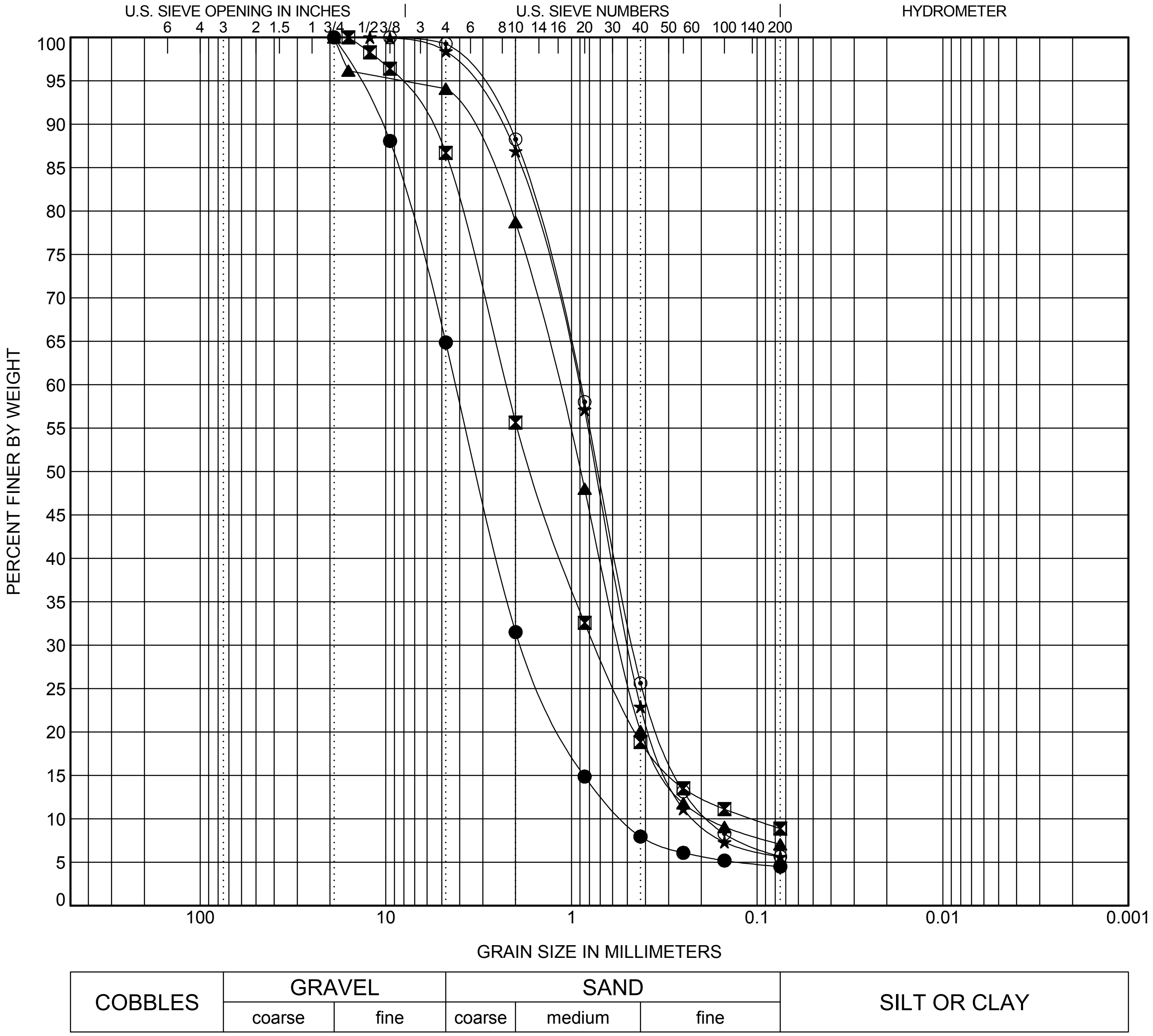
PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-2**	**25.0**	**SW Well Graded Sand with Gravel**				**1.57**	**8.02**
☒	**B-4**	**15.0**	**SW-SM Well Graded Sand with Silt**				**2.32**	**21.25**
▲	**B-5**	**25.0**	**SP-SM Poorly Graded Sand with Silt**				**1.39**	**6.64**
★	**B-6**	**20.0**	**SP-SM Poorly Graded Sand with Silt**				**1.21**	**4.30**
⊙	**B-7**	**20.0**	**SP-SM Poorly Graded Sand with Silt**				**1.35**	**5.00**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-2**	**25.0**	**19**	**4.187**	**1.851**	**0.522**	**35.1**	**60.4**	**4.5**	
☒	**B-4**	**15.0**	**15.9**	**2.258**	**0.747**	**0.106**	**13.3**	**77.8**	**8.9**	
▲	**B-5**	**25.0**	**19**	**1.187**	**0.543**	**0.179**	**5.9**	**87.0**	**7.1**	
★	**B-6**	**20.0**	**12.2**	**0.923**	**0.491**	**0.215**	**1.6**	**92.8**	**5.6**	
⊙	**B-7**	**20.0**	**9.5**	**0.899**	**0.467**	**0.18**	**0.7**	**93.6**	**5.6**	

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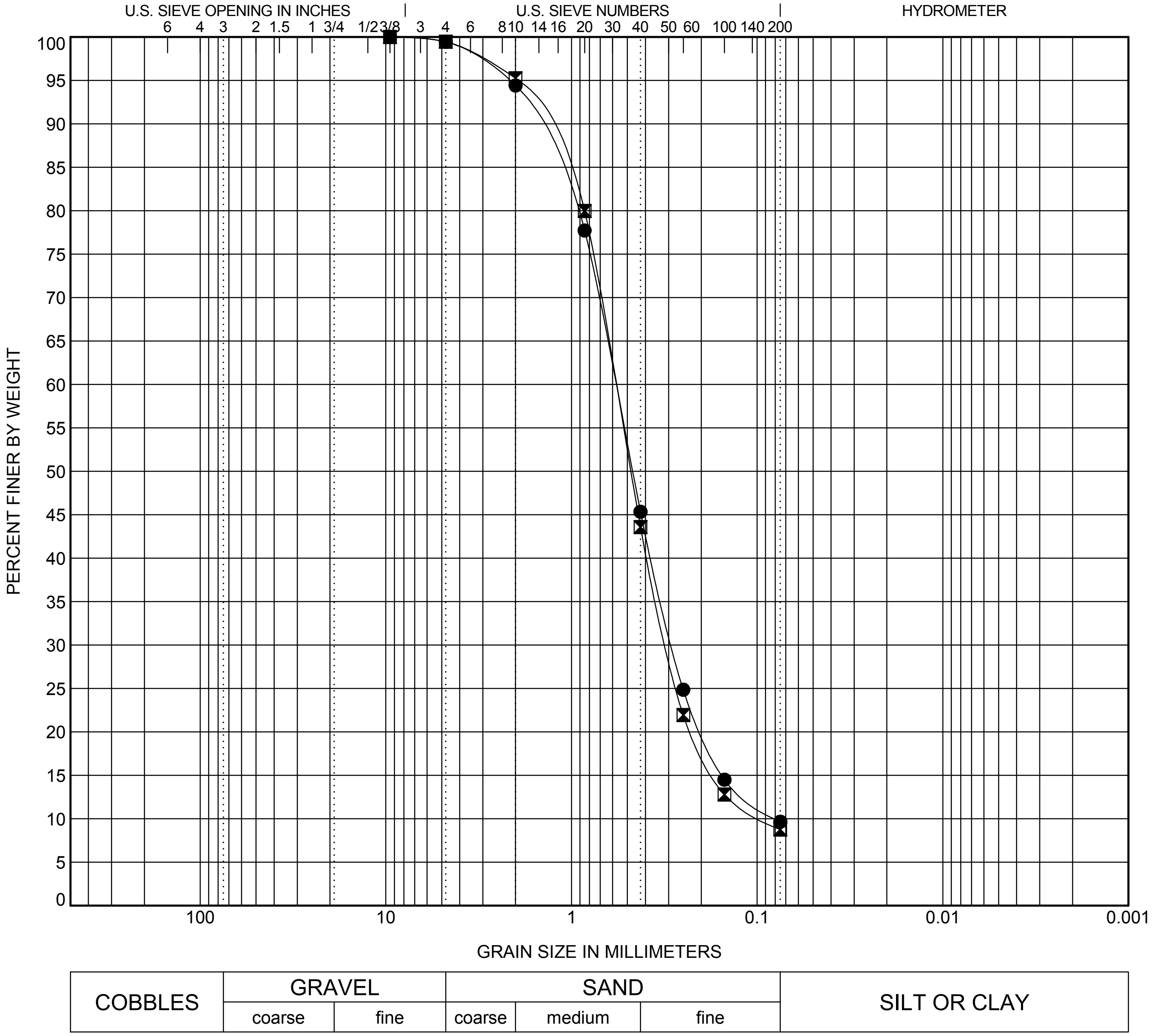
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black

PROJECT NAME Pinted Hills Phase 2

PROJECT NUMBER 2013-026A

PROJECT LOCATION Spokane Valley, WA



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-8**	**30.0**	**SW-SM Well Graded Sand with Silt**				**1.78**	**7.39**
☒	**B-10**	**15.0**	**SW-SM Well Graded Sand with Silt**				**1.72**	**6.26**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-8**	**30.0**	**9.5**	**0.582**	**0.286**	**0.079**	**0.5**	**89.8**	**9.7**	
☒	**B-10**	**15.0**	**9.5**	**0.581**	**0.305**	**0.093**	**0.5**	**90.7**	**8.8**	

REORT 7

Gustin Levee Evaluation, dated July 23, 2015, revised August 29, 2016

GEOTECHNICAL EVALUATION
GUSTIN LEVEE EVALUATION
PARCEL NO. 45344.9108
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037B

July 23, 2015
Revised August 29, 2016

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Geotechnical Engineering and Consulting

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Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

July 23, 2015
Project No. 14-037B

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Geotechnical Evaluation**
Gustin Levee Evaluation
4403 South Dishman-Mica Road
Spokane County, WA

Dear Mr. Walker:

We have completed the geotechnical evaluation for the Gustin Levee at the above-referenced site in Spokane County, Washington. The purpose of evaluation was to evaluate the existing levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

We appreciate the opportunity to provide our services to you on this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

Attachment: Geotechnical Evaluation Report

P.O. Box 1566, Veradale, WA 99037
Phone 509-209-6262

GEOTECHNICAL EVALUATION
GUSTIN LEVEE EVALUATION
PARCEL NO. 45344.9108
SPOKANE COUNTY, WASHINGTON

Inland Pacific Engineering Company Project No. 14-037B

July 23, 2015
Revised August 29, 2016

Prepared for:

NAI Black
Spokane, Washington

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

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Project No. 14-037B
Gustin Levee Evaluation
Parcel No. 45344.9108
Spokane County, Washington

1.0 INTRODUCTION

1.1 Project Description

We understand that the proposed Painted Hills project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed. In addition, runoff from the drainage east of the site will require a FEMA certified levee. The existing levee is located on the Gustin property off State Highway 27.

1.2 Purpose

The purpose of our services is to evaluate the existing levee for conformance to 44 CFR 65.10 of the Code of Federal Regulations for certification by the Federal Emergency Management Agency (FEMA).

1.3 Scope

Our services were requested by Mr. Bryan Walker of NAI Black. Mr. Walker authorized us to proceed on April 28, 2015. The scope of work agreed upon consisted of the following:

- review of existing geotechnical data and reports for the development, if available
- drill 8 penetration test borings at the site to a depth of 15 feet,
- excavate 6 test pits through the existing levee embankment,
- performing laboratory tests on samples obtained from the test pits,
- classifying the soils and preparing boring logs, and
- submitting a geotechnical report containing logs of the borings, results of our field investigation and laboratory testing, and our analyses, opinions, and recommendations relative to the conformance of the existing levee to FEMA standards.

1.4 Available Information

We were provided a topographic survey for the project site by WCE. This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was not dated.

We also performed a preliminary geotechnical evaluation for the golf course property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

In conjunction with this evaluation, West Consultants, Inc. (WEST) has been contracted by NAI Black to provide a FEMA Conditional Letter of Map Revision submittal (CLOMR). They have provided Inland Pacific Engineering Company (IPEC) water surface elevations and velocity output from their revised RAS model to assist us in our evaluation.

1.5 Locations and Elevations

The borings and test pits were drilled and/or excavated at or near locations selected by us. The boring and test pit locations are shown on the Boring Location Map in Appendix A. The borings were staked by Whipple Consulting Engineers, Inc. (WCE). The test pits were staked by IPEC. Ground surface elevations at the borings were provided by WCE. Ground surface elevations at the test pits were interpolated from the topographic survey provided by WCE.

2.0 RESULTS

2.1 Logs

Log of Boring and Log of Test Pit sheets indicating the vertical sequence of soils and materials encountered and groundwater observations are included in Appendix B. The strata changes were inferred from the changes in the penetration test samples and auger cuttings brought to the surface or measured from the surface in the test pits. Please note that the depths shown as changes between the strata are only approximate. The changes are likely transitions and the depths of changes vary between the borings. Geologic origins for each stratum are based on the soil type, available geologic maps, previous geotechnical reports for this and adjacent sites, and available common knowledge of the depositional history of the site.

2.2 Site Conditions

The site is an open field with no trees and is primarily grass-covered. The existing levee extends from the culvert under State Highway 27 on the east side of the property and extends west to the west side of the parcel. The creek side of the levee is typically at a 1.5:1 to 1:1 (H:V) slope. The land side of the levee is typically at a 2.5:1 to 1.5:1 slope. There are two existing crossings where the levee embankment is not present. The crossings consist of embankments with culverts.

2.3 Soils

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam and Urban land-Springdale, disturbed complex. The native soils encountered in the borings and test pits were consistent with the NRCS data.

The borings encountered approximately 1 foot of topsoil at the surface. Below the topsoil, the borings encountered alluvial or glacial silty to clayey sands and/or poorly graded sands to their termination depths. Borings B-1 and B-3 encountered silty clay between the 4 and 9-foot depths.

The test pits were excavated through the existing levee embankment. They encountered existing fill in the upper 4 to 5½ feet. The embankment fill consisted primarily of silty sand. Below the fill, the test pits encountered alluvial or glacial silty to clayey sands and/or gravels to their termination depths.

2.4 Penetration Resistances

Penetration resistances (N-values) in the sands and gravels ranged from 6 to 59 blows per foot (BPF) and averaged 23 BPF indicating that these soils were loose to very dense, but were typically medium dense. Penetration resistances in the clays ranged from 8 to 18 BPF indicating they were medium to very stiff in consistency.

2.5 Groundwater

Groundwater was not encountered in the borings or test pits. Groundwater is believed to currently exist at some depth below the termination depths of the borings and test pits. Well log data in the vicinity of the site indicate that groundwater is typically 50 to 80 feet below the surface.

2.6 Laboratory Testing

We obtained soil samples from the borings during our site investigation. The tests performed included the following:

1. ASTM D 6913, Sieve Analysis
2. ASTM D 4318, Atterberg Limits'

These tests were used to aid in classifying the soils and in the engineering analyses and formulation of engineering opinions and recommendations. The tests were performed by IPEC. Attached are data sheets summarizing the tests performed.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Discussion

Based on the results of the borings and test pits, along with topographic data from WCE, the existing levee will need significant modification in order to meet the FEMA standard. At this time, we understand that the existing crossings will be removed. As such, additional freeboard will not be required at these locations. The sideslopes of the levee will need to be sloped flatter to maintain slope stability during flooding. In addition, the crown will need to be widened. It is our opinion that the levee embankment materials are suitable but will need to be re-worked to provide adequate flood protection. In summary, the levee as it exists cannot be certified at this time.

3.2 History

The levee was constructed prior to 1945, when the Gustin family purchased the land. As such, design plans or as-built drawings are not available. However, an as-built survey was completed by WCE in 2015.

3.3 Freeboard

We were provided 100-year flood elevations by WEST. They provided us a plan view of the levee with flood elevations at 9 locations starting at the culvert on State Highway 27 and ending at the proposed triangle stormwater pond north of 40th Avenue west of the Gustin property. The elevations ranged from 2020.02 at State Highway 27 to 2008.85 at the triangle pond. Please refer to the WEST report for a complete summary of the floodplain analysis.

According to 44 CFR Section 65.10(b)(1), an additional 1 foot of freeboard is required within 100 feet of bridge structures. This will require the top of the levee to be at elevation 2024.02 at the State Highway 27 crossing and extending 100 feet west. Since the existing levee is at approximately elevation 2020 in this area, it will need additional fill to meet the minimum freeboard requirements.

3.4 Closures

There are no penetrations of the levee so closure devices are not required.

3.5 Embankment Protection

The levee is currently grass-covered for erosion protection. We evaluated the erosion protection for the creek side of the levee using the results of the HEC-RAS analysis by WEST. They provided flow velocities for the 100-year flood event. The flow velocities are shown in the following table.

FEMA FIS Station	RAS Station	100-year Channel Velocity (ft/sec)
1962.72	586	3.71
2027.72	651	2.67
2295.08	918	1.26
2848.82	1472	4.34
2886.75	1510	2.15
2904.75	1528	0.91
2933.32	1557	1.33
3338.84	1963	2.30
3364.84	1989	2.11

As shown in the table, the average flow velocity is typically less than 3 feet per second. At these velocities, it is our opinion that the vegetative erosion protection is adequate for levee slope protection.

3.6 Embankment and Foundation Stability

We evaluated the embankment and foundation stability for conditions described in EM 1110-2-1913, “Design and Construction of Levees, by the US Corps of Engineers dated April 30, 2000, Chapter 6. We analyzed the existing levee embankment for the following cases:

1. CASE I, End of construction.
2. CASE II: Sudden drawdown.
3. CASE III: Steady state seepage from full flood stage.

We performed slope stability analyses for each case. We analyzed the levee embankment with 1:1 slopes. This configuration is considered to have the lowest factor of safety. For our analyses, we used XSTABL software which is based on a software program developed at Purdue University.

For these cases, we calculated the minimum factors of safety as shown in the following table.

CASE	Minimum Factor of Safety
I	1.03
II	0.92
III	0.50

For stability, a minimum factor of safety of 1.5 is generally considered acceptable. Based on this analysis, it is our opinion that the levee will not be stable with respect to global slope stability with its current geometry.

We recommend that the levee be improved to have maximum 3:1 (H:V) slopes for stability. We recommend a minimum crown width of 8 feet. We recommend that the levee embankment materials consist of a granular soil having 10 to 30 percent by weight passing a 200 sieve to reduce the permeability and limit seepage. We have assumed that on-site soils will be used as borrow to construct the embankment.

3.7 Settlement

The average depth of fill is approximately 5 feet. This would result in a loading increase of approximately 625 pounds per square foot (psf) on the bearing soils. Based on the data obtained from the borings, the levee was constructed above medium dense sands. Settlement in these soils would have occurred shortly after construction. Also, given the age of the levee, it is our opinion that significant additional long term settlement will not occur even with addition of 1 to 2 feet in areas requiring additional fill to meet the freeboard requirements.

3.8 Interior Drainage

Interior drainage systems have been designed by WCE. We understand that these systems will include the proposed triangle stormwater pond with multiple drywells to control flood waters and infiltrate them into the ground. Please refer to the WCE report for a comprehensive description of the interior drainage system.

3.9 Operation Plans

The Operation Plan will be prepared as part of the final levee certification.

3.10 Maintenance Plan

The Maintenance Plan will be prepared as part of the final levee certification.

4.0 PROCEDURES

4.1 Excavation and Sampling

The borings were completed on July 13 and 14, 2015 using a truck-mounted drill rig operated by an independent firm working under subcontract to IPEC. After we logged the borings, they were abandoned in accordance with state requirements. The test pits were excavated on July 21, 2015 using a rubber-tired backhoe operated by an independent firm working under subcontract to IPEC. After we logged the test pits, the test pits were backfilled. A geotechnical engineer from our firm continuously observed the borings and test pits and logged the surface and subsurface conditions.

4.2 Soil Classification

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedures)".

5.0 GENERAL RECOMMENDATIONS

5.1 Basis of Recommendations

The analyses and recommendations submitted in this report are based on the data obtained from the borings and test pits performed at the locations indicated on the Boring and Test Pit Location Map in Appendix A. It should be recognized that the explorations performed for this evaluation reveal subsurface conditions only at discreet locations across the project site and that actual conditions in other areas could vary. Furthermore, the nature and extent of any such variations would not become evident until additional explorations are performed or until construction activities have begun. If significant variations are observed at that time, we may need to modify our conclusions and recommendations contained in this report to reflect the actual site conditions.

5.2 Groundwater Fluctuations

We made water level observations in the borings and test pits at the times and conditions stated on the boring and test pit logs. These data were interpreted in the text of this report. The period of observation was relatively short and fluctuation in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

5.3 Use of Report

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

5.4 Level of Care

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

5.5 Professional Certification

This report was prepared by me or under my direct supervision and I am a duly registered engineer under the laws of the State of Washington.

Paul T. Nelson, P.E.
Principal Engineer

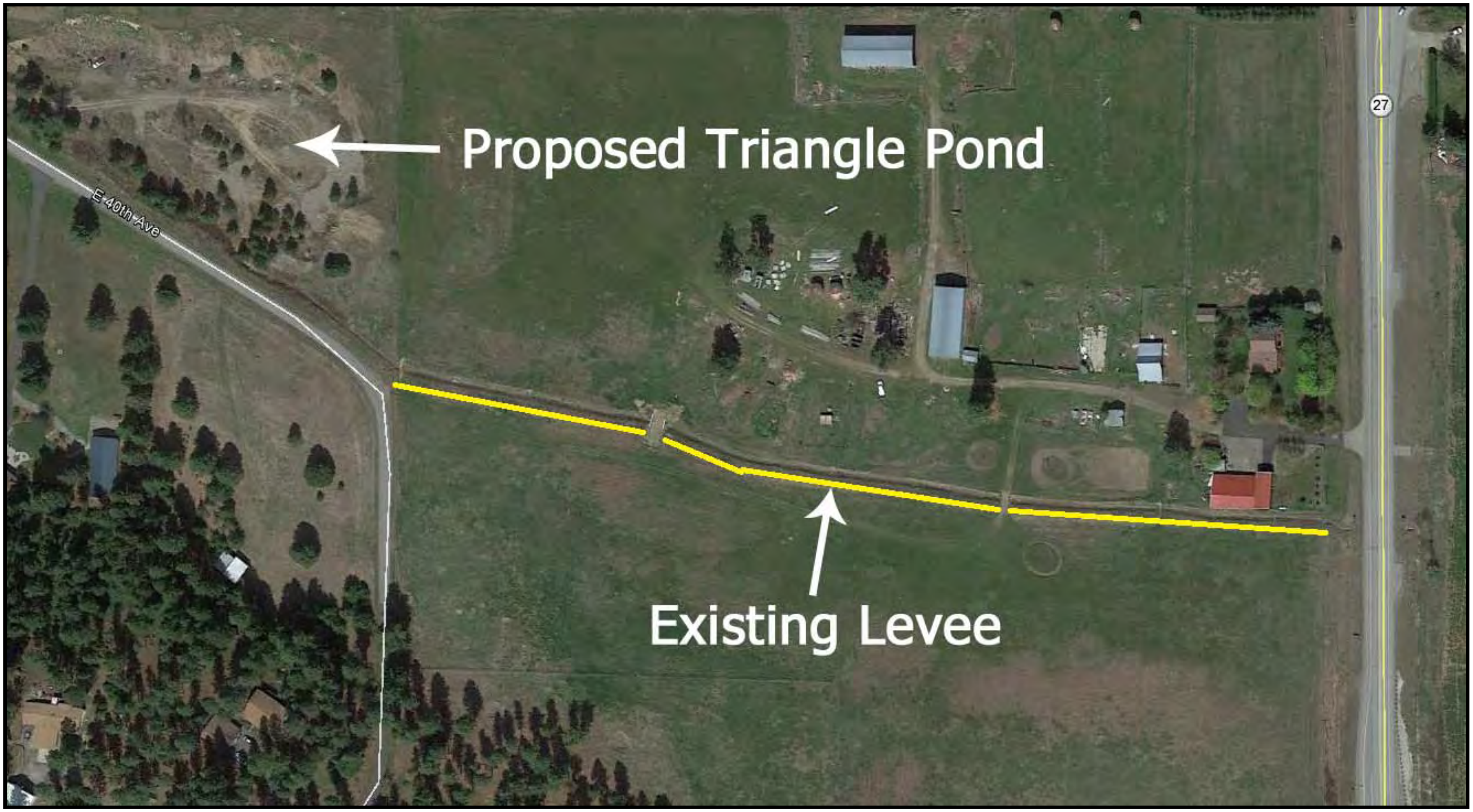
PAUL T NELSON
37228

7-23-15

APPENDIX A

SITE LOCATION MAP, NRCS MAP, BORING AND TEST PIT LOCATION MAP

FIGURE 1

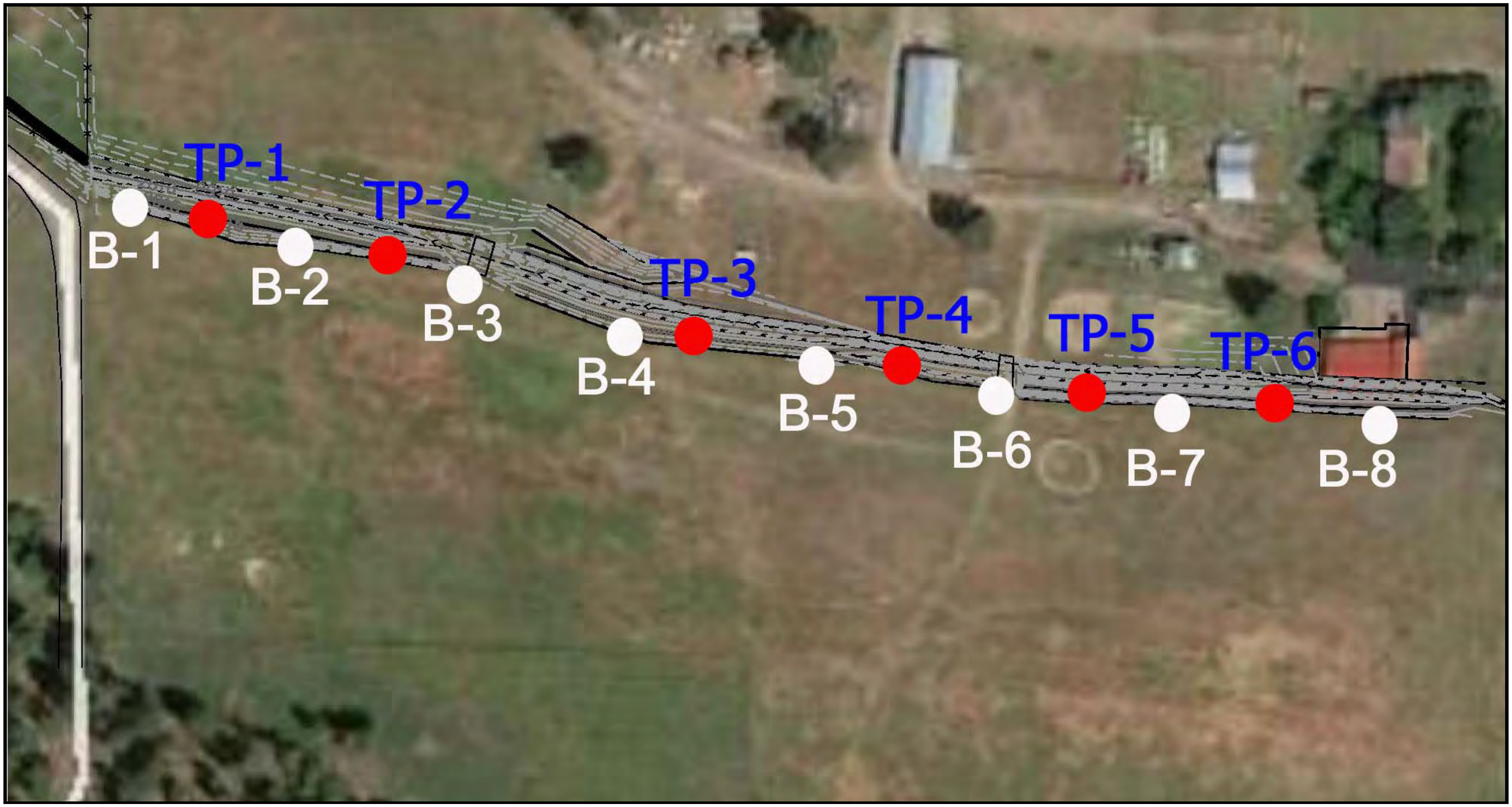


Site Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037B	July 22, 2015
	Gustin Levee Parcel No. 45344.9108 Spokane County, WA	

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037B Gustin Levee Parcel No. 45344.9108 Spokane County, WA	July 22, 2015

FIGURE 3



Boring Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 14-037B Gustin Levee Parcel No. 45344.9108 Spokane County, WA	July 22, 2015

APPENDIX B

LOGS OF BORINGS, LOGS OF TEST PITS, DECRIPTIVE TERMINOLOGY

IPEC

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BORING NUMBER B-1

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/13/15 **COMPLETED** 7/13/15

GROUND ELEVATION 2010.8 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY DD **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine to medium grained, brown, moist, loose. (Alluvium)										
			SS		5-4 (9)							
		(CL-ML) SANDY SILTY CLAY, brown, moist to wet, medium to stiff. (Alluvium)										
5			SS		4-4 (8)			21	24	20	4	77
			SS		6-8 (14)							
		(SM) SILTY SAND, fine to medium grained, a trace of Gravel, brown, moist, medium dense. (Alluvium)										
10			SS		12-13 (25)							
		(SM) SILTY SAND with GRAVEL, medium to coarse grained, brown, moist to wet, medium dense. (Glacial Outwash)										
15			SS		14-15 (29)							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-2

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/13/15 **COMPLETED** 7/13/15

GROUND ELEVATION 2010.7 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY DD **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine to medium grained, brown, moist, loose to medium dense. (Alluvium)										
			SS		3-3 (6)							
5			SS		7-8 (15)							
			SS		6-8 (14)							34
10			SS		5-8 (13)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, medium dense. (Glacial Outwash)										
15			SS		15-11 (26)							6

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

IPEC

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BORING NUMBER B-3

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County
DATE STARTED 7/13/15 **COMPLETED** 7/13/15
GROUND ELEVATION 2012.4 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Not encountered
LOGGED BY DD **CHECKED BY** PTN
AT END OF DRILLING --- Not encountered
NOTES
AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	▨	(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
	▨	(SM) SILTY SAND, very fine to fine grained, brown, moist, loose. (Alluvium)										
			☒ SS		3-3 (6)							
	▨	(CL-ML) SANDY SILTY CLAY, brown, moist to wet, very stiff. (Alluvium)										
5			☒ SS		8-10 (18)			17	23	19	4	62
	▨	(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)	☒ SS		7-6 (13)							
10			☒ SS		7-9 (16)							8
15			☒ SS		9-9 (18)							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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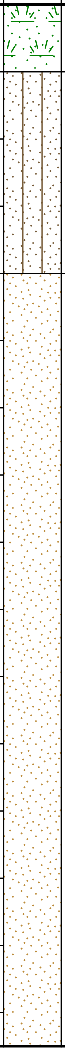
BORING NUMBER B-4

PAGE 1 OF 1

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County
DATE STARTED 7/13/15 **COMPLETED** 7/13/15
GROUND ELEVATION 2013 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Not encountered
LOGGED BY DD **CHECKED BY** PTN
AT END OF DRILLING --- Not encountered
NOTES
AFTER DRILLING --- Not encountered



DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND, fine to medium grained, brown, moist, loose. (Alluvium)										
			SS		4-4 (8)							36
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, medium dense to dense. (Glacial Outwash)										
5			SS		10-9 (19)							
			SS		6-7 (13)							
10			SS		20-21 (41)							
15			SS		13-13 (26)							4

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

IPEC

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BORING NUMBER B-5

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/14/15 **COMPLETED** 7/14/15

GROUND ELEVATION 2013.9 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to mediium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Glacial Outwash)										
			SS		11-10 (21)							
5			SS		15-10 (25)							
		(SP-SM) POORLY GRADED SAND with SILT and GRAVEL, medium to coarse grained, brown, moist, medium dense. (Glacial Outwash)										
			SS		5-6 (11)							
10			SS		6-9 (15)							8
15			SS		13-17 (30)							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

IPEC BORING LOG - GINT STD US LAB.GDT - 7/23/15 15:32 - J:_IPEC PROJECTS_2014 PROJECTS\14-037B GUSTIN LEVEE FOR PAINTED HILLS\GINT\14-037B GUSTIN LEVEE.GPJ

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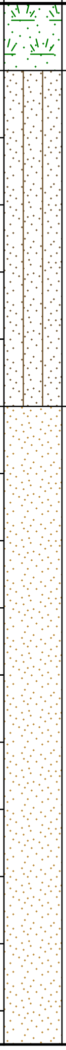
BORING NUMBER B-6

PAGE 1 OF 1

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County
DATE STARTED 7/14/15 **COMPLETED** 7/14/15
GROUND ELEVATION 2015.1 ft **HOLE SIZE** 8 inches
DRILLING CONTRACTOR Johnson Exploration Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING --- Not encountered
LOGGED BY SLN **CHECKED BY** PTN
AT END OF DRILLING --- Not encountered
NOTES
AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to mediium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND with GRAVEL, fine to coarse grained, brown, moist, dense to medium dense. (Glacial Outwash)										
			SS		16-16 (32)							
5			SS		7-15 (22)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist,very dense to medium dense. (Glacial Outwash)										
			SS		43-15 (58)							
10			SS		17-16 (33)							
15			SS		12-12 (24)							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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BORING NUMBER B-7

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/14/15 **COMPLETED** 7/14/15

GROUND ELEVATION 2015.9 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SM) SILTY SAND, fine to mediium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND with GRAVEL, fine to coarse grained, brown, moist, medium dense. (Glacial Outwash)	SS		5-13 (18)							
		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, dense to very dense. (Glacial Outwash)										
5			SS		24-18 (42)							
			SS		25-16 (41)							
10			SS		8-15 (23)							
15			SS		50							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

IPEC

Inland Pacific Engineering Company
3012 North Sullivan Road, Suite C
Spokane Valley, WA 99216
Telephone: 509-209-6262
Fax: 509-290-5734

BORING NUMBER B-8

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/14/15 **COMPLETED** 7/14/15

GROUND ELEVATION 2020 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

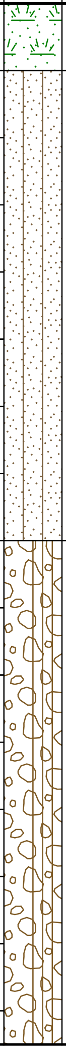
AT TIME OF DRILLING --- Not encountered

LOGGED BY SLN **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered



DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTIC LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
0		(SM) SILTY SAND, fine to mediium grained, with roots, dark brown, moist. (Topsoil)										
		(SM) SILTY SAND with GRAVEL, fine to coarse grained, brown, moist, medium dense. (Glacial Outwash)										
			SS		9-8 (17)							
5			SS		5-7 (12)							
			SS		7-7 (14)							
		(GP-GM) POORLY GRADED GRAVEL with SILT and SAND, fine grained, brown, moist, dense to very dense. (Glacial Outwash)										
10			SS		20-19 (39)							7
15			SS		27-32 (59)							

End of boring.

Groundwater not encountered with 14' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then grouted to the surface.

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TEST PIT NUMBER TP-1

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County
DATE STARTED 7/21/15 **COMPLETED** 7/21/15
GROUND ELEVATION 2016 ft **TEST PIT SIZE** 30 inches
EXCAVATION CONTRACTOR Alpine Excavating
GROUND WATER LEVELS:
EXCAVATION METHOD Backhoe
AT TIME OF EXCAVATION --- Not encountered
LOGGED BY PTN **CHECKED BY** PTN
AT END OF EXCAVATION --- Not encountered
NOTES
AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0					
2.5		MC = 16% Fines = 44%	SM	▨	(SM) FILL: Silty Clayey Sand, fine grained, a trace of fibers, brown, moist.
5.0				5.0	2011.0
			SC-SM	▨	(SC-SM) SILTY CLAYEY SAND, fine grained, brown, moist. (Alluvium)
				7.0	2009.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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TEST PIT NUMBER TP-2

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/21/15 **COMPLETED** 7/21/15

GROUND ELEVATION 2016 ft **TEST PIT SIZE** 30 inches

EXCAVATION CONTRACTOR Alpine Excavating

GROUND WATER LEVELS:

EXCAVATION METHOD Backhoe

AT TIME OF EXCAVATION --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

AT END OF EXCAVATION --- Not encountered

NOTES

AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0		SM	▩	(SM) FILL: Silty Sand, fine to medium grained, brown, moist.	
2.5					
4.0		SM	░	(SM) SILTY SAND, fine to medium grained, brown, moist. (Alluvium)	2012.0
5.0					
7.5					
8.0					2008.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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TEST PIT NUMBER TP-3

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/21/15 **COMPLETED** 7/21/15

GROUND ELEVATION 2015 ft **TEST PIT SIZE** 30 inches

EXCAVATION CONTRACTOR Alpine Excavating

GROUND WATER LEVELS:

EXCAVATION METHOD Backhoe

AT TIME OF EXCAVATION --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

AT END OF EXCAVATION --- Not encountered

NOTES

AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0 2.5 5.0		MC = 6% Fines = 22%	SM	▨	(SM) FILL: Silty Sand with Gravel, fine to medium grained, brown, moist. 5.5 2009.5
			SM	░	(SM) SILTY SAND, fine to coarse grained, a trace of Gravel, brown, moist. (Glacial Outwash) 7.0 2008.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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TEST PIT NUMBER TP-4

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/21/15 **COMPLETED** 7/21/15

GROUND ELEVATION 2017 ft **TEST PIT SIZE** 30 inches

EXCAVATION CONTRACTOR Alpine Excavating

GROUND WATER LEVELS:

EXCAVATION METHOD Backhoe

AT TIME OF EXCAVATION --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

AT END OF EXCAVATION --- Not encountered

NOTES

AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0 2.5		SM	▨	(SM) FILL: Silty Sand with Gravel, fine to coarse grained, brown, moist. 5.0 2012.0
5.0		SM	░	(SM) SILTY SAND with GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash) 7.0 2010.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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TEST PIT NUMBER TP-5

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/21/15 **COMPLETED** 7/21/15

GROUND ELEVATION 2021 ft **TEST PIT SIZE** 30 inches

EXCAVATION CONTRACTOR Alpine Excavating

GROUND WATER LEVELS:

EXCAVATION METHOD Backhoe

AT TIME OF EXCAVATION --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

AT END OF EXCAVATION --- Not encountered

NOTES

AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0 2.5		MC = 7% Fines = 48%	SM	▨	(SM) FILL: Silty Sand, fine grained, brown, moist.
5.0					5.0 2016.0
			SM	░	(SM) SILTY SAND with GRAVEL, fine to coarse grained, brown, moist. (Glacial Outwash)
					7.0 2014.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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TEST PIT NUMBER TP-6

PAGE 1 OF 1

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County

DATE STARTED 7/21/15 **COMPLETED** 7/21/15

GROUND ELEVATION 2021 ft **TEST PIT SIZE** 30 inches

EXCAVATION CONTRACTOR Alpine Excavating

GROUND WATER LEVELS:

EXCAVATION METHOD Backhoe

AT TIME OF EXCAVATION --- Not encountered

LOGGED BY PTN **CHECKED BY** PTN

AT END OF EXCAVATION --- Not encountered

NOTES

AFTER EXCAVATION --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0				▨	(SM) FILL: Silty Sand with Gravel, fine to coarse grained, brown, moist.	
2.5			SM	▨		
		Fines = 25%		▨		
5.0					5.0	2016.0
			GM	°	(GM) SILTY GRAVEL with SAND, fine to coarse grained, brown, moist. (Glacial Outwash)	
					7.0	2014.0

End of test pit.

Groundwater not encountered

Test pit immediately backfilled.

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Geotechnical Engineering and Consulting

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE

COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel	
			GP	Poorly Graded Gravel	
		Gravel (with >12% fines)	GM	Silty Gravel	
			GC	Clayey Gravel	
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand	
			SP	Poorly Graded Sand	
		Sand (with >12% fines)	SM	Silty Sand	
			SC	Clayey Sand	
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt	
			CL	Lean Clay	
			OL	Organic Silt and Clay (low plasticity)	
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt	
			CH	Fat Clay	
			OH	Organic Clay and Silt (med to high plasticity)	
Highly Organic Soils			PT	Peat	Muck

MODIFIERS

DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT

DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE

SIEVE SIZE						
12"	3"	3/4"	4	10	40	200
GRAIN SIZE (INCHES)						
12	3	0.75	0.19	0.079	0.0171	0.0029

Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

APPENDIX C

LABORATORY TEST RESULTS

IPEC
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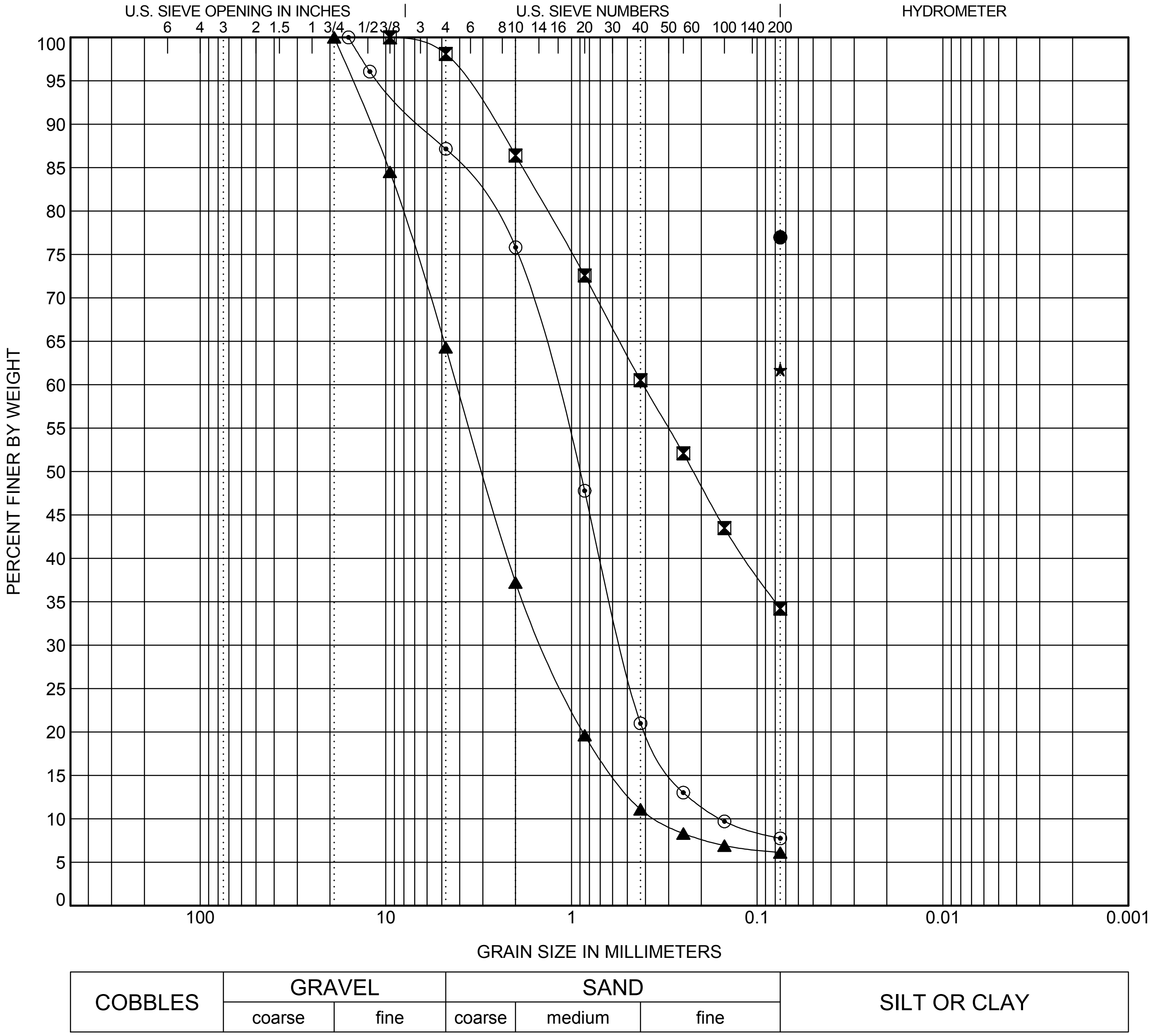
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-1**	**5.0**	**CL-ML Sandy Silty Clay**	**24**	**20**	**4**		
☒	**B-2**	**7.5**	**SM Silty Sand**					
▲	**B-2**	**15.0**	**SP-SM Poorly Graded Sand with Silt and Gravel**				**1.39**	**12.01**
★	**B-3**	**5.0**	**CL-ML Sandy Silty Clay**	**23**	**19**	**4**		
⊙	**B-3**	**10.0**	**SP-SM Poorly Graded Sand with Silt**				**1.48**	**7.85**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-1**	**5.0**	**0.075**						**77.0**	
☒	**B-2**	**7.5**	**9.5**	**0.411**			**1.9**	**63.9**	**34.2**	
▲	**B-2**	**15.0**	**19**	**4.142**	**1.408**	**0.345**	**35.7**	**58.2**	**6.1**	
★	**B-3**	**5.0**	**0.075**						**61.7**	
⊙	**B-3**	**10.0**	**15.9**	**1.234**	**0.537**	**0.157**	**12.8**	**79.4**	**7.8**	

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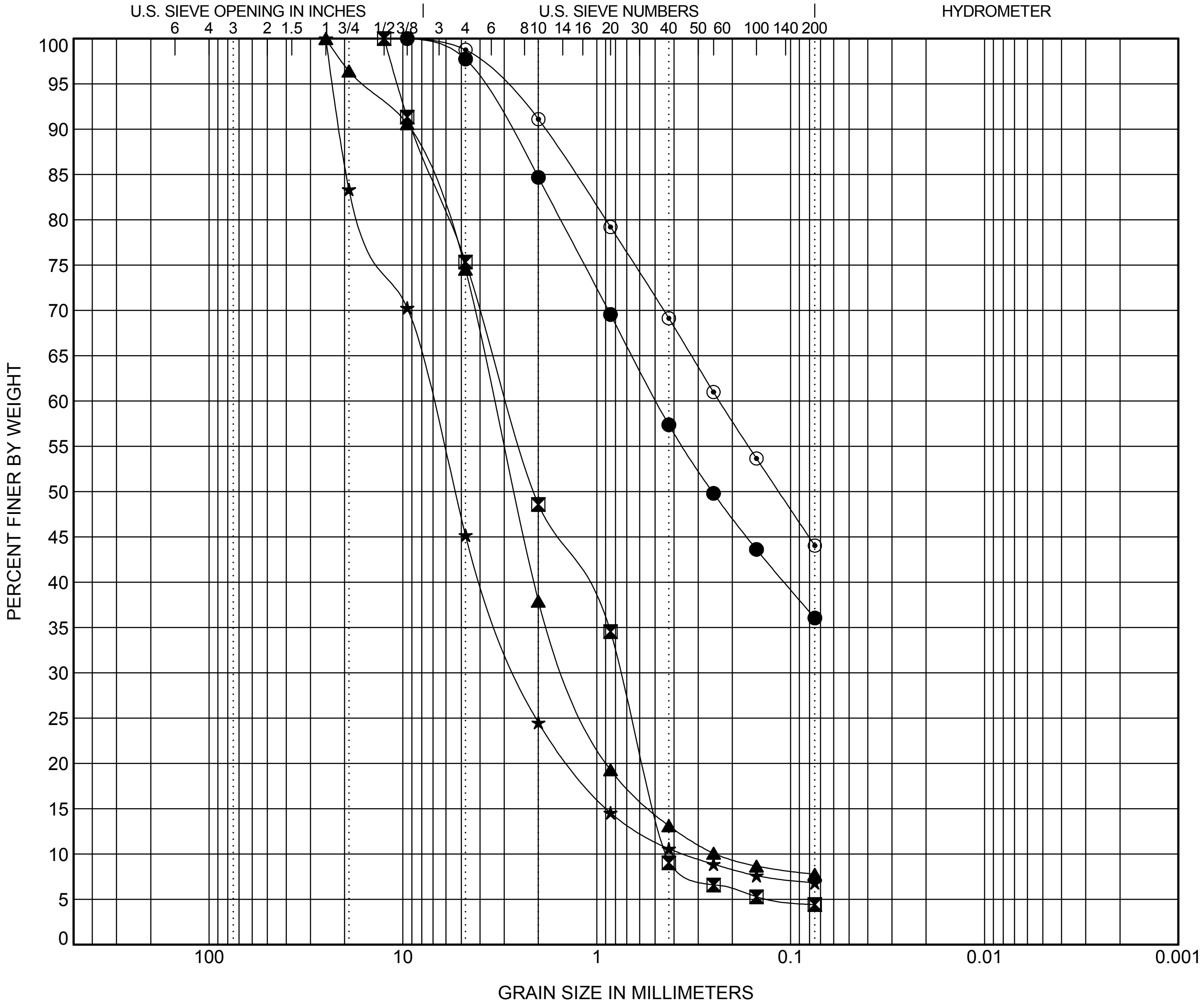
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-4**	**2.5**	**SM Silty Sand**					
☒	**B-4**	**15.0**	**SP Poorly Graded Sand with Gravel**				**0.45**	**6.63**
▲	**B-5**	**10.0**	**SP-SM Poorly Graded Sand with Silt and Gravel**				**2.37**	**13.93**
★	**B-8**	**10.0**	**GP-GM Poorly Graded Gravel with Silt and Sand**				**2.50**	**20.18**
⊙	**TP-1**	**4.0**	**SM Silty Sand**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-4**	**2.5**	**9.5**	**0.494**			**2.3**	**61.7**	**36.1**	
☒	**B-4**	**15.0**	**12.5**	**2.893**	**0.751**	**0.436**	**24.7**	**70.9**	**4.4**	
▲	**B-5**	**10.0**	**25**	**3.369**	**1.391**	**0.242**	**25.5**	**66.8**	**7.8**	
★	**B-8**	**10.0**	**25**	**7.153**	**2.518**	**0.354**	**54.8**	**38.4**	**6.8**	
⊙	**TP-1**	**4.0**	**9.5**	**0.233**			**1.2**	**54.7**	**44.0**	

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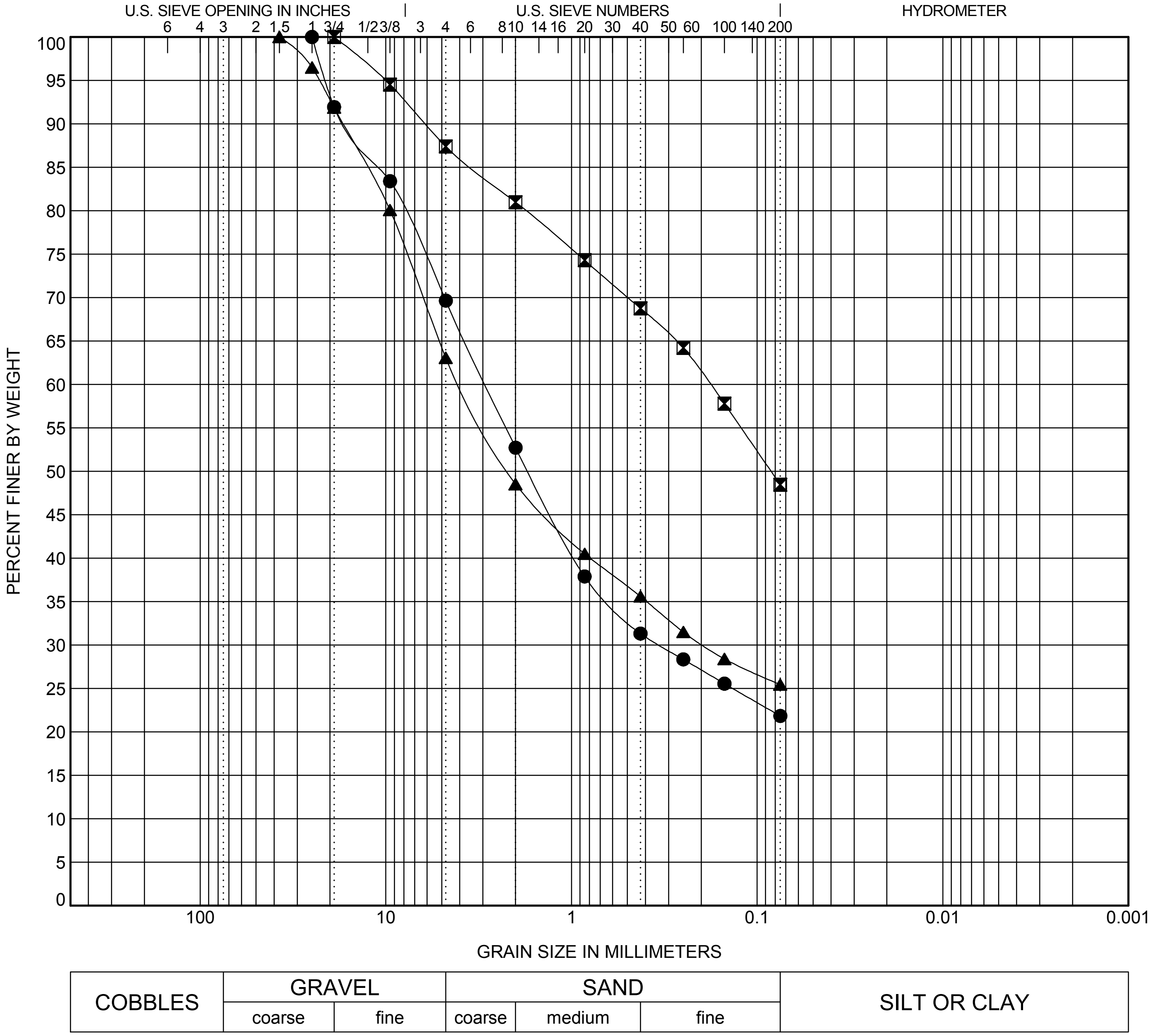
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black

PROJECT NAME Gustin Levee

PROJECT NUMBER 14-037B

PROJECT LOCATION Spokane County



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-3**	**3.5**	**SM Silty Sand with Gravel**					
☒	**TP-5**	**4.0**	**SM SIlty Sand**					
▲	**TP-6**	**4.0**	**SM Silty Sand with Gravel**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-3**	**3.5**	**25**	**2.902**	**0.336**		**30.4**	**47.8**	**21.8**	
☒	**TP-5**	**4.0**	**19**	**0.179**			**12.6**	**38.9**	**48.5**	
▲	**TP-6**	**4.0**	**37.5**	**3.959**	**0.195**		**36.9**	**37.6**	**25.4**	

GRAIN SIZE - GINT STD US LAB.GDT - 7/23/15 15:31 - J:_IPEC PROJECTS_2014 PROJECTS\14-037B GUSTIN LEVEE FOR PAINTED HILLS\GINT\14-037B GUSTIN LEVEE.GPJ

REPORT 8

Supplemental Geotechnical Evaluation, dated April 19, 2016

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

April 19, 2016
Project No. 16-249

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Supplemental Geotechnical Evaluation**
Painted Hills Golf Course Property
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed the supplemental geotechnical evaluation for the Painted Hills Golf Course property at the above-referenced site in Spokane Valley, Washington. The purpose of the supplemental evaluation is to provide additional soil and groundwater data to address concerns of the City of Spokane Valley. This report summarizes the results of our field investigation, laboratory testing, engineering analyses, and our opinions and recommendations for stormwater management.

PROJECT DESCRIPTION

We understand that the proposed project may consist of a residential development. The site consists of 91 acres currently developed as a golf course. Stormwater runoff will be treated using drywells and/or gravel galleries for subsurface infiltration. These type of facilities will also be used to manage potential floodwaters, if needed. This supplemental evaluation is intended to provide additional subsurface data at the north end of the site to assist in identifying areas where subsurface infiltration of stormwater may be feasible due to the presence of suitable soils at depth.

AVAILABLE INFORMATION

We were provided a topographic survey for the project site by Whipple Consulting Engineers, Inc. (WCE). This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

In addition, we performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

We also performed a geotechnical evaluation for certification of the existing levee along Chester Creek in April 2014. The results of that evaluation are summarized in our Geotechnical Evaluation report dated February 12, 2015.

Lastly, we performed a geotechnical evaluation in July 2015 consisting of ten 50-foot borings in the south half of the property. The results of that evaluation are summarized in our Geotechnical Evaluation Phase 2 report dated July 23, 2015.

FIELD EVALUATION

Procedures

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) observed the drilling of three penetration test borings at the site. The borings were drilled between March 17 and 19, 2016 using a truck-mounted drill operated by an independent firm working under subcontract to IPEC. A geotechnical engineer or engineering assistant from IPEC observed the borings and logged the surface and subsurface conditions. After we logged the borings, they were abandoned in accordance with state requirements. Ground surface elevations at the borings were provided by WCE.

The soils encountered in the borings were visually and manually classified in the field by our field personnel in accordance with ASTM D 2488, “Description and Identification of Soils (Visual-Manual Procedures)”. The samples were returned to our facility for review of the classification by a geotechnical engineer and laboratory testing.

Soils Encountered

In general, the borings encountered 2 feet of topsoil at the surface. Below the topsoil, the borings generally encountered glacially-deposited silty to clayey sands and/or gravels overlying poorly graded sands to termination depths of the borings. The clayey sands and gravels were generally encountered in the upper 12 to 18 feet.

Penetration resistances in the sands and gravels ranged from 15 to 90 blows per foot (BPF) and averaged 37 BPF, indicating that these soils were medium dense to very dense, but were typically dense.

Geologic maps indicate the soils in this area consist primarily of alluvial and/or glacially deposited silts, clays, sands, and gravels. According to the Soil Survey of Spokane County, the site soils are classified by the Natural Resource Conservation Service (NRCS) as Hardesty ashy silt loam, Narcisse silt loam, Endoaquolls and Fluvaquents, Phoebe ashy sandy loam, and Urban land-Springdale disturbed complex. The native soils encountered in the borings were consistent with the NRCS data.

Groundwater was encountered in Boring B-2 at a depth of 71 feet. This depth corresponds to an elevation of 1934.6. Groundwater was not encountered in the remaining borings. The observed water levels further indicates that groundwater levels drop generally from south to north with higher levels near Chester Creek. Fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw and other seasonal and annual factors not evident at the time the observations were made.

ANALYSIS, OPINIONS, AND RECOMMENDATIONS

Based on the data obtained from the recent and previous borings, previous test pits, field permeability tests, and laboratory tests performed, it is our opinion that subsurface infiltration of stormwater is feasible. The most promising layers are the glacial sands and gravels. These soils would be suitable for infiltration using standard drywells.

We will perform a mounding analysis for the drywells after the proposed full-scale drywell test is completed to assess down-gradient impacts

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,

Paul T. Nelson, P.E.
Principal Engineer

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Figure 3, Boring Location Map
Logs of Borings B-1 through B-3
Descriptive Terminology
Laboratory Test Results

PAUL T NELSON
37228

4-19-16

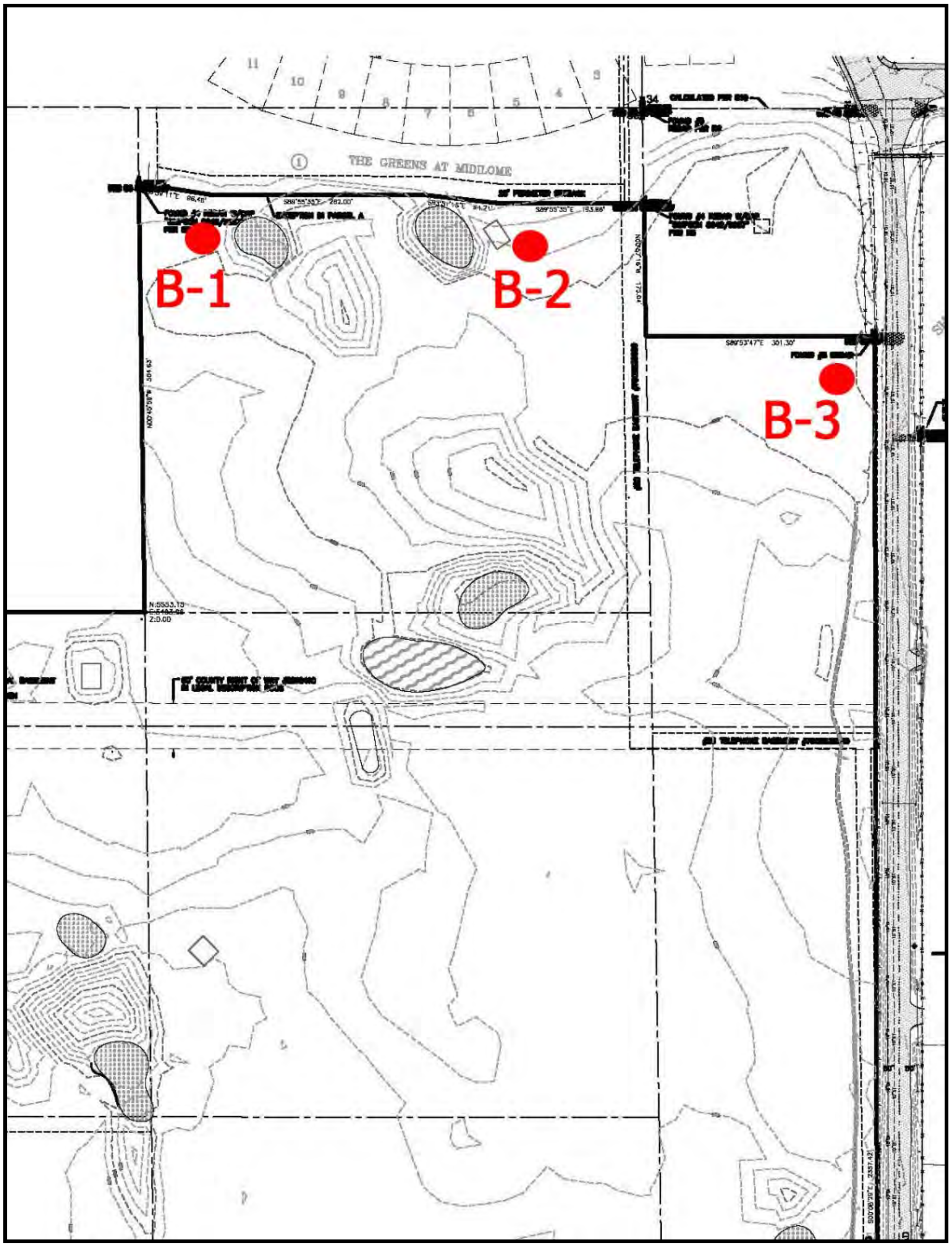
FIGURE 1

Site Location Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 16-249	April 19, 2016
	Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 16-249 Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	April 19, 2016

FIGURE 3



Boring Location Map

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

Project No. 16-249

Painted Hills Golf Course
4403 South Dishman-Mica Road
Spokane County, WA

April 19, 2016

IPEC

Inland Pacific Engineering Company
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Spokane Valley, WA 99216
Telephone: 509-209-6262
Fax: 509-290-5734

BORING NUMBER B-1

PAGE 1 OF 2

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 3/17/16 **COMPLETED** 3/17/16

GROUND ELEVATION 2005.9 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY PRF **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0			SM		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)	
2.0						2003.9
			SP-SM		(SP-SM) POORLY GRADED SAND with SILT, medium to coarse grained, a trace of Gravel, brown, moist, medium dense. (Glacial Outwash)	
5	☒ SS					
10	☒ SS					
15	☒ SS					
17.0						1988.9
			SP		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, very dense to medium dense. (Glacial Outwash)	
20	☒ SS					
25	☒ SS					
30	☒ SS	Fines = 7%				

(Continued Next Page)

IPEC

Inland Pacific Engineering Company
3012 North Sullivan Road, Suite C
Spokane Valley, WA 99216
Telephone: 509-209-6262
Fax: 509-290-5734

BORING NUMBER B-1

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
					(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown, moist, very dense to medium dense. (Glacial Outwash) *(continued)*
35	SS				
40	SS				
			SP		
45	SS				
50	SS				
					50.5 1955.4

End of boring.

Groundwater not encountered with 49' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then abandoned.

IPEC

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BORING NUMBER B-2

PAGE 1 OF 3

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 3/17/16 **COMPLETED** 3/18/16

GROUND ELEVATION 2005.6 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encontered

LOGGED BY PRF **CHECKED BY** PTN

▼ **AT END OF DRILLING** 71.00 ft / Elev 1934.60 ft

NOTES

▼ **AFTER DRILLING** 73.50 ft / Elev 1932.10 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				SM		(SM) SILTY SAND, fine to medium grained, with roots, dark brown, moist. (Topsoil)
2.0				SC		2003.6 (SC) CLAYEY SAND with GRAVEL, medium to coarse grained, brown, moist to wet, dense. (Glacial Outwash)
5	☒ SS	12-33 (45)				
6.5				GC		1999.1 (GC) CLAYEY GRAVEL with SAND, fine to coarse grained, brown, moist, dense. (Glacial Outwash)
10	☒ SS	24-20 (44)				
12.0				SP		1993.6 (SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. (Glacial Outwash)
15	☒ SS	24-29 (53)				
20	☒ SS	25-28 (53)				
25	☒ SS	10-18 (28)	Fines = 8%			
30	☒ SS	11-13 (24)				

(Continued Next Page)

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
				SP		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. (Glacial Outwash) *(continued)*
35	SS	28-37 (65)				
40	SS	50/5"				
45	SS	50/5"				
50	SS	50/5"				
55						
60	SS	8-17 (25)				
65						

(Continued Next Page)

BORING NUMBER B-2

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
70	☒ SS	21-11 (32)		SP	▨	(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. ▼ (Glacial Outwash) *(continued)* ▽
75						75.0 1930.6

End of boring.

Groundwater encountered at 71' with 75' of hollow-stem auger in the ground.

Goundwater encountered at 73.5' 10 minutes later.

Groundwater not encountered to cave-in depth of 15' immediately after withdrawal of the auger.

Bore hole then abandoned.

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Telephone: 509-209-6262
Fax: 509-290-5734

BORING NUMBER B-3

PAGE 1 OF 2

CLIENT NAI Black

PROJECT NAME Painted Hills Supplemental

PROJECT NUMBER 16-249

PROJECT LOCATION 4403 South Dishman-Mica Road

DATE STARTED 3/18/16 **COMPLETED** 3/19/16

GROUND ELEVATION 2004.5 ft **HOLE SIZE** 8 inches

DRILLING CONTRACTOR Johnson Exploration Drilling

GROUND WATER LEVELS:

DRILLING METHOD Hollow Stem Auger

AT TIME OF DRILLING --- Not encountered

LOGGED BY PRF **CHECKED BY** PTN

AT END OF DRILLING --- Not encountered

NOTES

AFTER DRILLING --- Not encountered

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0						
			ML		(ML) SANDY SILT, with roots, dark brown, moist. (Topsoil)	
				2.0		2002.5
					(GC) CLAYEY GRAVEL with SAND, fine to coarse grained, brown, moist, dense. (Glacial Outwash)	
5	☒ SS		GC			
				8.0		1996.5
					(SC) CLAYEY SAND with GRAVEL, medium to coarse grained, brown, moist to wet, dense. (Glacial Outwash)	
10	☒ SS		SC			
				12.0		1992.5
					(GC) SILTY CLAYEY GRAVEL with SAND, fine to coarse grained, brown, moist, medium dense. (Glacial Outwash)	
15	☒ SS		GC			
				18.0		1986.5
					(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. (Glacial Outwash)	
20	☒ SS					
25	☒ SS		SP			
30	☒ SS	Fines = 6%				

(Continued Next Page)

BORING NUMBER B-3

CLIENT NAI Black
PROJECT NAME Painted Hills Supplemental
PROJECT NUMBER 16-249
PROJECT LOCATION 4403 South Dishman-Mica Road

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
			SP		(SP) POORLY GRADED SAND with GRAVEL, medium to coarse grained, a trace of Cobbles, brown, moist, very dense to medium dense. (Glacial Outwash) *(continued)*
35	☒ SS				
40	☒ SS				
45	☒ SS				
50	☒ SS				50.5 1954.0

End of boring.

Groundwater not encountered with 49' of hollow-stem auger in the ground.

Groundwater not encountered immediately after withdrawal of the auger.

Bore hole then abandoned.

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALVE			
COARSE-GRAINED SOILS		FINE-GRAINED SOILS	
DENSITY	N(BLOWS/FT)	CONSISTENCY	N(BLOWS/FT)
Very Loose	0 - 4	Very Soft	0 - 1
Loose	4 - 10	Soft	2 - 3
Medium-Dense	11 - 30	Rather Soft	4 - 5
		Medium	6 - 8
Dense	31 - 50	Rather Stiff	9 - 12
		Stiff	13 - 16
Very Dense	> 50	Very Stiff	17 - 30
		Hard	> 30

USCS SOIL CLASSIFICATION				
MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse-Grained Soils <50% passes #200 sieve	Gravel and Gravelly Soils <50% coarse fraction passes #4 sieve	Gravel (with little or no fines)	GW	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravel (with >12% fines)	GM	Silty Gravel
			GC	Clayey Gravel
	Sandy and Sandy Soils >50% coarse fraction passes #4 sieve	Sand (with little or no fines)	SW	Well Graded Sand
			SP	Poorly Graded Sand
		Sand (with >12% fines)	SM	Silty Sand
			SC	Clayey Sand
Fine-Grained Soils >50% passes #200 sieve	Silt and Clay Liquid Limit < 50		ML	Silt
			CL	Lean Clay
			OL	Organic Silt and Clay (low plasticity)
	Salt and Clay Liquid Limit > 50		MH	Inorganic Silt
			CH	Fat Clay
			OH	Organic Clay and Silt (med to high plasticity)
Highly Organic Soils			PT	Peat Muck

MODIFIERS	
DESCRIPTION	RANGE
Occasional	<5%
Trace	5% - 12%
With	>12%

MOISTURE CONTENT	
DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Dry of optimum moisture content
Wet	Wet of optimum moisture content

MAJOR DIVISIONS WITH GRAIN SIZE							
SIEVE SIZE							
12" 3" 3/4" 4 10 40 200							
GRAIN SIZE (INCHES)							
12 3 0.75 0.19 0.079 0.0171 0.0029							
Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

IPEC

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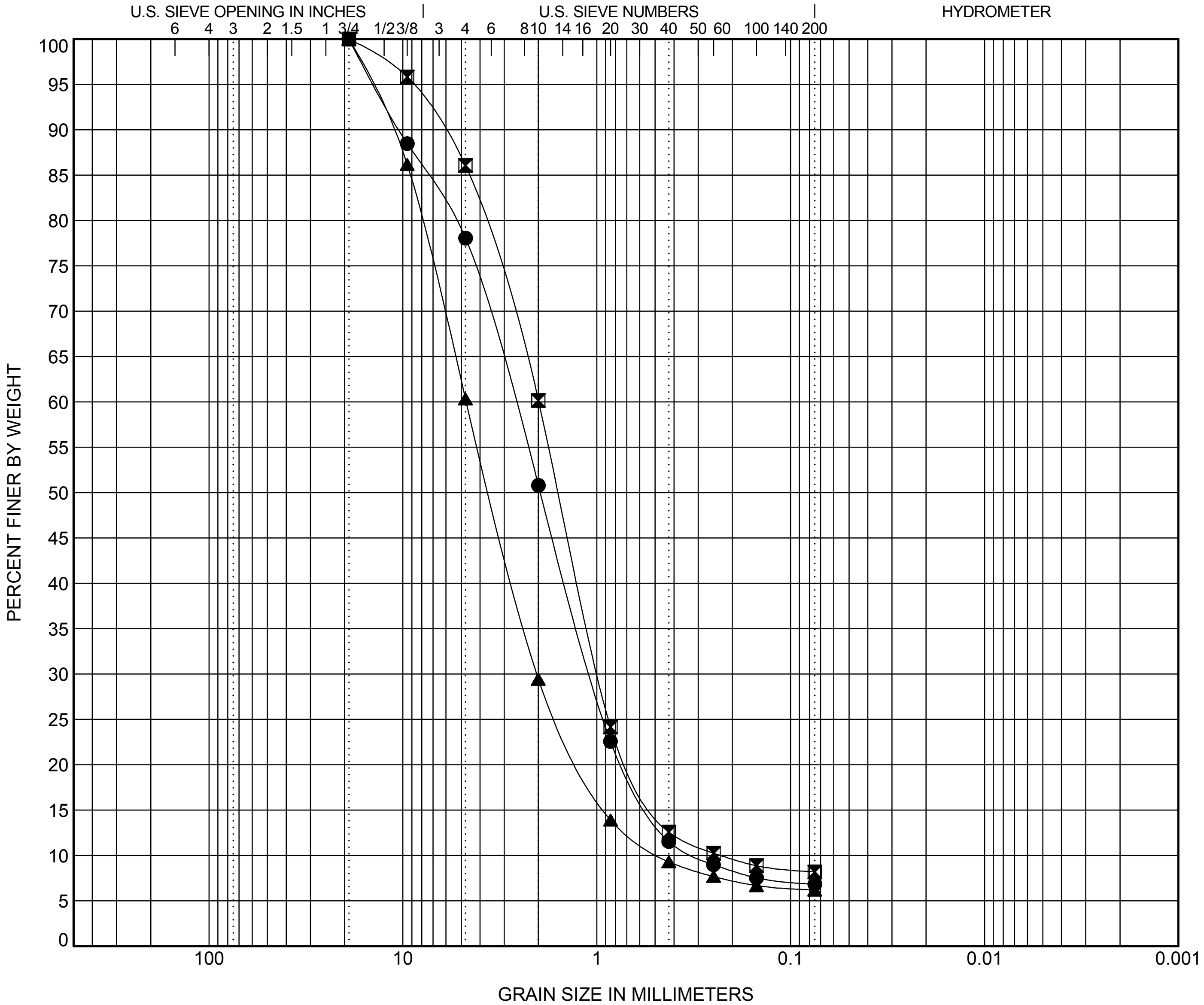
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Painted Hills Supplemental
PROJECT NUMBER 16-249
PROJECT LOCATION 4403 South Dishman-Mica Road



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-1**	**30.0**	**SP-SM Poorly Graded Sand with Silt**				**1.37**	**8.65**
☒	**B-2**	**25.0**	**SP-SM Poorly Graded Sand with Silt**				**2.10**	**8.72**
▲	**B-3**	**30.0**	**SP-SM Poorly Graded Sand with Silt**				**1.85**	**9.95**

BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-1**	**30.0**	**19**	**2.679**	**1.065**	**0.31**	**21.9**	**71.2**	**6.8**	
☒	**B-2**	**25.0**	**19**	**1.992**	**0.977**	**0.228**	**13.9**	**77.9**	**8.2**	
▲	**B-3**	**30.0**	**19**	**4.708**	**2.032**	**0.473**	**39.7**	**54.1**	**6.2**	

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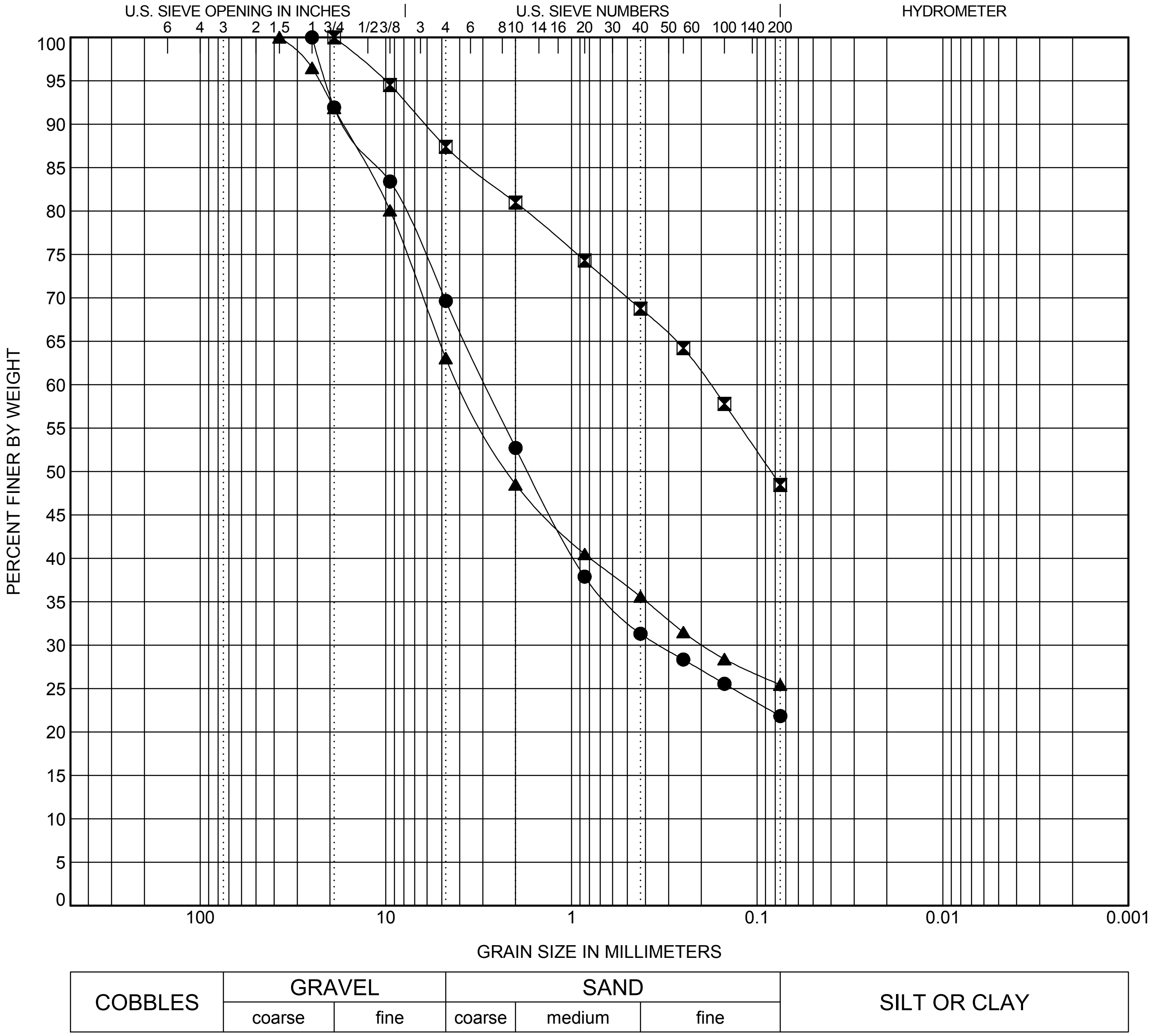
Fax: 509-290-5734

GRAIN SIZE DISTRIBUTION

CLIENT NAI Black
PROJECT NAME Gustin Levee
PROJECT NUMBER 14-037B
PROJECT LOCATION Spokane County



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-3**	**3.5**	**SM Silty Sand with Gravel**					
☒	**TP-5**	**4.0**	**SM SIlty Sand**					
▲	**TP-6**	**4.0**	**SM Silty Sand with Gravel**					

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-3**	**3.5**	**25**	**2.902**	**0.336**		**30.4**	**47.8**	**21.8**	
☒	**TP-5**	**4.0**	**19**	**0.179**			**12.6**	**38.9**	**48.5**	
▲	**TP-6**	**4.0**	**37.5**	**3.959**	**0.195**		**36.9**	**37.6**	**25.4**	

REPORT 9

Full-Scale Drywell Testing, dated June 28, 2016

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

June 28, 2016
Project No. 16-249A

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Full-Scale Drywell Testing**
Proposed Stormwater Management Facility
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed a full-scale drywell test on the drywell installed at the above-referenced site in Spokane Valley, Washington. The purpose of the testing was to establish a design flow rate. This report summarizes the results of our site investigation, engineering analyses and recommendations.

AVAILABLE INFORMATION

We were provided a topographic survey for the project site by Whipple Consulting Engineers, Inc. (WCE). This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

In addition, we performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

We also performed a geotechnical evaluation for certification of the existing levee along Chester Creek in April 2014. The results of that evaluation are summarized in our Geotechnical Evaluation report dated February 12, 2015.

Lastly, we performed a geotechnical evaluation in July 2015 consisting of ten 50-foot borings in the south half of the property. The results of that evaluation are summarized in our Geotechnical Evaluation Phase 2 report dated July 23, 2015.

FIELD EVALUATION

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) performed a full-scale drywell test on the Type 2 drywell on May 6, 2016. The drywell test was performed in accordance with the Spokane Regional Stormwater Manual, Appendix 4B procedures.

ANALYSIS AND RECOMMENDATIONS

We calculated a design outflow rate for the existing drywell using the results of the recent and previous laboratory tests and the procedures described in the SRSM manual, Appendix 4B (Full-Scale Drywell Test Method). Based on the test performed, we recommend using a design flow rate of 1.05 cfs for design. This recommended design outflow rate includes a safety factor of 1.1 as required by the SRSM.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
6-28-16

Attachments: Figure 1, Site Location Map
Figure 2, NRCS Map
Laboratory Test Results
Full-Scale Drywell Test Results

FIGURE 1

<table>
<tr><th colspan="3">Site Location Map</th></tr>
<tr><td rowspan="2">IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting</td><td>Project No. 16-249A</td><td rowspan="2">June 28, 2016</td></tr>
<tr><td>Painted Hills Golf Course
4403 South Dishman-Mica Road
Spokane County, WA</td></tr>
</table>

FIGURE 2

NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 16-249A Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	June 28, 2016

IPEC

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Spokane Valley, WA 99216
Telephone: 509-209-6262
Fax: 509-290-5734

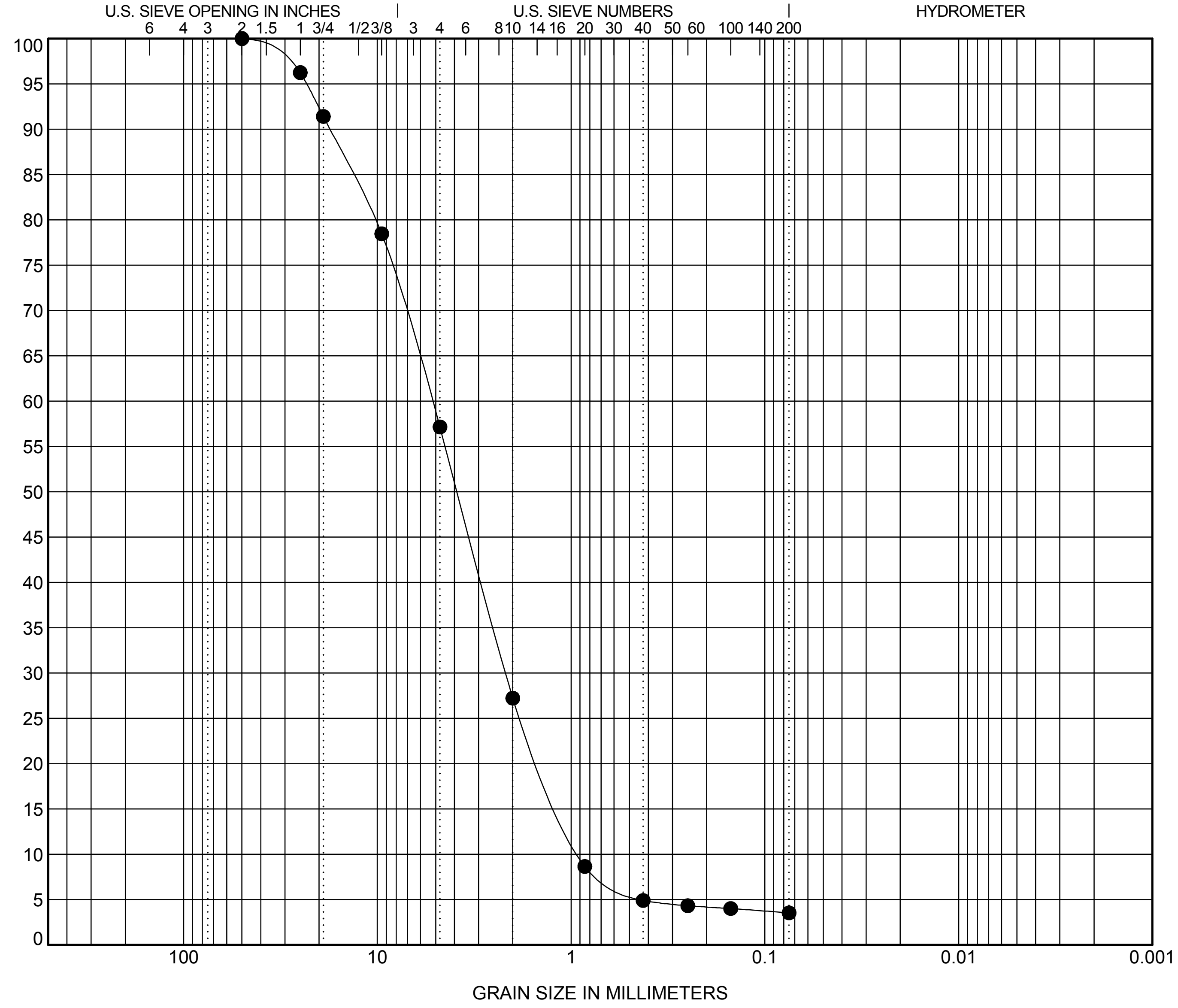
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black

PROJECT NAME Painted Hills Drywell Test

PROJECT NUMBER 16-249A

PROJECT LOCATION 4403 South Dishman-Mica Road



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**L16-057**	**20.0**	**SP Poorly Graded Sand with Gravel**				**1.00**	**5.76**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**L16-057**	**20.0**	**50**	**5.212**	**2.167**	**0.904**	**42.9**	**53.6**	**3.5**	

IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

Full-Scale Drywell Test Results

Project Name: Painted Hills Drywell Test

Project Number: 16-249A

Client: NAI Black

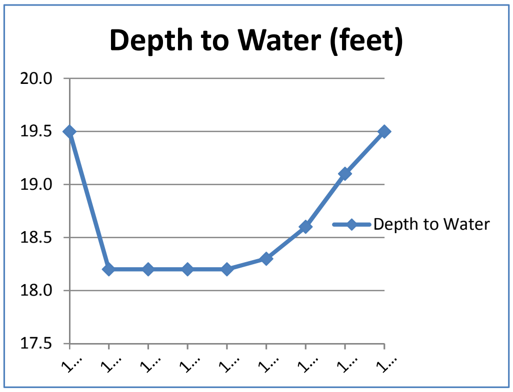
Test Date: 5/6/2016

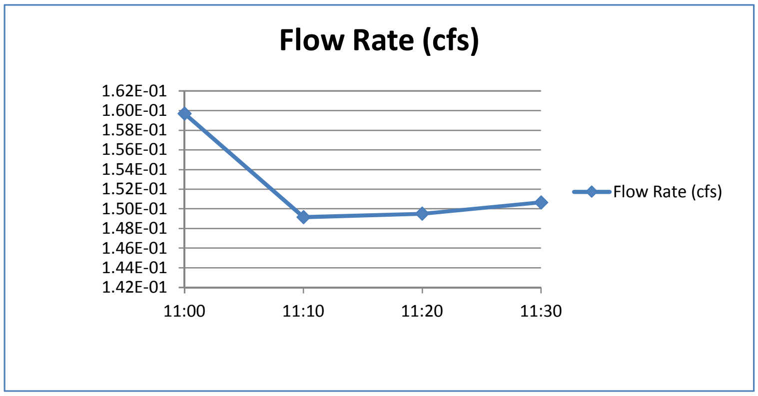
Test Location: Existing Drywell

Depth: 20'

Time	Elapsed Time (seconds)	Depth to Water (feet)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)
10:00	0	19.5	596.6		
11:00	3600	18.2	1171.5	574.90	1.60E-01
11:10	600	18.2	1261.0	89.50	1.49E-01
11:20	600	18.2	1350.7	89.70	1.50E-01
11:30	600	18.2	1441.1	90.40	1.51E-01
11:35		18.3			
11:40		18.6			
11:45		19.1			
11:50		19.5			

Average Flow Rate: 1.50E-01





OPERATIONS AND MAINTENANCE PLAN
FOR PAINTED HILLS PRD FLOOD CONTROL SYSTEM

Owner: Black Realty Inc.
Party responsible for Operations & Maintenance: Painted Hills PRD Homeowners Assn.
Parent Parcel Number(s): 45336.9191, 45334.0106, .0108, .0109, .0110, .0113, .0114, .9135, 44040.9144
LOCATED IN SECTION 33 & 34, T25N, R44E & SECTION 4, T24N, R44E, W.M.
SPOKANE COUNTY, WASHINGTON

The above parent parcels contain the Painted Hills PRD flood control drainage and levee system.

The residential lot owners, commercial property owners and multi-family property owners of Painted Hills PRD are benefitting from these flood control facilities. The homeowners association of this project is responsible for (details described later):

- The continued operations and maintenance, including repair and replacement as needed, of these facilities,
- Providing funds to finance the continued operation and maintenance of these facilities,
- The administration of this agreement with each property owner being bound by this agreement and with the responsibilities to be shared equally between each Painted Hills PRD property owner, and,
- Establishing a maintenance committee and designating a member to be responsible for the administration of this plan.

This operations and maintenance plan runs with the land and is binding upon the Painted Hills PRD Homeowners Association property owners, their heirs, successors and assigns.

The City of Spokane Valley assumes no responsibility at all for any operations or maintenance of facilities mentioned herein or the administration of this plan.

1.00 PURPOSE

This plan is to provide:

1. General operations and maintenance responsibilities for the facilities described herein, and

2. Cost estimates of the assessments to be paid by each property owner mentioned herein for the funding of this maintenance.

2.00 GENERAL OPERATIONAL CHARACTERISTICS

Drainage Facilities

The Painted Hills PRD flood control drainage and levee system is intended to collect and discharge stormwater runoff generated by upstream basins and, possibly, stormwater from adjacent properties that has historically flowed into the property and identified on FEMA panel as compensatory storage. The drainage facilities consist of a box culvert under Thorpe Road, a five foot wide concrete channel, a 48" and 60" concrete pipe mainline, manholes, a bio-infiltration swale and a drywell/gravel gallery infiltration field with associated pipe, manholes and headwalls. The system includes 4-18" culverts under Madison Road. A levee along the northerly side of Chester Creek between Thorpe Road and Dishman-Mica Road and then extending along the northerly side of Dishman-Mica Road to Wilbur Road is also a part of the system.

A portion of stormwater runoff from the upstream basins south of the project flows in the Chester Creek channel under Thorpe Road continuing northwesterly under Dishman-Mica Road. The levee provides flood protection of the development site from Chester Creek.

The remainder of stormwater runoff from upstream basins south of the project flows under Thorpe Road via the box culvert, enters the concrete channel, then flows in the pipe system, through the bio-infiltration swale into the drywell/gravel gallery infiltration field at the north end of the site where the flow is stored and infiltrated into the ground.

Stormwater runoff from upstream basins east of the project flows under Madison Road in 18" culverts and outfalls into the 60" pipeline via manholes.

It is important to provide adequate maintenance activities to ensure that the flood control facilities remain silt and debris free, as this silt and debris will affect their performance. Additionally, vegetation must be maintained to prevent erosion of the levee. Maintenance details are discussed below in Section 3.0.

3.00 MAINTENANCE REQUIREMENTS AND SCHEDULES

Drainage Facilities

The drainage facilities consist of several elements including: box culverts, stream channel, levee, concrete channel, storm drain mainline, culverts, outlet structure, bio-infiltration swale, inlet structure, drywell/gravel gallery infiltration field, manholes, catch basins, access roads, headwalls with trash racks and fencing. These elements are located as shown on the attached exhibit. The following describes these facilities and the recommended maintenance.

A comprehensive visual inspection of the complete flood control drainage facilities should be conducted twice a year. More frequent inspections for various elements may be required as described below. For long duration storms, greater than 24 hours, the drainage facilities should be inspected during the storm event to identify any developing problems and safely correct them before they become major problems. Signs shall be posted notifying all residents to look for "potential" problems and to notify the homeowners' association of those observations.

In general it is important to provide adequate maintenance activities to ensure that the vegetated areas and structures remain silt, dirt and debris free because accumulations of these will affect the facilities function for stormwater storage volume as well as the ability of the drywells/gravel galleries to discharge stormwater. Should these facilities fill up or become clogged, the flood control system will not function as intended putting areas at risk of flooding. Therefore, periodic maintenance is a must.

Box Culvert:

There are three box culverts adjoining the project site. These box culverts are within the public road right of way and will be maintained by the agency having jurisdiction (AHJ) of the roadway. Any problems noticed while inspecting or maintaining other elements of the system should be reported to the AHJ.

Chester Creek and Levee:

Chester Creek extends across the southwest corner of the site from Thorpe Road northwesterly for approximately 900 feet where it crosses under Dishman-Mica Road. The creek carries seasonal flows from the foothills to the south. The site is protected from flood flows by a levee along the northerly side of the creek. The creek channel and levee need to be maintained to ensure flood flows are prevented from entering the site. Maintenance of the channel and levee shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Regular mowing, grass should be kept at about 2-4 inches in height,
- Removing trash, debris, noxious weeds plus items that reduce the amount of vegetative cover,
- Removing any starts of woody vegetation that appear in the channel or on the levee side slopes,
- Repairing any holes caused by animals on the levee side slopes,
- Inspecting the levee side slopes and channel bottom making sure there are no breaches or breaks or erosion. Immediately repair with a sandy loess soil, compacted in place and follow up after the storm event with seeding or sodding the repair and more substantial maintenance activities if needed,
- Repairing mowing damage,
- Removing and replacing of the grass and underlying soil if it becomes contaminated to the extent that the grass is not healthy.

Concrete Channel:

There is approximately 370 feet of 5 foot wide concrete open channel extending from the easterly box culvert under Thorpe Rd to the corner of Thorpe Road and Madison Road. At Madison Road the channel flow enters into a 48" pipe fitted with a trash rack. The channel needs to be maintained to ensure there is no debris or vegetation blocking the flow out of the box culvert and along the channel. Additionally, the trash rack at the end of the channel needs to be kept clear. Maintenance of the channel shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Visually inspecting twice a year the walls and floor surface of the channel for damage or wear that would compromise the channel integrity.
- Prior to each rainy season (August or September), inspecting the channel ensuring that there is no debris present.
- Following large storm events or rapid snow melt events performing a visual inspection and

remove any deleterious debris and trash.

- Instructing those performing other maintenance functions on the system to report any observed damage to the channel.

Storm Drain Mainline:

The storm drain mainline consists of 277 feet of 48” and 2174 feet of 60” RCP pipe from the downstream end of the concrete channel at Thorpe Rd and Madison Rd, running parallel to Madison Rd and ending at the bio-infiltration swale at the north end of the site. Additionally, there is 630 feet of 36” HDPE pipe from the downstream end of the bio-infiltration swale to the drywell/gravel gallery infiltration field. The pipes need to be maintained to prevent sediment and trash build-up in the bio-infiltration swale and the drywell/gravel gallery infiltration field. Maintenance of the storm drain mainline shall be the responsibility of the Painted Hills PRD Homeowner’s Association.

Maintenance items include:

- Annually inspecting the pipe openings on each end to ensure there is no blockage or damage to the ends.
- Every three years or after substantial storm runoff, performing a TV inspection of the pipe looking for blockages, damage, etc.,
- Removing sediment build-up from the pipe,
- Repairing any sections of damaged pipe.

Manholes & Catch Basins:

The mainline pipe system has manholes at pipe junctions and angle points. Along Madison Road there are catch basin connected by pipe to the mainline pipe system to drain overflow from the roadside swales. Manholes and catch basins need to be maintained to prevent blockage of flow within the system. Contact a professional to remove the debris, trash and sediment buildup. HOMEOWNERS ARE NOT TO ENTER THE MANHOLES. Maintenance of the manholes and catch basins shall be the responsibility of the Painted Hills PRD Homeowner’s Association.

Maintenance items include:

- During routine landscape maintenance of roadside swales, removing any debris from catch basin grates.
- Annually inspecting catch basins for trash and sediment build-up and removing trash.
- When sediment build-up fills ½ the depth of the sump (about 1 foot), removing the sediment.
- Annually inspecting manhole lids and catch basin grates to ensure they are properly seated and are structurally sound.
- Every five years, inspecting the structure walls to ensure the concrete walls are in good condition and the joints remain sealed.
- Instructing those performing other maintenance functions on the system to report any missing lids or grates.

Cross Culverts:

The cross culverts consist of 18" CMP pipe crossing under Madison Road flowing from east to west in four locations. The culverts connect into manholes on the 60" storm drain mainline. The cross culverts need to be maintained to prevent the reduction of seasonal flows within the pipes. The reduction in flow may be caused by sediment or trash build-up within the pipe or obstruction of the pipe entrance on the east side of Madison Rd. Maintenance of the cross culverts shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Annually inspecting the culvert openings on the east side of Madison Rd to ensure there is no blockage or damage to the culvert end.
- Every five years performing a TV inspection of the pipe looking for blockages, damage, corrosion, etc.,
- Removing sediment build-up from the pipe,
- Repairing any sections of damaged or corroded pipe.

Bio-infiltration Swale:

The bio-infiltration swale consists of a grass lined channel approximately 450 feet long with a 6 foot bottom width and 3:1 side slopes. The swale needs to be maintained to perform the function of removing any remaining contaminants prior to storm water entering the infiltration field. Maintenance of the bio-infiltration swale shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Annually inspecting the channel bottom and side slopes to ensure there is a covering of grass.
- Reseeding any bare or dead areas of grass.
- Removing any noxious weeds.

Drywells/Gravel Gallery Infiltration Field:

The drywell/gravel gallery infiltration field consists of four trenches (10' wide by 13' deep by 450' long) filled with rock, 24" pipe running the length of each trench and drywells located at each end and at the middle. The drywells need to be maintained to prevent or reduce sediment buildup in the drywell barrel so as to not reduce infiltration into the surrounding ground. Maintenance of the drywells/gravel gallery infiltration field shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Visually inspecting twice a year the inside of the drywell barrel(s) by removing the lid to look into the structure. Have all debris and trash removed. Sediment must be removed before buildup reaches the bottom of the lowest slot out of the drywell in the barrel wall. Contact a professional to remove the debris, trash and sediment buildup. HOMEOWNERS ARE NOT TO ENTER THE DRYWELL.

Headwalls/Trash Racks:

The trash racks at the headwalls need to be maintained to ensure there is no debris preventing the flow of storm water through the system. Additionally, the trash racks need to be inspected for physical integrity to ensure that no one can enter into the pipe system unless required for inspection/repair. Maintenance of the headwalls/trash racks shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Visually inspecting twice a year the trash racks for damage or corrosion that would compromise the trash rack integrity.
- Prior to each rainy season (August or September), inspecting each trash rack ensuring that there is no debris present.
- Following large storm events or rapid snow melt events performing a visual inspection and remove any deleterious debris and trash.
- Instructing those performing other maintenance functions on the system to report any observed damage to the trash rack.

Fencing:

The fencing of various system elements needs to be maintained to restrict access to those elements and to protect the public. Maintenance of the fencing shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Visually inspect twice a year the entire fencing system for damaged fence fabric, posts, gates, etc.
- Prior to each rainy season (August or September), inspecting each access point ensuring that locks and gates are functional.
- Instructing those performing other maintenance functions on the system to report any observed breaches or damage to the fencing.

Access Roads/Parking Pads:

The access roads/parking pads to various system elements need to be maintained to allow maintenance vehicles access to those elements for periodic maintenance and emergency repairs to protect the public. Maintenance of the access roads/parking pads shall be the responsibility of the Painted Hills PRD Homeowner's Association.

Maintenance items include:

- Visually inspecting annually the entire access road/parking pad system for rutting, potholes, etc. Regrade and repair with additional aggregate as needed.
- Removing vegetation from the aggregate surface.
- Instructing those performing other maintenance functions on the system to report any observed damage to the access roads/parking pads.

4.00 SINKING FUNDS

A sinking fund is an account that is set up to receive regular deposits which are to be used for paying off future costs and debts. The sinking fund monies will be used to pay for planned and unplanned operation and maintenance costs along with certain future replacement costs for the storm drainage facilities. The sinking fund calculation should be revised as necessary to account for actual expenses and changes in rates.

In setting up the fund, first the future replacement costs are estimated and then they are converted to annual costs (or deposits) by the following calculations. These calculations assume that the inflation rate is 3% (for estimating the future replacement costs), the typical interest rate is 2% (for estimating the annual costs) and the number of years before replacement is 20. Equations and guidance for using other rates and years can be found in Appendix A.

1) Estimate the value that the item will have in the future when it is time to replace it using the following equation:

   $FV=PV*1.8061$, where:
   FV = future value
   PV = present value

2) Estimate how much money will need to be deposited each year in a bank account in order to have enough money accumulated in time to pay for the replacement using the following equation.

   $A=FV*0.0412$, where:
   A = annual payment (or deposit)
   FV = future value (from step 1, above)

Sinking Fund Calculation Results:

The developer shall provide $25,000 to initiate the set-up of maintenance funds.

The following values are the results of the calculations which are shown on the following page.

Annual cost for regular operation and maintenance	$25,954
Annual cost for replacements	$11,894
Total annual costs	$37,848
Total monthly costs (= total annual costs /12)	$3154
Number of units	580
Monthly cost per lot (= total monthly costs /# lots)	**$5.44**

Sinking Fund Calculations

REGULAR OPERATION AND MAINTENANCE COSTS

Description	Units	Annual Quantity x	Unit Price =	Annual Cost
Drywell cleaning	EA	12	$300	$3,600
Catch Basin cleaning	EA	4	$300	$1,200
Mowing	EA	4	$2,000	$8,000
Debris removal	EA	4	$2,000	$8,000
Channel/Trash Rack inspection	EA	2	$500	$1,000
Pipeline TV inspection(3 years-3,053)	LF	1018	$3	$3,054
Manhole inspection	EA	11	$100	$1,100
			Total	$25,954

REPLACEMENT COSTS (for more information on calculations in this table see Appendix A)

	Un its	Quantity x	Unit Price =	Present Value, PV	n	Inflation Rate, i_1	Future Value, FV	Interest Rate, i_2	Annual Payment, A
Drywell(12)	EA	12	$4,000	$48,000	20	0.03	$86,693	0.02	$3,572
1/3 Manhole, 84" (9)	EA	3	$4,100	$12,300	20	0.03	$22,215	0.02	$915
¼ Manhole, 60" (2)	EA	0.5	$2,500	$1,250	20	0.03	$2,258	0.02	$93
18" Culvert (280)	LF	280	$50	$14,000	20	0.03	$25,286	0.02	$1,042
¼ Catch basin (4)	EA	1	$1,500	$1,500	20	0.03	$2,710	0.02	$112
Bio-infiltration swale-seeding (13,800)	SF	13,800	$0.10	$1,380	20	0.03	2,493$	0.02	$103
2" Asphalt pathway	SY	2340	$10	$23,400	20	0.03	$42,263	0.02	$1,742
6" CSTC Access Rd	CY	210	$40	$8,400	20	0.03	$15,172	0.02	$625
Grading Access Rd	SF	11,340	$1.25	$14,175	20	0.03	$25,602	0.02	$1,055
Fencing	LF	1770	$20	$35,400	20	0.03	$63,936	0.02	$2635
								Total	$11,894

Notes:
n = number of years to replacement
LS means Lump Sum, EA means Each, SY means square yard

IN WITNESS WHEREOF, the undersigned has reviewed the above information and determined it to be appropriate for the improvements proposed for this plan and has caused this instrument to be executed on this _____________day of _________________________, 20____.

Signature: ____

Name (print): ____

Title: ____

STATE OF WASHINGTON)
COUNTY OF SPOKANE)
CITY OF SPOKANE VALLEY) ss

I certify that I know or have satisfactory evidence that ___________________________________is/are the individual(s) who personally appeared before me, and who acknowledged that he/she/they executed and signed this instrument and acknowledged it to be his/her/their free and voluntary act for the uses and purposes mentioned in this instrument.

Dated this __________ date of ______________________, 20____.

____
NOTARY PUBLIC
In and for the State of Washington,
Residing at _____________________________
My appointment expires: ___________________

Appendix A

The future replacement costs can be estimated and then converted to annual costs (or deposits) by the following calculations.

1) Estimate the value that the item will have in the future when it is time to replace it using an assumed (best estimate) inflation rate and the following equation:

   $FV=PV*(1+i_1)^n$, where:

   FV = future value

   PV = present value

   i_1 = inflation rate

   n = number of years to replacement

   Example values for the factor: $(1+i)^n$

		n, years			
		5	**10**	**15**	**20**
i_1	**0.02**	1.1041	1.2190	1.3459	1.4859
	0.03	1.1593	1.3439	1.5580	1.8061
	0.04	1.2167	1.4802	1.8009	2.1911
	0.05	1.2763	1.6289	2.0789	2.6533

2) Estimate how much money will need to be deposited each year in a bank account in order to have enough money accumulated in time to pay for the replacement using an assumed (best estimate) interest rate and the following equation:

   $A=FV* i_2 / [(1+i_2)^n-1]$, where:

   A = annual payment

   FV = future value

   i_2 = interest rate

   n = number of years to replacement

   Example values for the factor: $i_2/[(1+i_2)^n-1]$

		n, years			
		5	**10**	**15**	**20**
i_2	**0.02**	0.1922	0.0913	0.0578	0.0412
	0.03	0.1884	0.0872	0.0538	0.0372
	0.04	0.1846	0.0833	0.0499	0.0336
	0.05	0.1810	0.0795	0.0463	0.0302

OPERATIONS AND MAINTENANCE PLAN
FOR GUSTIN DITCH FLOOD CONTROL SYSTEM

Owner: Bar 4 Bar, Inc. & Timothy and Joanne Comer
Party responsible for Operations & Maintenance: Painted Hills PRD Homeowners Assn.
Parent Parcel Number(s): 45344.9108, 45343.9052
LOCATED IN SECTION 34, T25N, R44E, W.M.
SPOKANE COUNTY, WASHINGTON

The above parent parcels contain the Gustin ditch and levee drainage system.

The residents of Painted Hills PRD are benefitting from these flood control facilities. The homeowners association of the Painted Hills PRD project is responsible for (details described later):

- The continued operation and maintenance, including repair and replacement as needed, of these facilities,
- Providing funds to finance the continued operation and maintenance of these facilities,
- The administration of this agreement with each resident being bound by this agreement and with the responsibilities to be shared equally between each Painted Hills PRD property owner, and,
- Establishing a maintenance committee and designating a member to be responsible for the administration of this plan.

This operations and maintenance plan runs with the land and is binding upon the Painted Hills PRD Homeowners Association property owners, their heirs, successors and assigns until such time as the Gustin property (Parcel No. 45344.9108) develops and then the owner of that parcel will assume responsibility for this plan. Parcel No. 45343.9052 is covered by a storm drainage easement granted to Spokane County as recorded in Book 659 Page 1803.

Spokane County assumes no responsibility at all for any operations or maintenance of the facilities mentioned herein or the administration of this plan.

1.00 PURPOSE

This plan is to provide:

1. General operations and maintenance responsibilities for the facilities described herein, and

2. Cost estimates of the assessments to be paid by each property owner mentioned herein for the funding of this maintenance.

2.00 GENERAL OPERATIONAL CHARACTERISTICS

Drainage Facilities

The Gustin ditch and levee drainage system is intended to collect and discharge stormwater runoff generated by upstream basins and, possibly, stormwater from adjacent properties that has historically flowed into this ditch. The drainage facilities consist primarily of a 36" culvert outfall, a 3 foot bottom width ditch, a levee along the south side of the ditch, an existing gravel (borrow) pit (pond) and 18 drywells. Stormwater runoff from the upstream basins is routed under Hwy 27 through a 36" culvert into the ditch where the storm water flows to the west. At the west end of the ditch the storm water flows into the bottom of the existing borrow pit and infiltrates through the bottom of the pit. During larger storms the storm water will overflow into the drywells and infiltrate into the ground. It is important to provide adequate maintenance activities to ensure that the drainage facilities remain silt and dirt free, as this silt and dirt will affect their performance. Additionally, vegetation must be maintained to prevent erosion of the levee. Maintenance details are discussed below in Section 3.0.

3.00 MAINTENANCE REQUIREMENTS AND SCHEDULES

Drainage Facilities

The drainage facilities consist of a 36" culvert outfall, a 3 foot bottom width ditch, a levee along the south side of the ditch, an existing borrow pit (pond) and 18 drywells and are located as shown in the attached exhibit. The following describes these facilities and the recommended maintenance.

A visual inspection of the drainage facilities should be conducted each biennial. For long duration storms, greater than 24 hours, the drainage facilities should be inspected during the storm event to identify any developing problems and safely correct them before they become major problems.

In general it is important to provide adequate maintenance activities to ensure that the vegetated areas and structures remain silt, dirt and debris free because accumulations of these will affect the ditch's and pond's function for stormwater storage volume as well as the ability of the drywells to discharge stormwater. Should these facilities fill up or become clogged, the only remedy would be to remove the material. Therefore, periodic maintenance is a must.

Ditch with Levee:

The culvert outfall needs to be maintained to ensure there is no debris or vegetation blocking the flow out of the culvert. The ditch needs to be maintained to ensure a strong, healthy, dense vegetative cover and that it is free of debris. Maintenance of the ditch and outfall shall be the responsibility of the Painted Hills PRD Homeowner's Association until such time as the Gustin property (Parcel No. 45344.9108) is developed. At that time the owner(s) of the new development shall assume responsibility for maintenance of the ditch and levee.

Maintenance items include:

- Regular mowing, grass should be kept at about 2-4 inches in height,
- Removing trash, debris, noxious weeds plus items that reduce the amount of vegetative cover,
- Removing any starts of woody vegetation that appear in the ditch or on the levee side slopes,
- Repairing any holes caused by animals on the levee side slopes,
- Inspecting the ditch side slopes, levee side slopes and bottom making sure there are no breaches or breaks or erosion. Immediately repair with a sandy loess soil, compacted in place and follow up after the storm event with seeding or sodding of the repair and more substantial maintenance activities if needed,
- Repairing mowing damage,
- Removal and replacement of the grass and underlying soil if it becomes contaminated to the extent that the grass is not healthy.

Pond & Drywells:

At the borrow pit the pond bottom needs to be maintained to ensure there is no debris, vegetation or sediment preventing the infiltration of storm water through the bottom of the pond. Also, that no debris, vegetation or sediment buildup rise to a level that would allow it to enter into the drywells. Drywells need to be maintained to prevent or reduce sediment buildup in the drywell barrel so as to not reduce infiltration into the surrounding ground. Maintenance of the pond and drywells shall be the responsibility of the Painted Hills PRD Homeowner's Association until such time as the Gustin property (Parcel No. 45344.9108) is developed. At that time the owner(s) of the new development shall assume responsibility for maintenance.

Maintenance items include:

- Periodically visually inspect the grate and remove any deleterious debris and trash.
- Biennially visually inspect the inside of the drywell barrel(s) by removing the grate to look into the structure. Have all debris and trash removed. Sediment must be removed before buildup reaches the bottom of the lowest slot out of the drywell in the barrel wall. Contact a professional to vacuum out the debris, trash and sediment buildup. HOMEOWNERS ARE NOT TO ENTER THE DRYWELLS.

4.00 SINKING FUNDS

A sinking fund is an account that is set up to receive regular deposits which are to be used for paying off future costs and debts. The sinking fund monies will be used to pay for planned and unplanned operation and maintenance costs along with certain future replacement costs for the storm drainage facilities. The sinking fund calculation should be revised as necessary to account for actual expenses and changes in rates.

In setting up the fund, first the future replacement costs are estimated and then they are converted to annual costs (or deposits) by the following calculations. These calculations assume that the inflation rate is 3% (for estimating the future replacement costs), the typical interest rate is 2% (for estimating the annual costs) and the number of years before replacement is 20. Equations and guidance for using other rates and years can be found in Appendix A.

1) Estimate the value that the item will have in the future when it is time to replace it using the following equation:

    $FV=PV*1.8061$, where: FV = future value
    PV = present value

2) Estimate how much money will need to be deposited each year in a bank account in order to have enough money accumulated in time to pay for the replacement using the following equation.

    $A=FV*0.0412$, where: A = annual payment (or deposit)
    FV = future value (from step 1, above)

Sinking Fund Calculation Results:

- The following values are the results of the calculations which are shown on the following page.

Annual cost for regular operation and maintenance	$10,500
Annual cost for replacements	$7,076
Total annual costs	$17,576
Total monthly costs (= total annual costs /12)	$1,465
Number of units	580
Monthly cost per unit (= total monthly costs /# units)	**$2.53**

Sinking Fund Calculations

REGULAR OPERATION AND MAINTENANCE COSTS

Description	Units	Annual Quantity x	Unit Price =	Annual Cost
Drywell Cleaning	EA	18	$250	$4,500
Mowing	EA	4	$500	$2,000
Debris removal	EA	4	$1,000	$4,000
			Total	$10,500

REPLACEMENT COSTS (for more information on calculations in this table see Appendix A)

	Units	Quantity x	Unit Price =	Present Value, PV	n	Inflation Rate, i_1	Future Value, FV	Interest Rate, i_2	Annual Payment, A
Drainage Structures	LS	18	$4,000	$72,000	20	0.03	$130,040	0.02	$5,358
6” CSTC Access Rd	CY	221	$40	$8,840	20	0.03	$15,966	0.02	$658
Grading Access Rd	SF	11,400	$1.25	$14,250	20	0.03	$25,737	0.02	$1,060
								Total	$7,076

Notes:
n = number of years to replacement
LS means Lump Sum, EA means Each, SY means square yard

IN WITNESS WHEREOF, the undersigned has reviewed the above information and determined it to be appropriate for the improvements proposed for this plan and has caused this instrument to be executed on this _____________day of _________________________, 20____.

Signature: ____

Name (print): ____

Title: ____

STATE OF WASHINGTON)
COUNTY OF SPOKANE)
CITY OF SPOKANE VALLEY) ss

I certify that I know or have satisfactory evidence that ___________________________________is/are the individual(s) who personally appeared before me, and who acknowledged that he/she/they executed and signed this instrument and acknowledged it to be his/her/their free and voluntary act for the uses and purposes mentioned in this instrument.

Dated this __________ date of ______________________, 20____.

____
NOTARY PUBLIC
In and for the State of Washington,
Residing at _____________________________
My appointment expires: __________________

Appendix A

The future replacement costs can be estimated and then converted to annual costs (or deposits) by the following calculations.

1) Estimate the value that the item will have in the future when it is time to replace it using an assumed (best estimate) inflation rate and the following equation:

   $FV=PV*(1+i_1)^n$, where:

   FV = future value
   i_1 = inflation rate
   PV = present value
   n = number of years to replacement

   Example values for the factor: $(1+i)^n$

		n, years			
		5	**10**	**15**	**20**
i_1	**0.02**	1.1041	1.2190	1.3459	1.4859
	0.03	1.1593	1.3439	1.5580	1.8061
	0.04	1.2167	1.4802	1.8009	2.1911
	0.05	1.2763	1.6289	2.0789	2.6533

2) Estimate how much money will need to be deposited each year in a bank account in order to have enough money accumulated in time to pay for the replacement using an assumed (best estimate) interest rate and the following equation:

   $A=FV* i_2 / [(1+i_2)^n-1]$, where:

   A = annual payment
   i_2 = interest rate
   FV = future value
   n = number of years to replacement

   Example values for the factor: $i_2/[(1+i_2)^n-1]$

		n, years			
		5	**10**	**15**	**20**
i_2	**0.02**	0.1922	0.0913	0.0578	0.0412
	0.03	0.1884	0.0872	0.0538	0.0372
	0.04	0.1846	0.0833	0.0499	0.0336
	0.05	0.1810	0.0795	0.0463	0.0302

Appendix K. Infiltration Facilities Design Report

WCE
Whipple Consulting Engineers, Inc.

WCE No. 2013-1166

July 23, 2015
Revised October 13, 2016

City of Spokane Valley
11707 E Sprague Ave, Suite 106
Spokane Valley, WA 99206

Attn: Mr. Gabe Gallinger, P.E.

Re: Painted Hills Flood Control Development Narrative (Storage Area #1 & #6, SA1)

Dear Gabe:

This letter is intended to present the flood control plan for the above referenced storage areas in anticipation of the future development.

Background

A hydrologic and hydraulic analysis for Chester Creek was completed by Michael Baker Jr., Inc. and approved by Spokane County in a letter to the Federal Emergency Management Agency dated August 6, 1990. There are no long-term gage records for Chester Creek. The limited gage measurements on Chester Creek were collected near the Dishman-Mica Road crossing of Chester Creek for December 1994 through March 1995 and November 1995 through February 1996 when no flood events occurred. In February 2006, the hydraulic analysis for Chester Creek was revised by West Consultants, Inc. under a FEMA contract. The analysis established flood magnitude-frequency estimates for the watercourse. A steady flow model has been developed for Chester Creek. [1]

The reports conclude that spring floods in the upper Spokane River basin are due to snowmelt runoff from high elevation watersheds. Such floods are of less significance on Chester Creek because the lower elevation of the water shed limit the size of the snowpack so spring runoff occurs about a month earlier and the more gradual rates than on the Spokane River. Nearly all maximum annual flood peaks on Chester Creek occur during the winter. Warm winds and rain can melt the snow rapidly. When winter rain causes snowmelt on frozen soil conditions, short-duration, intense runoff generates a flood peak during winter storms. During the more extreme events, Chester Creek runs over its banks filling depressions in the flood zone. [1]

The duration of flooding is generally between 100 hours and 1000 hours, or between four days and forty days with smaller events occurring with greater frequency than large events. [1]

Channel geometry for Chester Creek were developed from surveys conducted in March 2003. Overbank geometry was developed from topography developed by TerraPoint (2003). Flood plain boundaries for Chester Creek and Unnamed Tributary to Chester Creek were delineated using 2 foot contour interval maps developed by TerraPoint from LiDAR data. [1]

Previously, a watershed plan for Chester Creek was designed with management recommendations for drainage, flooding, water quality, and riparian habitat. As a result, flood control improvements have been implemented along Chester Creek. The improvements area began at the Painted Hills Golf Course. In 1998, a project to install new culverts and extensive dredging of the channel between Thorpe Road and Schaffer Road was implemented. Two large volume borrow pits were constructed downstream. Each pit was designed for the retention and infiltration of Chester Creek floodwaters up to a 25 year event. One borrow pit was constructed just north of E 40th Avenue and the other just south of 28th Avenue. [1]

Before the storage areas #1 and #6 are to be modified (see Site Element Plan), it is important to understand where they are within the Chester Creek Basin, and what floodwaters they receive. Within the Chester Creek Basin, the storage areas are generally located in the northeast corner of the basin along the edge of the valley floor. Specifically, north of Thorpe Road (Storage Area 1) and to the east of 40th Avenue (Storage Area 6).

The flood condition flows as identified by West Consultants are separated into three parts in relation to the three directions of flow that enters into the Painted Hills Development: the main flow (Golf Course Overflow Reach) across Thorpe Road, the secondary (Unnamed Tributary) flow from Highway 27, and the secondary flow across Madison Road. The project is proposing to redirect the anticipated flows of the identified flood events for storage area #1 (main flow and secondary flow) to a discharge point at the north end of the development and for storage area #6 (Unnamed Tributary) to an offsite discharge point to the east of the development.

Storage Area #1 is a large storage area that encompasses the majority of the former Painted Hills Golf Course as well as areas to the east of Madison Road. There is no outflow route for this storage area so it is classified as compensatory storage and is allowed to infiltrate through the native soils and into the Spokane Rathdrum Aquifer. The soils below the storage area include the Spokane Rathdrum Aquifer as its base followed by layers of course sands that are topped by soils of an alluvial fan or an area of natural deposit from Chester Creek, before the creek was channelized.

The floodwaters that enter Storage Area #1 are identified on the July 6, 2010 Firm Map as the Chester Creek Golf Course Overflow. The Chester Creek Golf Course Overflow originates at a point to the south of Thorpe Road where there was at one time a breach in the man-made channel of Chester Creek. The breach was reportedly from a lack of maintenance and the overgrowth of vegetation in the main channel that blocked the main channel during a storm event. This flow of floodwater enters the storage area from the south at a low point in Thorpe Road through two 10" culverts and, if flow is larger, by overtopping the road.

Storage Area #6 is a smaller storage area that is located east of 40th Avenue primarily within a 30-foot-deep gravel pit that was excavated during the early development years of Spokane Valley. Spokane County obtained a drainage easement over the pit in 1983 for storm drainage purposes. The overflow route of storage area #6 is along the south side of 40th Avenue and flows into Storage Area #1 via culverts under Madison Road. The soils below the storage area include the Spokane Rathdrum Aquifer as its base followed by layers of course sands and gravels that were further exposed by the gravel pit excavation.

The Main Flow Across Thorpe Road

Concept Design and Process

For the concept design the 100-year event was used to size facilities. The initial design was to capture the approximately 1,594,812 cf or 36.61 ac-ft into a deep pond for storage and discharge through evaporation. However, it occurred to us when reviewing the Geotechnical Evaluations, Phase I (December 31, 2013 – Revised August 29, 2016) and Phase II (July 23, 2015) that there are "valley gravels" or well-draining soils that lead directly to the Spokane-Rathdrum Aquifer under the poor draining soils that cover the site. If we connected into these soils the compensatory storage may be treated and discharged into these soils. Initially we were looking at 128 double depth drywells with a design outflow rate of 1.0 cfs each. That would provide twice the outflow rate of 128 cfs to the 64 cfs peak inflow rate of the flow across Thorpe Road. However, as the construction consideration of the drywells was made, it was decided that a gravel gallery system sized to the storm would more evenly distribute the stormwater across a larger area. But after further geotechnical investigation, it was determined the south area may have groundwater at or above the proposed depth of the gravel galleries. Therefore, a new site for the gravel galleries was chosen at the north end of the development where groundwater was determined to be much deeper than the galleries. See Supplemental Geotechnical Evaluation by IPEC dated April 19, 2016.

Proposed Design

See Site Element Plan in the attachments.

Box Culvert/Open Channel

The flow coming from the breach of the east levee upstream on Chester Creek is anticipated to approach Thorpe Road as before at the low point where there are currently 2-10" culverts within the natural drainage way or Golf Course Overflow Reach. The flow will then enter into a 30 foot wide by 3 foot high box culvert under Thorpe Road, replacing the 2 existing culverts. The roadside ditches along Thorpe Road will be regraded to ensure positive flow toward the box culvert. Given the topography of the area, aside from shallow puddles, all stormwater will enter into the proposed box culvert. On the north side of Thorpe Road the flow will exit the box culvert and enter into a 5 foot wide concrete open channel that flows to the east.

Pipe Mainline

The open channel will then turn north and transition into a buried pipe system with manholes along the west side of Madison Road. The flow will enter into a 48" floodwater pipe at the headwall and continue for approximately 270 feet and then transition into a 60" floodwater pipe to the north end of the project with an outfall into a bio-infiltration channel. Each manhole along Madison Road will have a sump for the settling of particles in low flow conditions. These particles or silt can then be vactored out of the manholes as part of the routine maintenance.

Bio-infiltration Channel

The bio-infiltration channel receives the stormwater from the 60" pipe and will be planted with tall dryland grasses. The flow of the floodwater overland through the tall grass provides the last phase of cleaning before the floodwater flows into the gravel gallery system for ultimate disposal into the aquifer, its final destination. See Bio-infiltration worksheet in the attachments.

Gravel Gallery System

Floodwater from the downstream end of the bio-infiltration channel is piped via two 36" pipes to manholes at the east end of the gravel gallery system. From the manholes the floodwater is piped to drywells to evenly distribute the floodwater and enters the gravel galleries by either flowing through the drywell barrels or distributing through 24" pipes to the next drywell and through pipe cross fittings.

The gravel gallery system is based upon four 10 foot wide by 13 foot deep by 450 foot long infiltration trenches that are lined with geo-fabric per WSDOT Std. Spec. 9-33.2(1) and filled with gravel drywell material in conformance with WSDOT Std. Spec. 9-03.12(5). Within the top 3 feet of the infiltration trench runs a 24" pipe at a 1% slope that connects drywells located at the ends and center (totaling 12 drywells) within each trench segment. Pipe cross fittings will be installed every 50 feet with geotech fabric banded over the open ends to allow water within the pipe to enter the rock section without rock entering the pipe. The cross fittings are offset from each other across adjacent trenches. This equidistant separation allows for a balanced distribution of water within the gravel gallery system ensuring all of the gallery is filled and used for infiltration. When the next drywell fills or rises to the invert of the next pipe, stormwater will continue to the next fitting/drywell until the gravel gallery is filled. Once filled the gallery is at its maximum design infiltration rate of 118 cfs (see gravel gallery worksheet in the attachments). A 100-year storm has a peak flow rate in this system of 64 cfs so with a design outflow rate over 1.8 times greater that the design inflow rate the system will not be overwhelmed. This is a conservative measure of protection.

Infiltration Rate

The Phase I geotechnical evaluation performed laboratory grain size analysis tests on soils from the test pits, including at Test Pit TP-29 at the 10 to 12-foot depth. This test showed a fines content of 2.3 percent with design drywell rates of 0.3 and 1.0 cfs for Type A and Type B drywells, respectively.

A full-scale dry well test was performed at the north end of the site. Based on this test we used the design flow rate of 1.8 x 10^{-3} cfs/sf for design of the gravel galleries in the open space area north of the proposed Cottages residential area. See attached IPEC Geotechnical Report dated June 28, 2016.

Maintenance of the gravel gallery system is a semi-annual inspection of the gallery through the system drywells looking for a build-up of sediment and debris, and if needed, the removal of the sediment and debris by a vactor truck.

Levee

The project site is protected from the main channel of Chester Creek by a levee on the northerly and easterly side of the creek from Thorpe Road to Dishman-Mica Road. This levee will be improved by some minor grading to increase freeboard in the area of the Thorpe Road culvert and at the existing cart crossing bridges. Additionally, new levee will be constructed from the existing levee northwesterly along the easterly side of Dishman-Mica Road terminating at Wilbur Road.

The Secondary Flow Across Madison Road:

The flow across Madison Road is divided into 5 basins from the heights above and to the east of Madison Road that correspond to the 5 culverts that are placed under Madison Road. The most northerly culvert does not have an outlet on the west side of Madison Road. Therefore, the floodwater distributes along the east side of Madison and appears to be separated into 4 culverts that cross Madison Road at Stations (S-N) 13+22, 20+44, 24+43 and 30+43. As the development proposes to widen Madison Road on the west side, the 4 culverts will be replaced and extended. Since the proposed inverts of the extended culverts will fall below the proposed grade of the roadside swales, the culverts will connect into the 60" pipe.

The storm water along the west side of Madison Road will be collected in roadside swales where it will receive treatment. The swales will have catch basins with the rim set 6" above the swale bottom. Any excess treated flow that does not infiltrate and exceeds a 6" depth will enter the catch basins. The catch basins will be connected to the 60" storm pipe.

West Consultants provided the following 100-year storm flows for each culvert during the 100-year storm. We are using these flows to size and design floodwater facilities.

STA.	100 Year Storm Flow (cfs)	
13+22	4	
20+44	1	
24+41	1	
30+42	2	
38+98	7	

Any floodwater generated west of the triangle pond along E 40th Avenue flows to the west. Then at Madison Road it flows south between the road and the easterly hillside. These flows will be intercepted with the replacement culverts installed at Stations 13+22 through 30+42 that are connected at manholes into the 60" pipe.

The Secondary Flow From Highway 27

Proposed Design

The 16 cfs flow from Highway 27 (Unnamed Tributary) is currently conveyed via a 36" culvert that empties into a ditch that flows across the Gustin property. The stormwater flows through the ditch and into the existing borrow pit within the triangular parcel located northeast of E 40th Avenue. The ditch has been maintained over the years by the property owner to ensure that whatever floodwater comes out of the culvert under Highway 27 will be conveyed to the borrow pit. With this project the ditch will be regraded to a uniform 3 foot bottom width and its southern berm will be reconstructed to be certified as a levee so that FEMA does not immediately assume that the berm is breached and the stormwater flows to the lower area to the south. The area north of the ditch is at a higher elevation that prevents flood water from going north.

Design Elements:

Proposed Pond 17,060 sf @ El: 1990.00; 35,812 sf @ El. 1995.00; 84,416 sf @ El. 2000.00
Drywell spacing 30', total drywell outflow 18.0 cfs
Maintenance Access Road: 6" gravel, max grade 10%, min. radius 35'
Fenced with gate

Infiltration Pond

WCE proposes to improve the outflow of the borrow pit by regrading and expanding the lowest bottom area of the borrow pit and installing 18 double depth drywells into the bottom of the internal pond. The drywells will provide outflow during a frozen ground condition. Each double depth drywell will provide a design outflow of 1.0 cfs for a total of 18 cfs per the recommendations in the Geotechnical Evaluation by IPEC dated October 14, 2014.

If you have any questions or comments in regard to this letter please feel free to contact us at (509) 893-2617.

Sincerely,
WHIPPLE CONSULTING ENGINEERS, INC.

Todd R. Whipple, PE

TRW/bng

CC: File

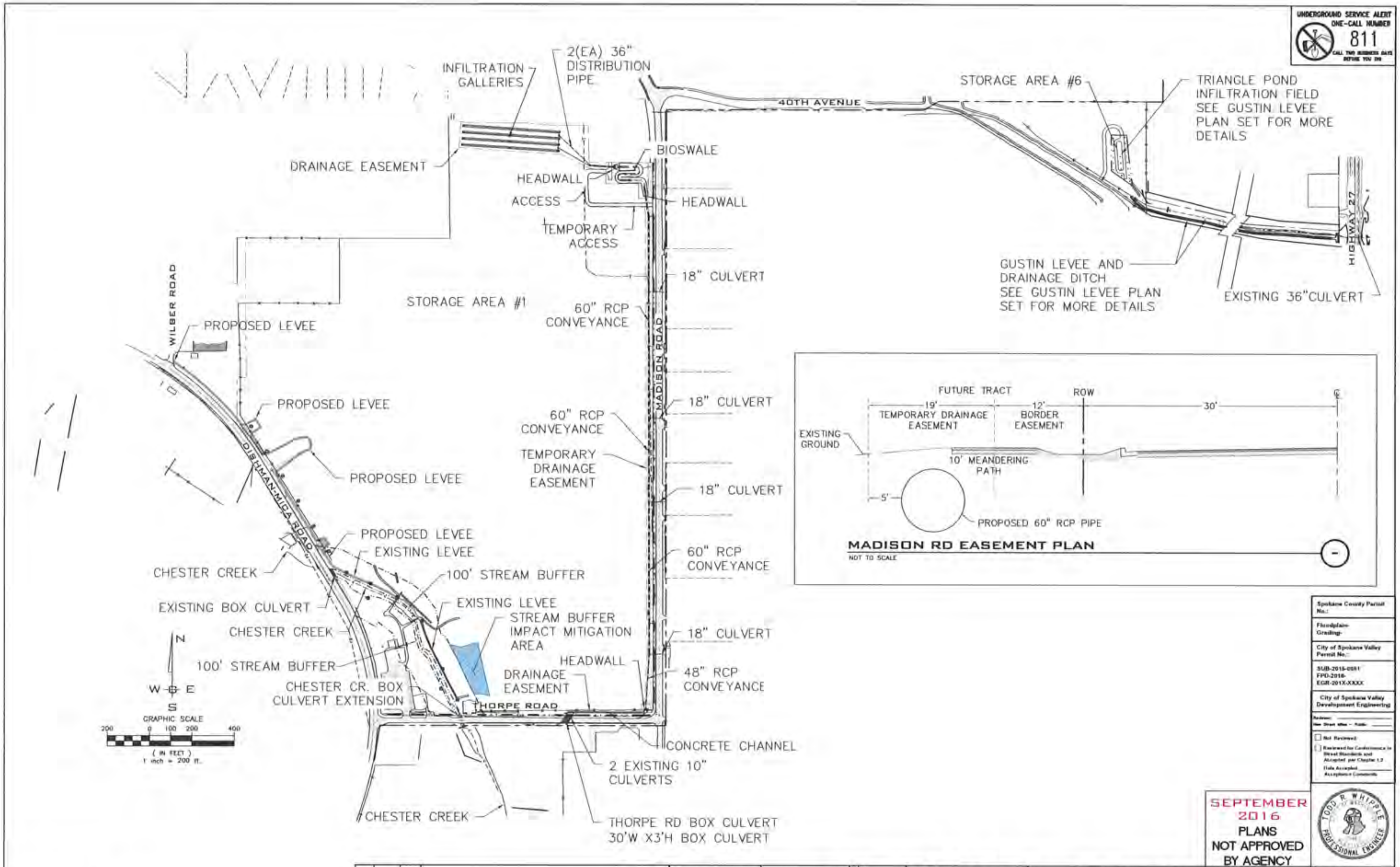
ATTACHEMENTS

Bibliography
Site Element Plan
Box Culvert/Concrete Channel Calculations
Pipe System Calculations
Gravel Gallery Worksheet – North
Bio-infiltration Channel Worksheet
Madison Rd Culvert Flows
V-Ditch Rock Calculations
IPEC Geotechnical Report dated June 28, 2016

BIBLIOGRAPHY

1) Dawes, Larry. August 30, 2016. Biological Evaluation, Buffer Averaging, and Habitat Management Plan for the Painted Hills PRD. Biology Soil & Water, Inc., Spokane Valley, WA. 12-13.

SITE ELEMENT PLAN



Spokane County Permit No.:

Floodplain-
Grading-

City of Spokane Valley Permit No.:

SUB-2015-0001
FPD-2016-
EGR-201X-XXXX

City of Spokane Valley Development Engineering

Reviewer: ______
New Street Name – Public: ______

☐ Not Reviewed
☐ Reviewed for Conformance to Street Standards and Accepted per Chapter 1.3
Date Accepted ______
Acceptance Comments

SEPTEMBER
2016
PLANS
NOT APPROVED
BY AGENCY

TODD R. WHIPPLE

DATUM: NAVD - 88

NO.	DATE	BY	REVISIONS
1	08-12-16	JPP	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1" = 200'
VERTICAL: N/A

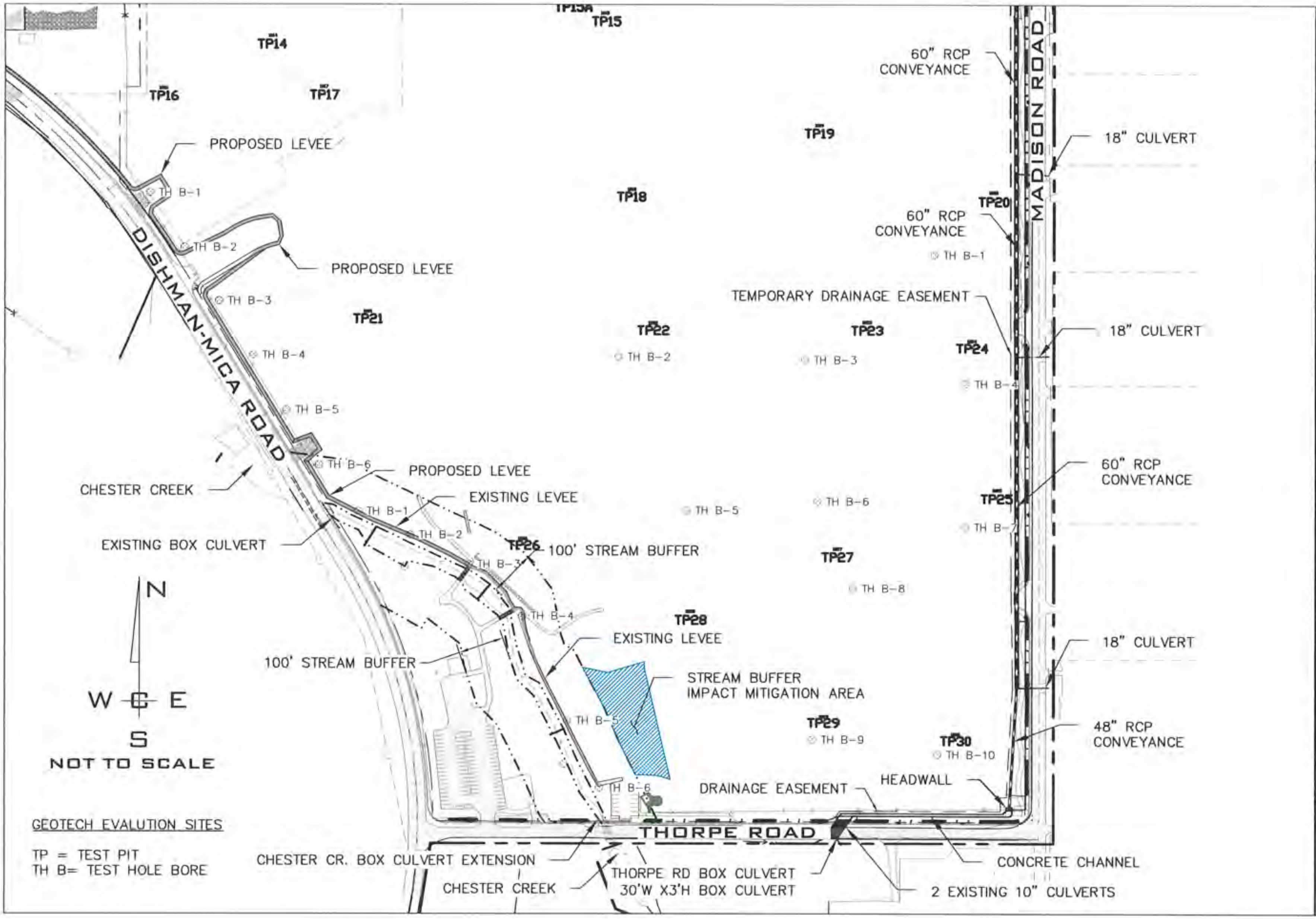
PROJ #: 13-1166
DATE: 08/17/16
DRAWN: JPP
REVIEWED: TRW

WCE

SPOKANE VALLEY PAINTED HILLS PRD
SITE ELEMENT PLAN
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
C1.3

JOB NUMBER
13-1166



GEOTECH EVALUTION SITES

TP = TEST PIT
TH B= TEST HOLE BORE

WCE

WHIPPLE CONSULTING ENGINEERS
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TRANSPORTATION ENGINEERING
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY, WASHINGTON 99216
PH [illegible] FAX [illegible]

PROJ #: 13-1166
DATE: 10/11/16
DRAWN: JPP
APPROVED: TRW

SOUTH ONSITE ELEMENT PLAN
PAINTED HILLS PRD
DISHMAN-MICA RD AND THORPE RD
CITY OF SPOKANE VALLEY, WASHINGTON

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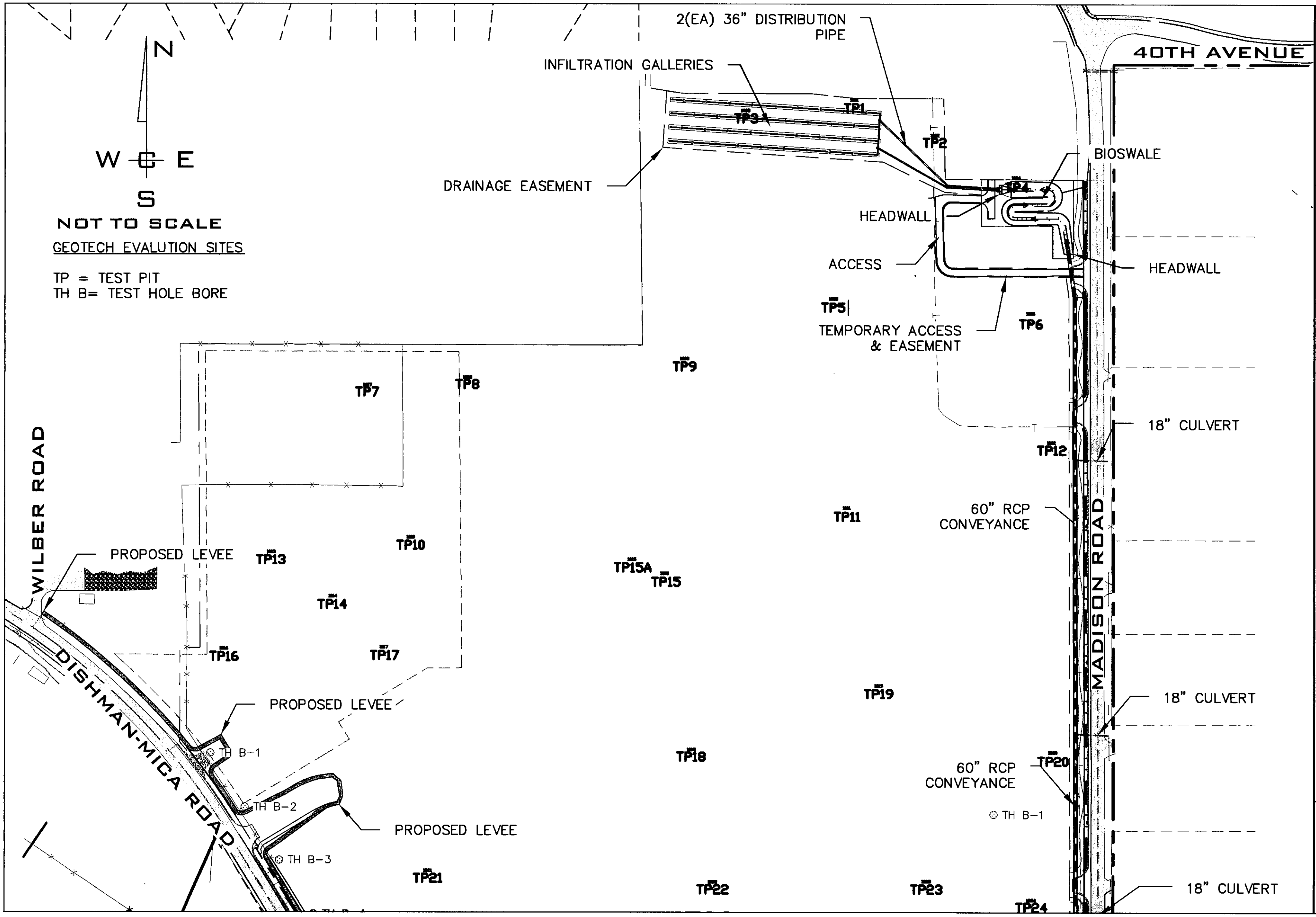

WCE

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PROJ #: 13-1166
DATE: 10/11/16
DRAWN: JPP
APPROVED: TRW

NORTH ONSITE ELEMENT PLAN
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CITY OF SPOKANE VALLEY, WASHINGTON

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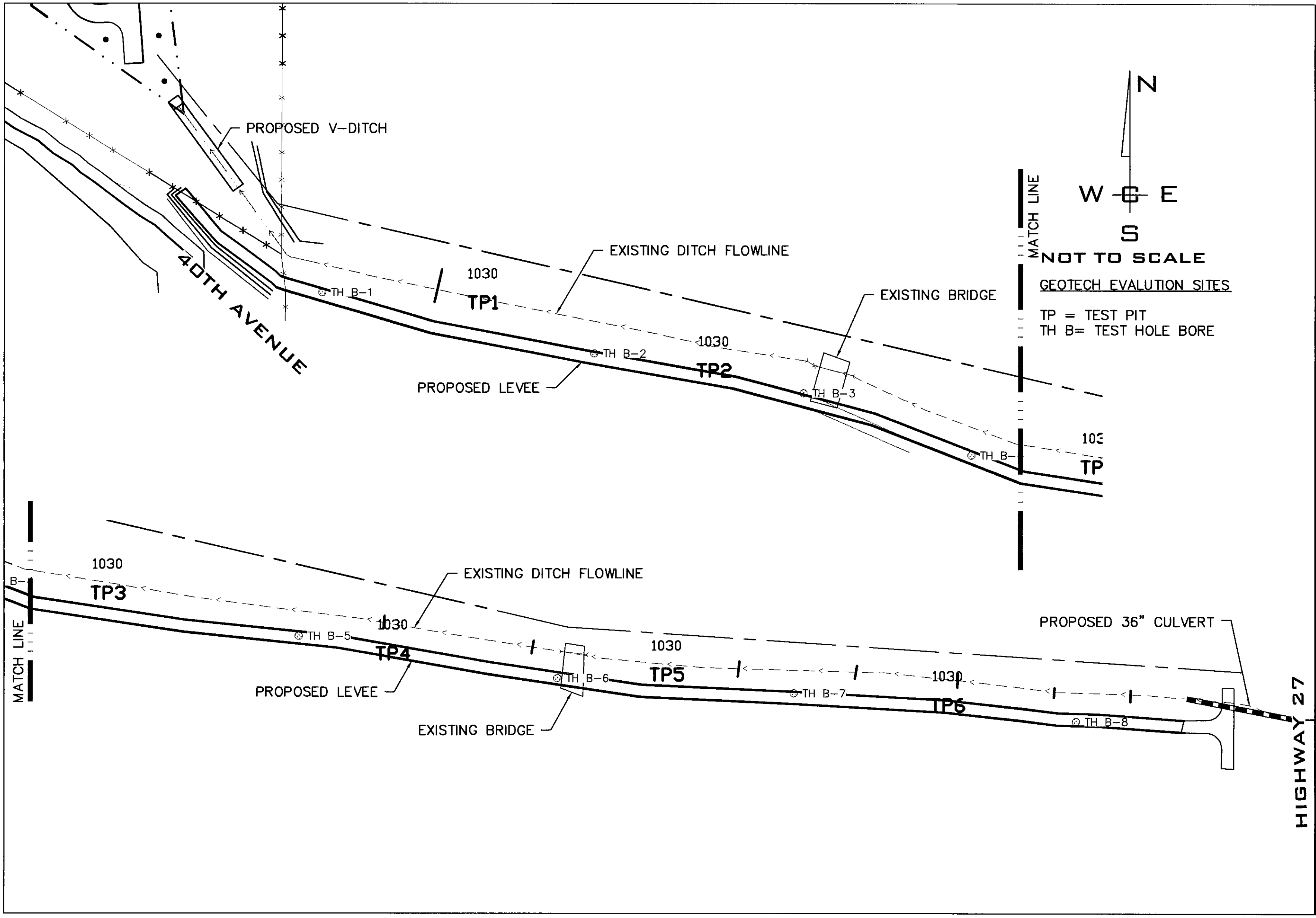

NOT TO SCALE

GEOTECH EVALUTION SITES

TP = TEST PIT
TH B= TEST HOLE BORE

WHIPPLE CONSULTING ENGINEERS
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PROJ #: 13-1166
DATE: 10/11/16
DRAWN: JPP
APPROVED: TRW

GUSTIN DITCH ONSITE ELEMENT PLAN
PAINTED HILLS PRD
DISHMAN-MICA RD AND THORPE RD
CITY OF SPOKANE VALLEY, WASHINGTON

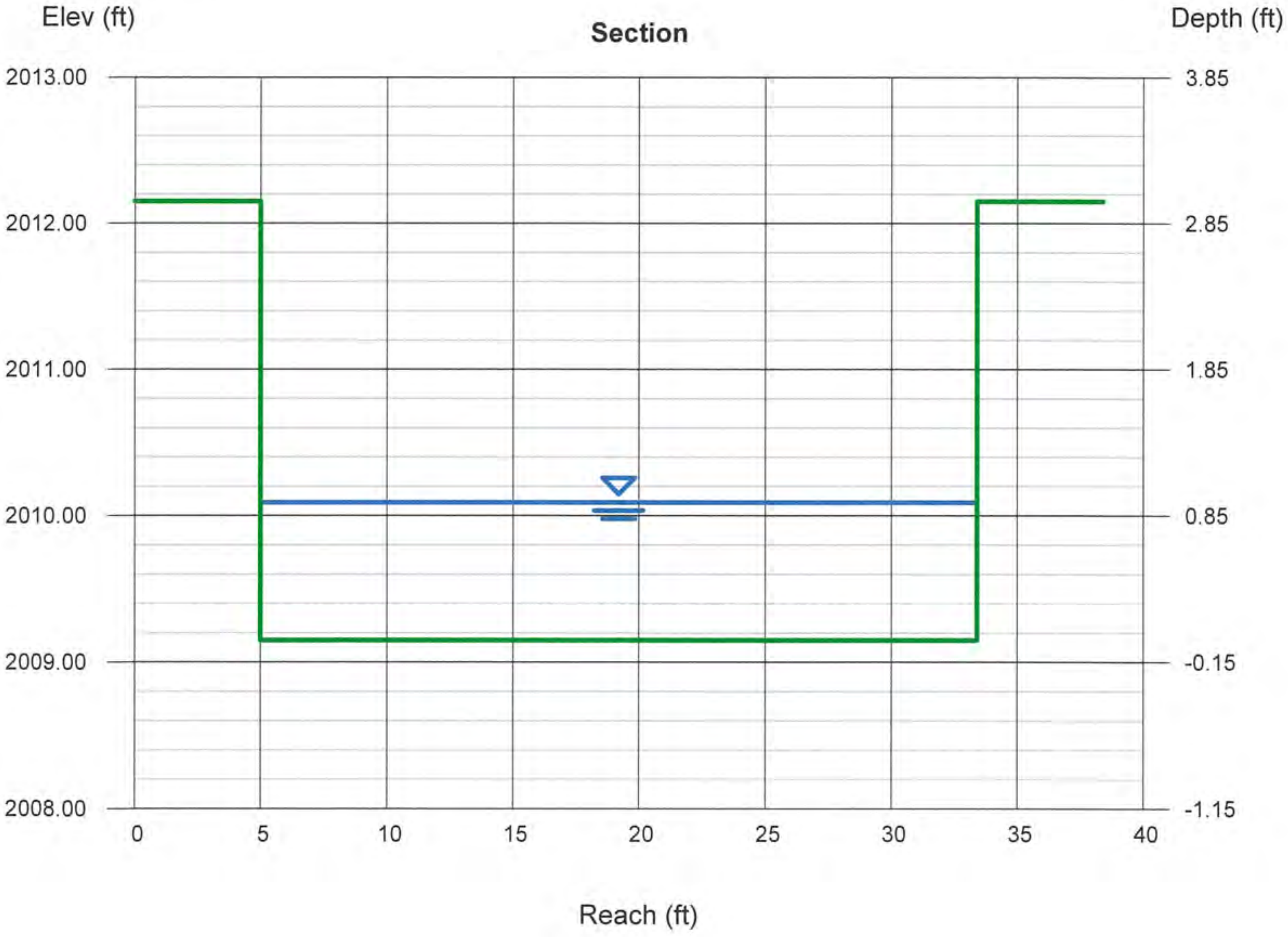
SHEET
3
OF
3

BOX CULVERT/CONCRETE CHANNEL CALCULATIONS

Channel Report

Thorpe Box Culvert

Rectangular		**Highlighted**	
Bottom Width (ft)	= 28.40	Depth (ft)	= 0.94
Total Depth (ft)	= 3.00	Q (cfs)	= 64.00
		Area (sqft)	= 26.70
Invert Elev (ft)	= 2009.15	Velocity (ft/s)	= 2.40
Slope (%)	= 0.50	Wetted Perim (ft)	= 30.28
N-Value	= 0.040	Crit Depth, Yc (ft)	= 0.55
		Top Width (ft)	= 28.40
Calculations		EGL (ft)	= 1.03
Compute by:	Known Q		
Known Q (cfs)	= 64.00		

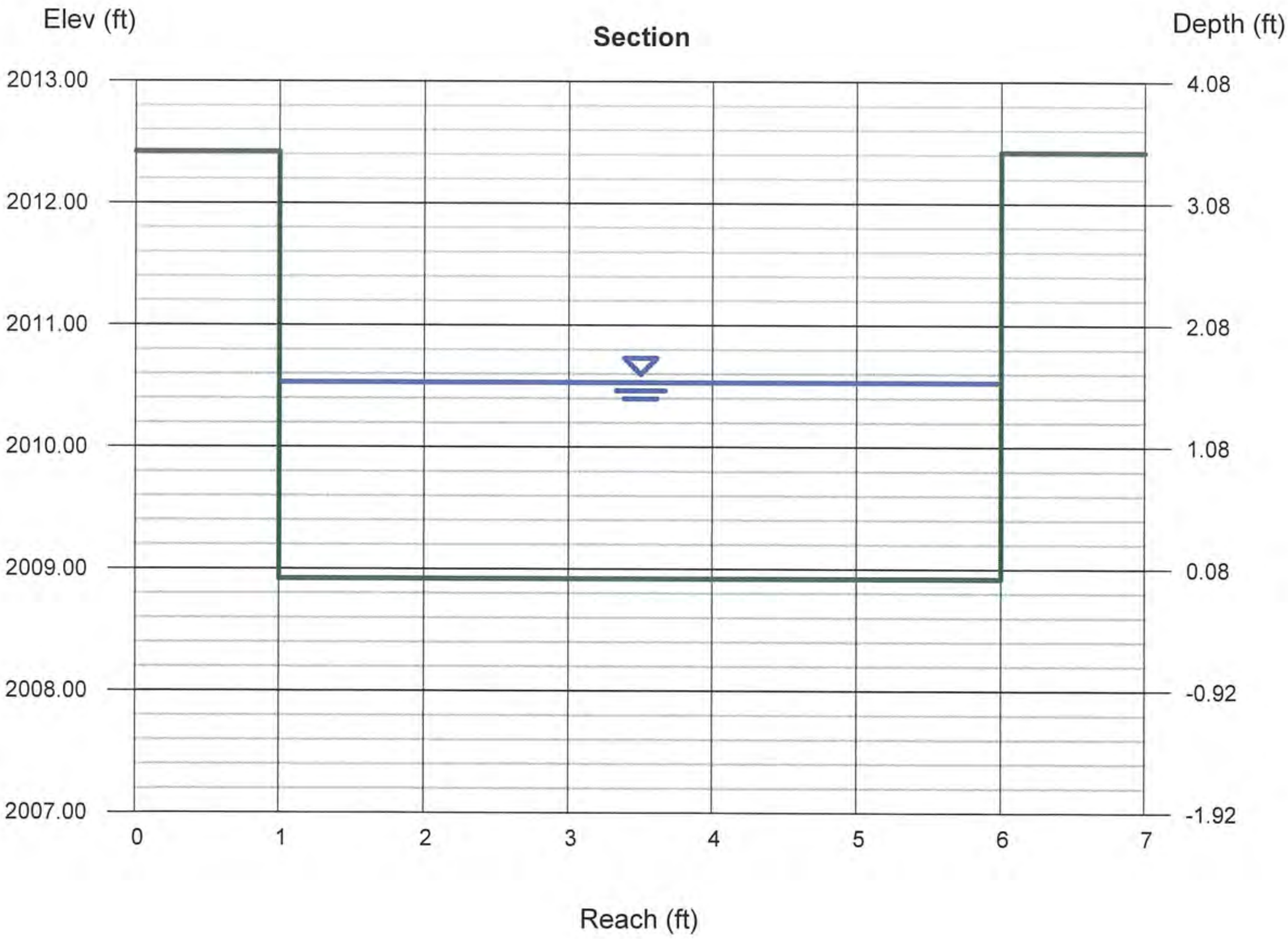


Channel Report

Open Channel

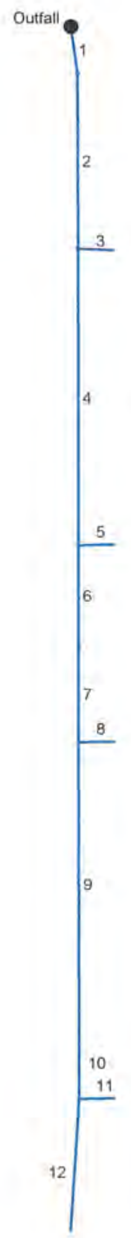
Rectangular	
Bottom Width (ft)	= 5.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 2008.92
Slope (%)	= 0.50
N-Value	= 0.013
Calculations	
Compute by:	Known Q
Known Q (cfs)	= 64.00

Highlighted	
Depth (ft)	= 1.61
Q (cfs)	= 64.00
Area (sqft)	= 8.05
Velocity (ft/s)	= 7.95
Wetted Perim (ft)	= 8.22
Crit Depth, Yc (ft)	= 1.73
Top Width (ft)	= 5.00
EGL (ft)	= 2.59



PIPE SYSTEM CALCULATIONS

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Madison Pipe.stm	Number of lines: 12	Date: 10/13/2016

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len	Drainage Area			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	ADD		Date: 10/13/2016
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total Flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 100 yrs
														Elev of Invert							Proj: Madison Pipe.stm
					Incre-ment	Sub-Total	Sum CA					Q		Up	Down	Fall	Size	Slope	Vel	Cap	
				(ft)	(ac)	(ac)		(min)	(min)	(in/hr)		(cfs)	(ft)	(ft)	(ft)	(ft)	(in)	(%)	(ft/s)	(cfs)	Line description
1	End	MH	0.013	95.291	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	10.55	0.39	0.00	0.00	0.00 79.00	2008.68	2004.73 2006.34 2001.34	2004.58 2006.24 2001.24	0.15 0.10	60 60 Cir	0.16 0.10	5.62 4.30	79.00 84.37	Pipe - (1)
2	1	MH	0.013	357.374	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	9.07	1.48	0.00	0.00	0.00 79.00	2012.87	2005.61 2006.70 2001.70	2005.25 2006.34 2001.34	0.36 0.36	60 60 Cir	0.10 0.10	4.79 4.21	79.00 82.67	Pipe - (2)
3	2	None	0.013	70.839	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00	0.23	0.00	0.00	9.00 9.00	2005.87	2007.03 2007.37 2005.87	2006.29 2006.70 2005.20	0.74 0.67	18 18 Cir	1.04 0.95	6.33 5.78	9.00 10.21	Pipe - (9)
4	2	MH	0.013	600.822	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	6.26	2.81	0.00	0.00	0.00 70.00	2008.85	2006.37 2007.29 2002.29	2005.97 2006.70 2001.70	0.40 0.59	60 60 Cir	0.07 0.10	4.00 4.16	70.00 81.63	Pipe - (3)
5	4	None	0.013	71.843	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00	2.12	0.00	0.00	1.00 1.00	2006.56	2006.93 2008.06 2006.56	2006.63 2007.29 2005.79	0.30 0.77	18 18 Cir	0.42 1.07	1.95 6.15	1.00 10.87	Pipe - (10)
6	4	MH	0.013	202.450	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	5.30	0.96	0.00	0.00	0.00 69.00	2008.95	2006.75 2007.49 2002.49	2006.63 2007.29 2002.29	0.12 0.20	60 60 Cir	0.06 0.10	3.84 4.17	69.00 81.86	Pipe - (4)
7	6	MH	0.013	197.451	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	4.37	0.94	0.00	0.00	0.00 69.00	2011.72	2006.91 2007.69 2002.69	2006.79 2007.49 2002.49	0.12 0.20	60 60 Cir	0.06 0.10	3.87 4.22	69.00 82.89	Pipe - (5)
8	7	None	0.013	71.291	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00	2.10	0.00	0.00	1.00 1.00	2007.72	2008.09 2009.22 2007.72	2007.14 2007.69 2006.19	0.95 1.53	18 18 Cir	1.33 2.15	1.88 8.71	1.00 15.38	Pipe - (11)
9	7	MH	0.013	577.952	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	1.58	2.78	0.00	0.00	0.00 68.00	2011.00	2007.49 2008.25 2003.25	2007.14 2007.69 2002.69	0.35 0.56	60 60 Cir	0.06 0.10	3.76 4.13	68.00 81.08	Pipe - (6)
10	9	MH	0.013	146.439	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.88	0.70	0.00	0.00	0.00 68.00	2011.72	2006.18 2008.86 2003.86	2007.52 2008.25 2003.25	-1.34 0.61	60 60 Cir	-0.91 0.42	5.71 8.56	68.00 168.1	Pipe - (7)

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 (in/hr) ; Time of flow in section is based on full flow.

Project File: Madison Pipe.stm

FL-DOT Report

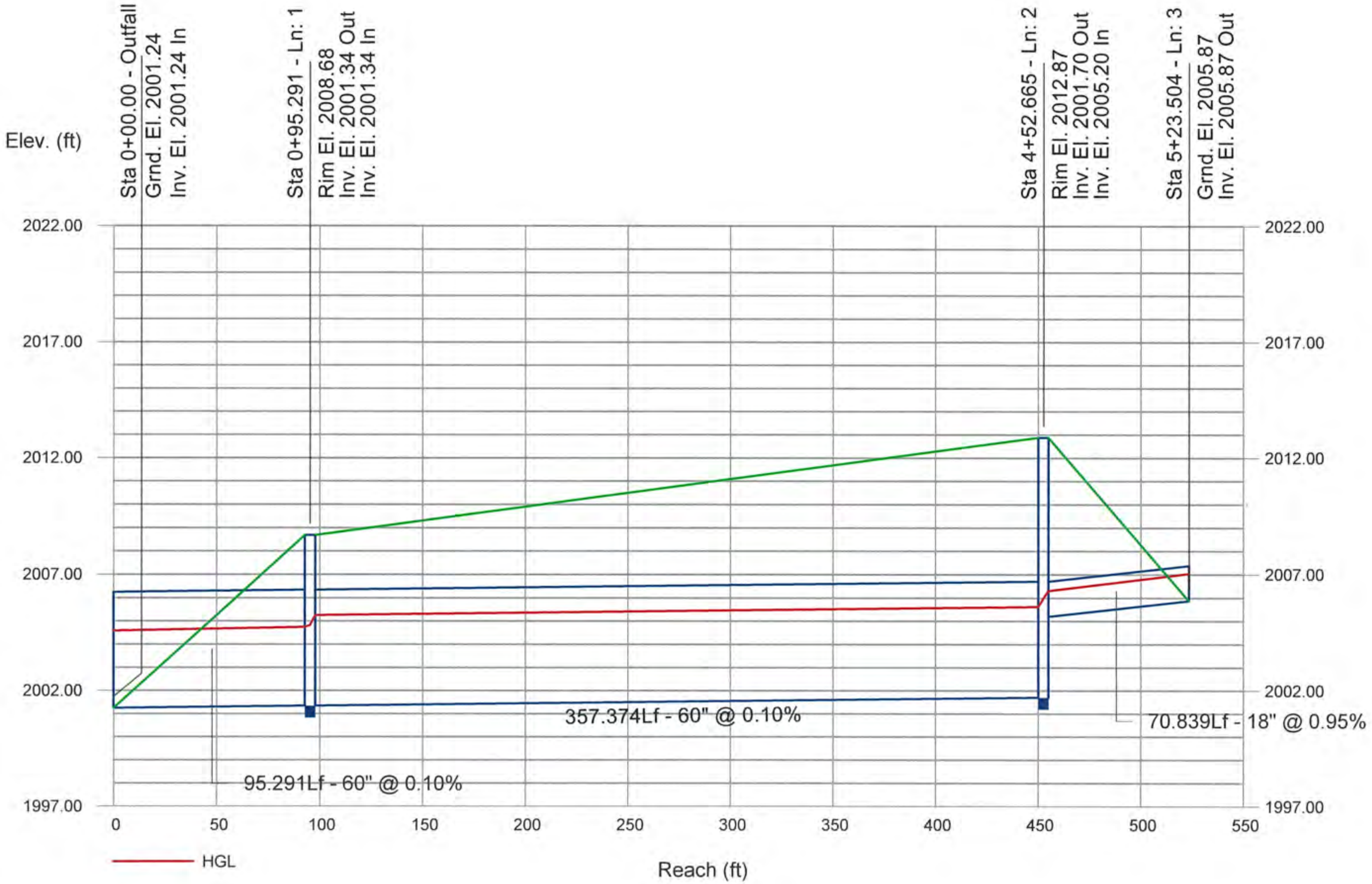
Line No	To Line	Type of struc	n - Value	Len	Drainage Area			Time of conc	Time of Flow in sect	Inten (I)	Total CA	Add Q	Inlet elev	Elev of HGL			Rise	HGL	ADD		Date: 10/13/2016
					C1 = 0.2 C2 = 0.5 C3 = 0.9							Total Flow		Elev of Crown			Span	Pipe	Full Flow		Frequency: 100 yrs
														Elev of Invert							Proj: Madison Pipe.stm
				(ft)	Incre-ment (ac)	Sub-Total (ac)	Sum CA	(min)	(min)	(in/hr)		Q (cfs)	(ft)	Up (ft)	Down (ft)	Fall (ft)	Size (in)	Slope (%)	Vel (ft/s)	Cap (cfs)	Line description
11	10	None	0.013	69.575	0.00	0.00	0.00	0.00	0.51	0.00	0.00	4.00	2007.72	2008.50	2008.14	0.36	18	0.52	4.33	4.00	Pipe - (12)
					0.00	0.00	0.00					4.00		2009.22	2008.86		18	0.52	4.27	7.55	
					0.00	0.00	0.00							2007.72	2007.36	0.36	Cir				
12	10	MH	0.013	268.776	0.00	0.00	0.00	0.00	0.88	0.00	0.00	64.00	2014.25	2009.46	2006.85	2.62	48	0.97	9.18	64.00	Pipe - (8)
					0.00	0.00	0.00					64.00		2011.05	2008.86		48	0.81	10.32	129.7	
					0.00	0.00	0.00							2007.05	2004.86	2.19	Cir				

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 (in/hr) ; Time of flow in section is based on full flow.

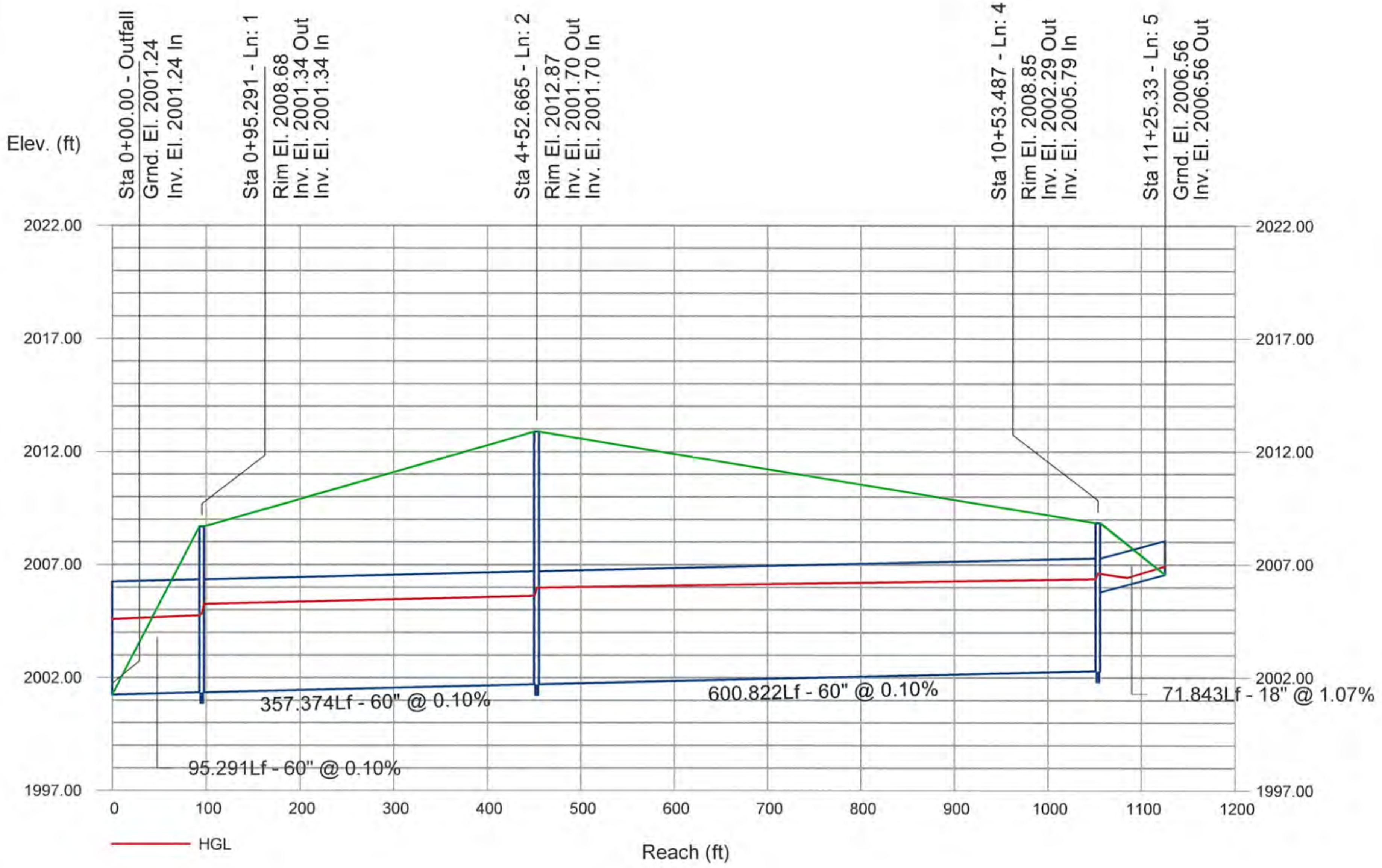
Project File: Madison Pipe.stm

Storm Sewer Profile

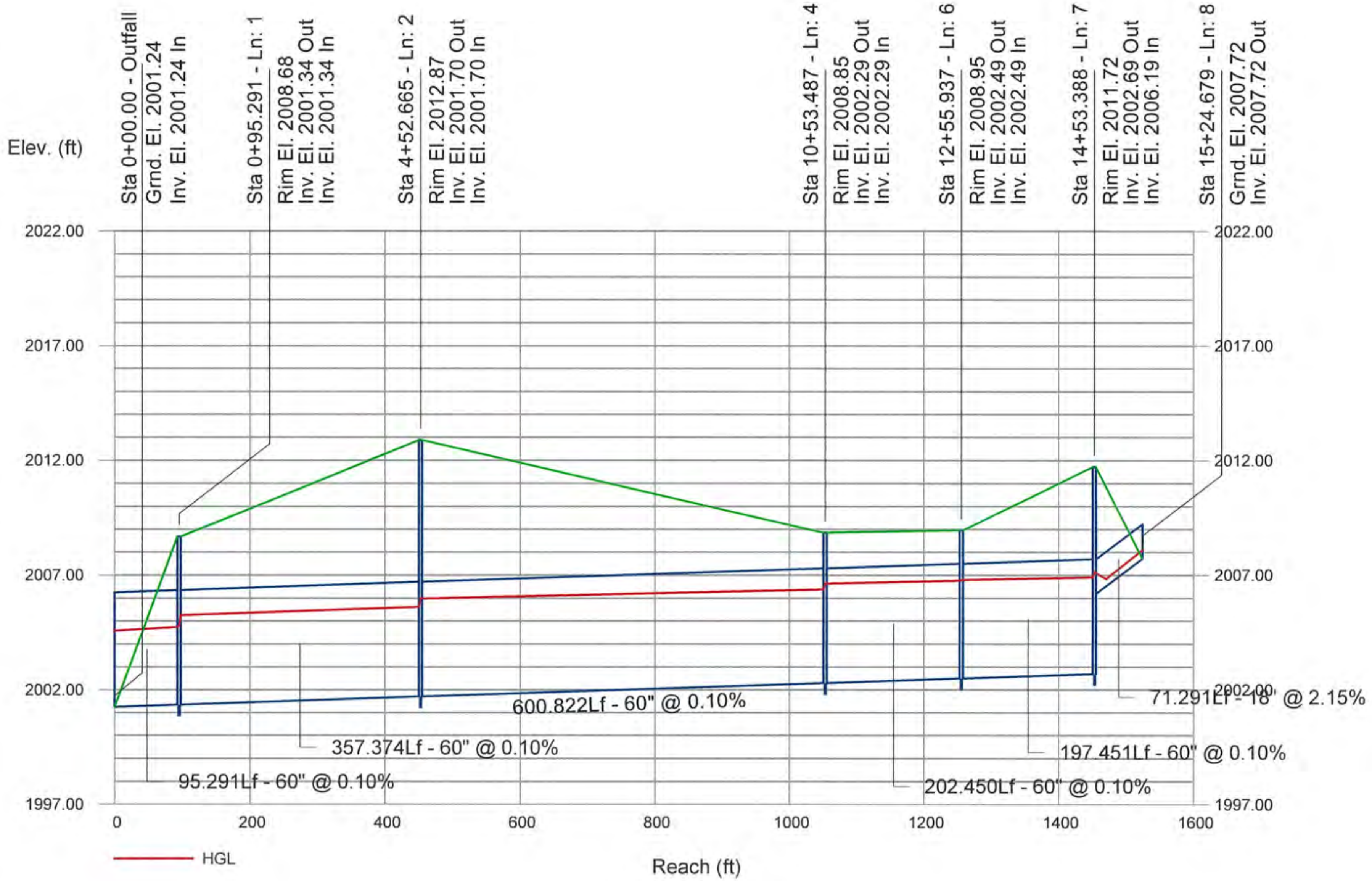
Proj. file: Madison Pipe.stm



Storm Sewer Profile



Storm Sewer Profile



Storm Sewer Profile

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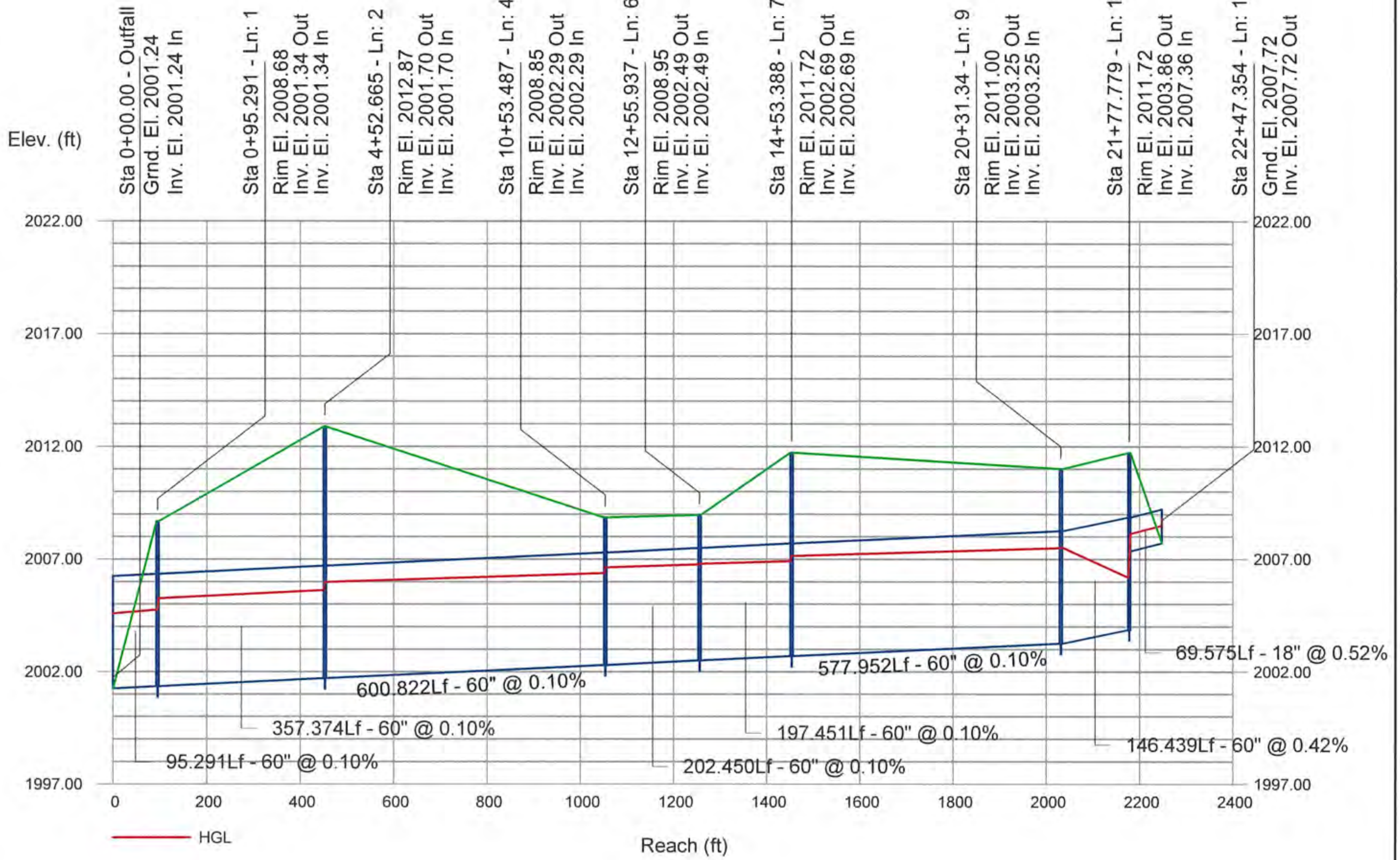
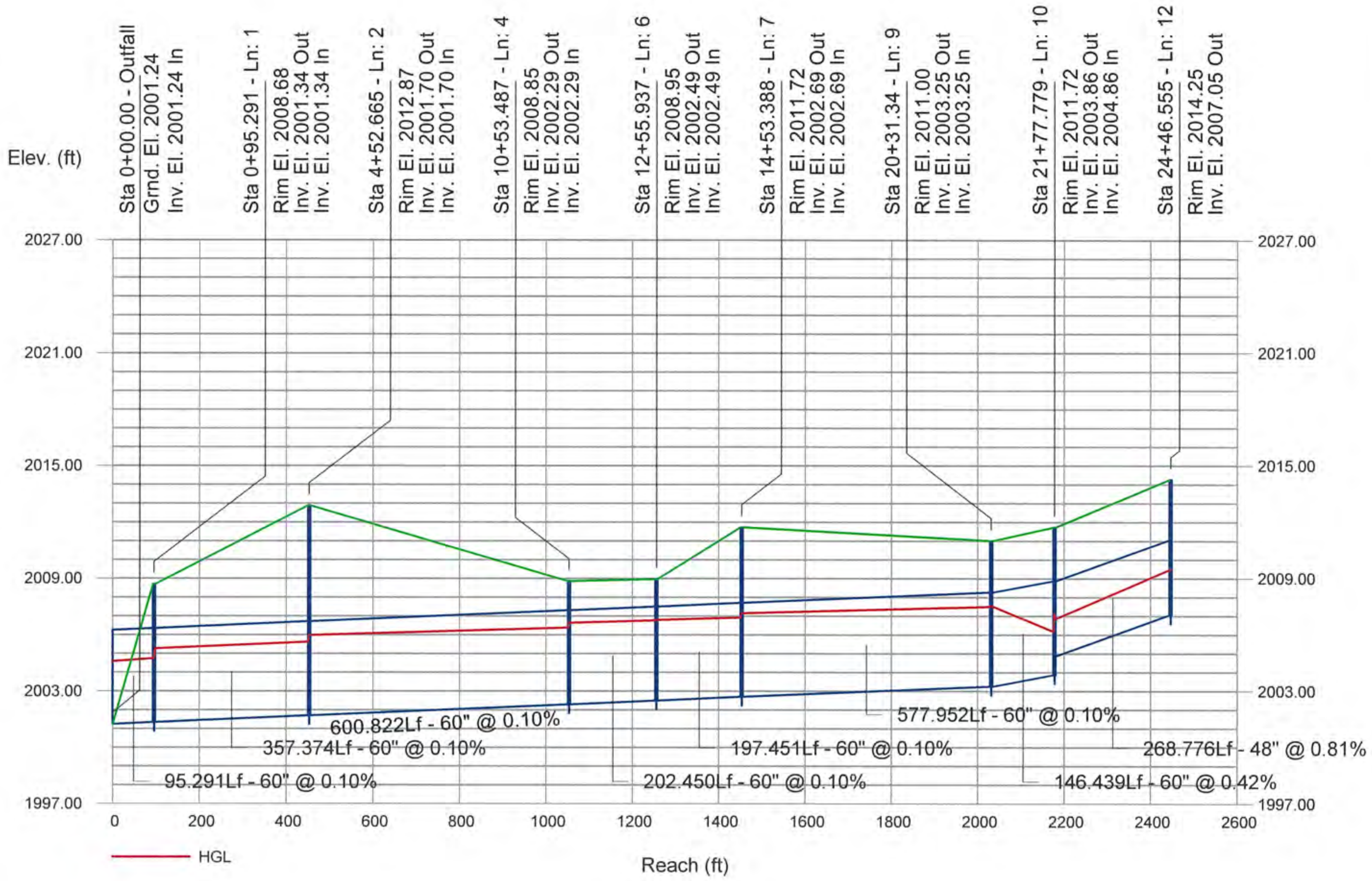


Storm Sewer Profile



GRAVEL GALLERY WORKSHEET - NORTH

WHIPPLE CONSULTING ENGINEERS

GRAVEL GALLERY CALC SHEET

10/13/2016

13-1166 Painted Hills PRD
ENGINEER BNG

Note: infiltration rates per IPEC Geotechnical Report Dated December 31, 2013

Gallery Depth (Min)	Porosity of Gravel (Typ)			Infiltration Rate
ft	cf/cf			cfs/sf
13	0.3			1.80E-03

Gallery		Number of Galleries	Length	Width	Ground Water EL.	Gravel Gallery Bott. EL	Volume	Storage Volume	Perimeter	Sidewall Area	Bottom Area	Outflow
			ft	ft	ft	ft	cf	cf	ft	sf	sf	cfs
A		1	450.00	10.00	-	1000.00	58,500	**17,550**	920	11,960	4,500	**29.63**
B		1	450.00	10.00	-	1000.00	58,500	**17,550**	920	11,960	4,500	**29.63**
C		1	450.00	10.00	-	1000.00	58,500	**17,550**	920	11,960	4,500	**29.63**
D		1	450.00	10.00	-	1000.00	58,500	**17,550**	920	11,960	4,500	**29.63**
Totals		4	1800	10			234,000	**70,200**	3,680	23,920	9,000	**118.51**

Storage Volume = Volume* Porosity
Sidewall Area= Perimeter*Depth
OutFlow = Sidewall Area+ Bottom Area * Infiltration Rate

Note: Outflow Assumes a Full Gallery

BIO-INFILTRATION CHANNEL WORKSHEET

Bio-filtration Swale Design - Swale A3

Based on King County 2005 Surface Water Design Manual (Section 6.2 and 6.3)

Calculation of Design Flow:

$Q_{wq} = 0.64 * (2\text{-yr peak flow rate})$

$Q_{peak,\,2} =$ 79.00 cfs

$Q_{wq} =$ 50.56 cfs

Calculation of swale bottom width:

$Q = 1.49\ A\ R^{0.67} S^{0.5}\ n^{-1}$ Manning's equation

OR

$b = Q_{wq}\ n_{wq}\ (1.49 * y^{1.67} S^{0.5})^{-1}$

OR

$y = [Q_{wq}\ n_{wq}\ (1.49 * b * S^{0.5})^{-1}]^{0.6}$

where

b = bottom width of swale (ft)…minimum 2 ft width required, maximum 10 ft

Q_{wq} = water quality design flow (cfs)

n_{wq} = Manning's roughness coefficient for shallow flow conditions = 0.20 (unitless)

y = design flow depth

S = longitudinal slope (along direction of flow) (ft/ft), slope shall be between 1%-6%. If less than 1.5%, underdrains must be provided. Slope less than 1% is considered a "wet biofiltration swale" and must be designed under those guidelines. Slope greater than 6% requires check dams with vertical drops of 12-inches

width known:

b = 6.00 ft

S = 0.010 ft/ft

y = 4.29 ft

Determining design flow velocity:

$V_{wq} = Q_{wq} / A_{wq}$, max 1.0 fps

$A_{wq} = b*y + Z*y^2$

where

V_{wq} = design flow velocity (fps)

A_{wq} = cross-sectional area of flow at design depth (sf)

Z = side slope length per unit height (e.g. for 3:1, Z = 3)

Z = 2

$A_{wq} =$ 62.47 sf

$V_{wq} =$ 0.81 fps

Calculate swale length to achieve a minimum hydraulic residence time of 9 minutes (540 seconds):

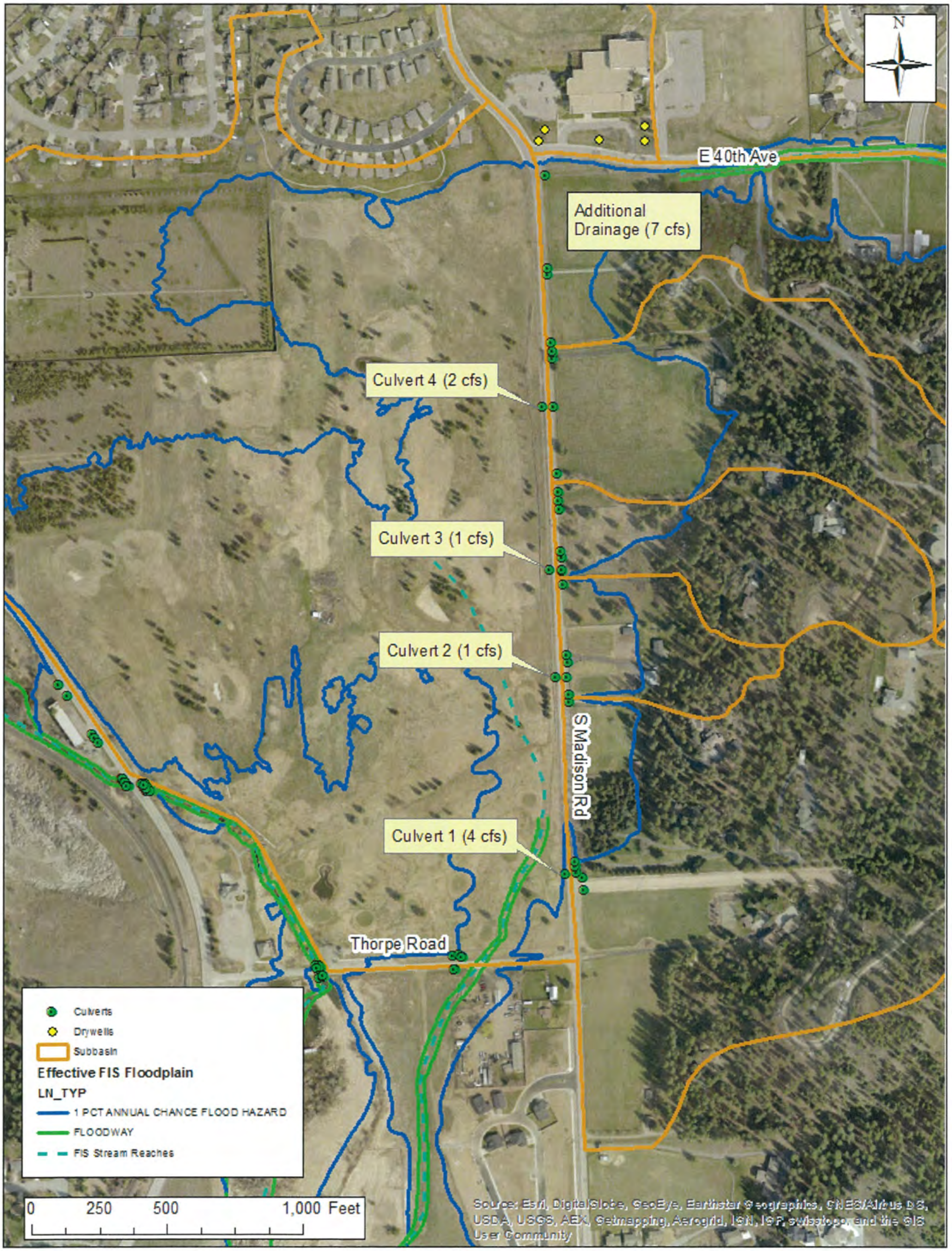
$L = 540 * V_{wq}$, minimum swale length is 100 ft

L = 437.07 ft

Conveyance of larger storms using previous steps, Velocity must not exceed 3 fps:

$Q_{peak,25} =$	2.5	cfs	y=	**0.71**	ft	A_{25}	=	5.23	sf	$V_{25} =$ 0.48
$Q_{peak,100} =$	4.65	cfs	y=	**1.02**	ft	A_{100}	=	8.24	sf	$V_{100} =$ 0.56

MADISON RD CULVERT FLOWS



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

V-DITCH ROCK CALCULATIONS

Hydraulic Analysis Report

Project Data

Project Title: Triangle Pond V-DITCH

Designer:

Project Date: Monday, October 03, 2016

Project Units: U.S. Customary Units

Notes:

Channel Lining Analysis: Approach Channel Lining

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 1 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.08369

Lining Results

Angle of Repose: 41.7 degrees

Relative Flow Depth: 1.13551

Manning's n method: Bathurst

Manning's n: 0.129511

Channel Bottom Shear Results

V*: 0.812111

Reynold's Number: 66730.6

Shield's Parameter: 0.0642078

shear stress on channel bottom: 1.27808 lb/ft^2

Permissible shear stress for channel bottom: 6.58772 lb/ft^2

channel bottom is stable

Stable D50: 0.210246 ft

Channel Side Shear Results

K1: 1

K2: 0.968982

Kb: 0

shear stress on side of channel: 1.27808 lb/ft^2

Permissible shear stress for side of channel: 6.38338 lb/ft^2

Stable Side D50: 0.216977 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is stable

Channel Summary

Report for channel

Channel Analysis: Channel Analysis

Notes:

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Channel Width: 3.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.1295

Lining Type: Rock Riprap - 300 mm (12-inch)

Depth: 2.0482 ft

Result Parameters

Flow: 38.7908 cfs

Area of Flow: 31.3156 ft^2

Wetted Perimeter: 27.9176 ft

Hydraulic Radius: 1.1217 ft

Average Velocity: 1.2387 ft/s

Top Width: 27.5785 ft

Froude Number: 0.2049

Critical Depth: 0.9907 ft

Critical Velocity: 4.3774 ft/s

Critical Slope: 0.2950 ft/ft

Critical Top Width: 14.89 ft

Calculated Max Shear Stress: 1.2781 lb/ft^2

Calculated Avg Shear Stress: 0.7000 lb/ft^2

IPEC Geotechnical Report dated June 28, 2016

Full-Scale Drywell Testing

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

June 28, 2016
Project No. 16-249A

NAI Black
c/o Mr. Bryan Walker
107 South Howard
Suite 500
Spokane, WA 99201

Re: **Full-Scale Drywell Testing**
Proposed Stormwater Management Facility
4403 South Dishman-Mica Road
Spokane Valley, WA

Dear Mr. Walker:

As you authorized, we have completed a full-scale drywell test on the drywell installed at the above-referenced site in Spokane Valley, Washington. The purpose of the testing was to establish a design flow rate. This report summarizes the results of our site investigation, engineering analyses and recommendations.

AVAILABLE INFORMATION

We were provided a topographic survey for the project site by Whipple Consulting Engineers, Inc. (WCE). This topographic survey showed the existing roadways, existing structures, property lines, and existing ground surface elevation contours. This plan was prepared by WCE and was dated November 7, 2013. The site was used as a golf course prior to our evaluation. The site is relatively level with some elevated golf greens and excavated areas for water hazards. The site is primarily grass-covered with scattered trees along the fairways and pine trees in the undeveloped area to the northwest. The clubhouse building is present at the southwest corner.

In addition, we performed a preliminary geotechnical evaluation for the property in December 2013. The results of that evaluation, along with our opinions and recommendations, are summarized in our Preliminary Geotechnical Evaluation dated December 31, 2013.

P.O. Box 1566, Veradale, WA 99037
Phone 509-209-6262

We also performed a geotechnical evaluation for certification of the existing levee along Chester Creek in April 2014. The results of that evaluation are summarized in our Geotechnical Evaluation report dated February 12, 2015.

Lastly, we performed a geotechnical evaluation in July 2015 consisting of ten 50-foot borings in the south half of the property. The results of that evaluation are summarized in our Geotechnical Evaluation Phase 2 report dated July 23, 2015.

FIELD EVALUATION

A geotechnical engineer from Inland Pacific Engineering Company (IPEC) performed a full-scale drywell test on the Type 2 drywell on May 6, 2016. The drywell test was performed in accordance with the Spokane Regional Stormwater Manual, Appendix 4B procedures.

ANALYSIS AND RECOMMENDATIONS

We calculated a design outflow rate for the existing drywell using the results of the recent and previous laboratory tests and the procedures described in the SRSM manual, Appendix 4B (Full-Scale Drywell Test Method). Based on the test performed, we recommend using a design flow rate of 1.05 cfs for design. This recommended design outflow rate includes a safety factor of 1.1 as required by the SRSM.

REMARKS

This report is for the exclusive use of the addressee and the copied parties to use in design of the proposed project and to prepare construction documents. In the absence of our written approval, we make no representations and assume no responsibility to other parties regarding this report. The data, analyses, and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

Services performed by the geotechnical engineers for this project have been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is intended or made.

GENERAL REMARKS

It has been a pleasure being of service to you for this project. If you have any questions or need additional information, please do not hesitate to call me at (509) 209-6262 at your convenience.

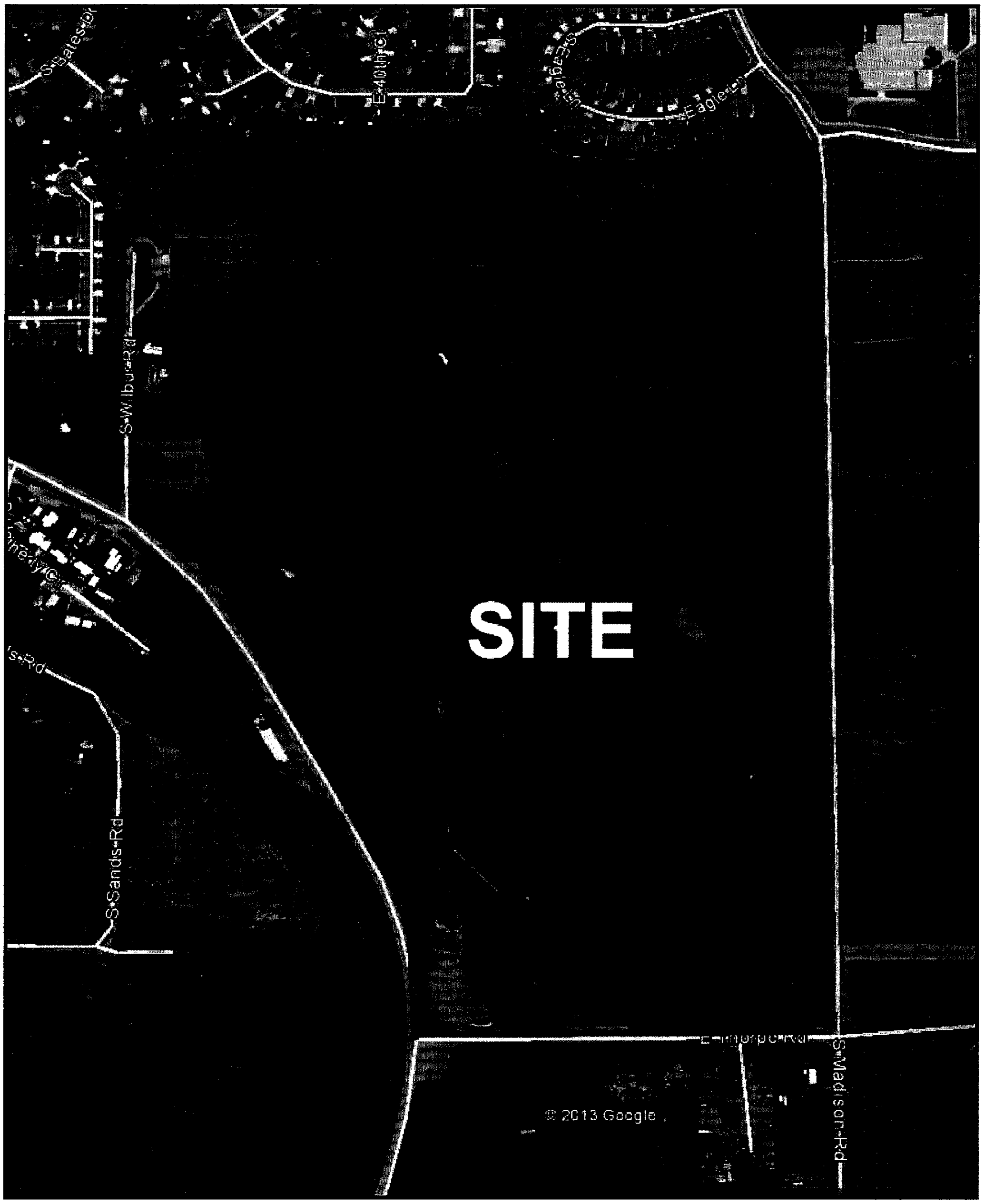
Sincerely,
Inland Pacific Engineering Company

Paul T. Nelson, P.E.
Principal Engineer

PAUL T NELSON
37228
6-28-16

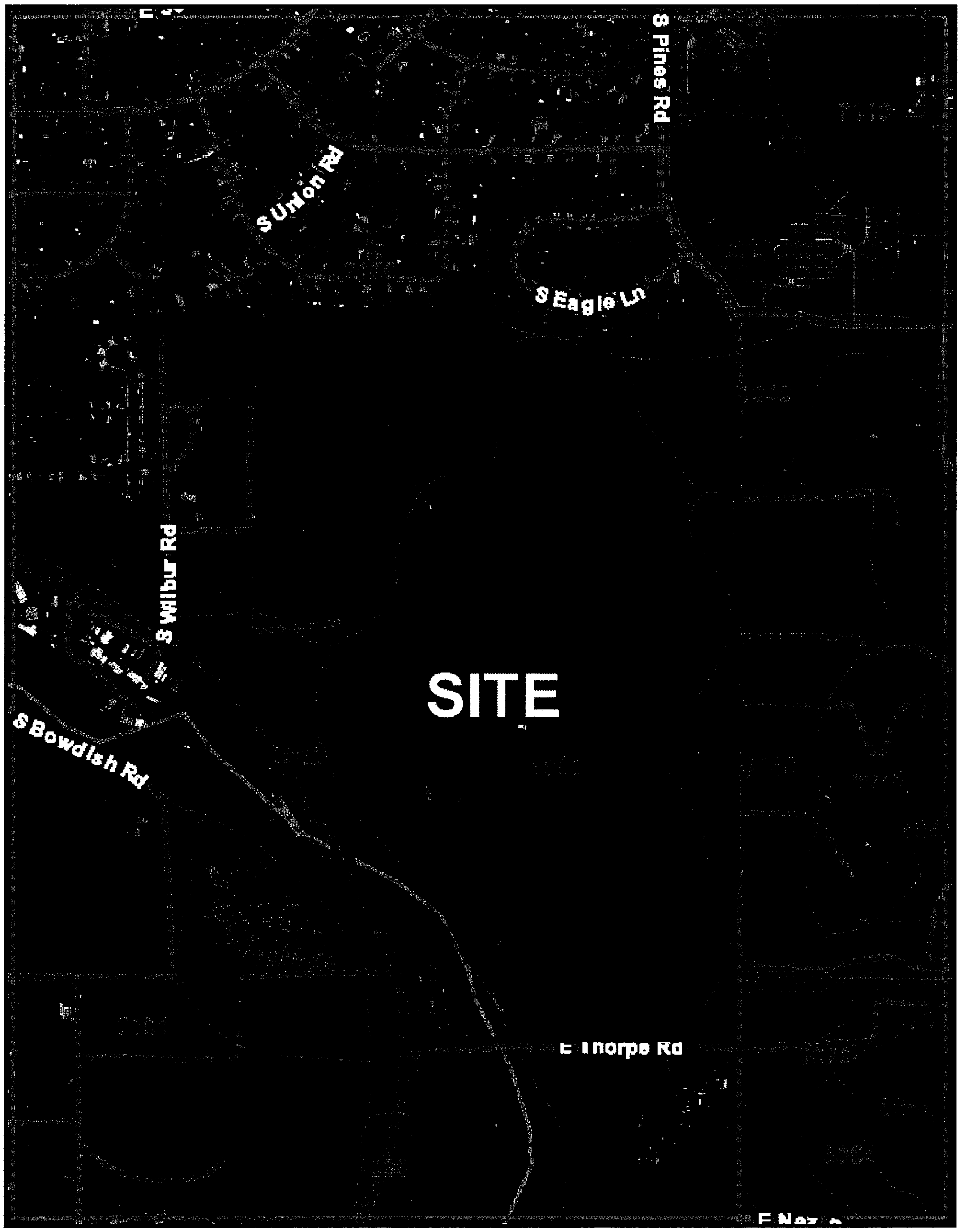
Attachments:	Figure 1, Site Location Map
	Figure 2, NRCS Map
	Laboratory Test Results
	Full-Scale Drywell Test Results

FIGURE 1



<table>
<tr><th colspan="3">Site Location Map</th></tr>
<tr><td rowspan="2">IPEC
Inland Pacific Engineering Company
Geotechnical Engineering and Consulting</td><td>Project No. 16-249A</td><td rowspan="2">June 28, 2016</td></tr>
<tr><td>Painted Hills Golf Course
4403 South Dishman-Mica Road
Spokane County, WA</td></tr>
</table>

FIGURE 2



NRCS Map		
IPEC Inland Pacific Engineering Company Geotechnical Engineering and Consulting	Project No. 16-249A Painted Hills Golf Course 4403 South Dishman-Mica Road Spokane County, WA	June 28, 2016

IPEC

Inland Pacific Engineering Company
3012 North Sullivan Road, Suite C
Spokane Valley, WA 99216
Telephone: 509-209-6262
Fax: 509-290-5734

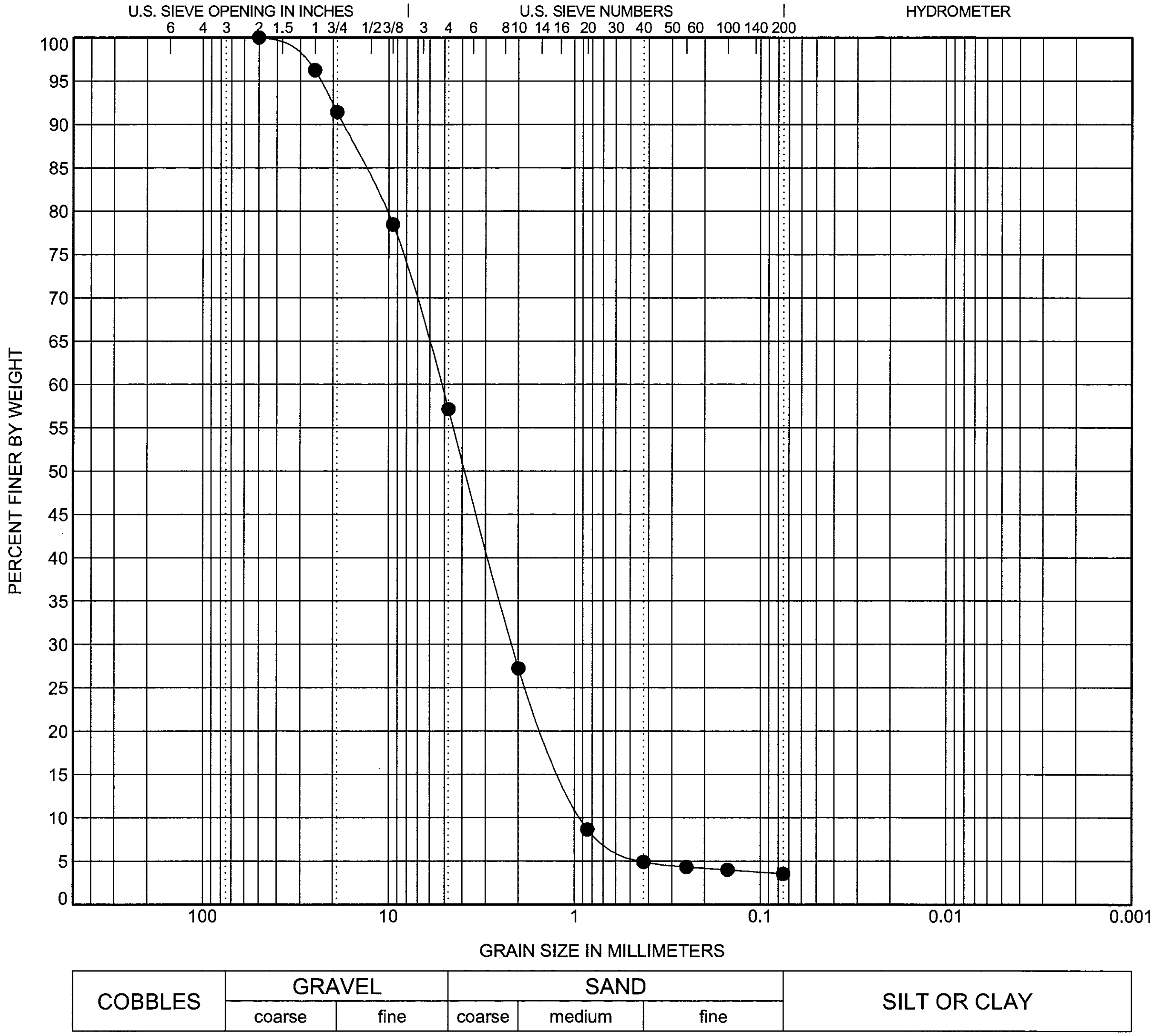
GRAIN SIZE DISTRIBUTION

CLIENT NAI Black

PROJECT NAME Painted Hills Drywell Test

PROJECT NUMBER 16-249A

PROJECT LOCATION 4403 South Dishman-Mica Road



	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**L16-057**	**20.0**	**SP Poorly Graded Sand with Gravel**				**1.00**	**5.76**

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**L16-057**	**20.0**	**50**	**5.212**	**2.167**	**0.904**	**42.9**	**53.6**	**3.5**	

IPEC

Inland Pacific Engineering Company
Geotechnical Engineering and Consulting

Full-Scale Drywell Test Results

Project Name: Painted Hills Drywell Test

Project Number: 16-249A

Client: NAI Black

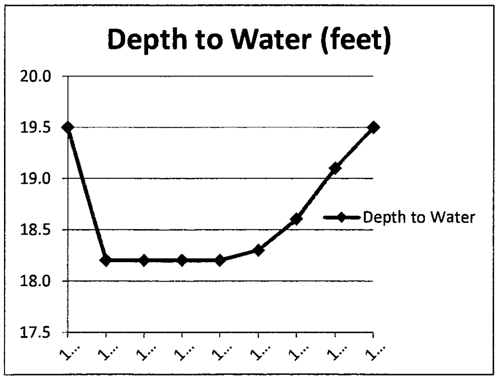
Test Date: 5/6/2016

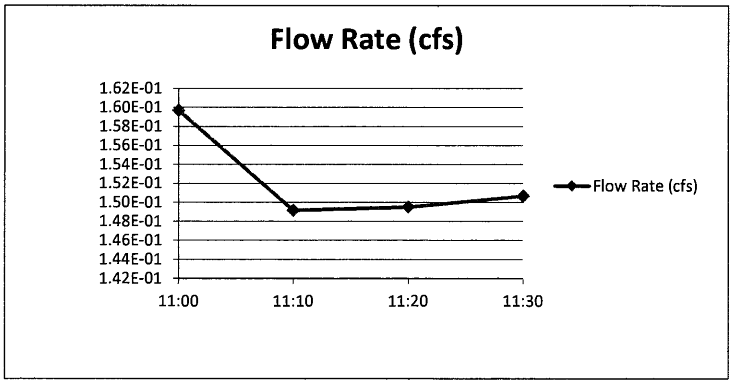
Test Location: Existing Drywell

Depth: 20'

Time	Elapsed Time (seconds)	Depth to Water (feet)	Flow Meter Reading (ft^3)	Volume of Water (ft^3)	Flow Rate (cfs)
10:00	0	19.5	596.6		
11:00	3600	18.2	1171.5	574.90	1.60E-01
11:10	600	18.2	1261.0	89.50	1.49E-01
11:20	600	18.2	1350.7	89.70	1.50E-01
11:30	600	18.2	1441.1	90.40	1.51E-01
11:35		18.3			
11:40		18.6			
11:45		19.1			
11:50		19.5			

Average Flow Rate: 1.50E-01





Appendix L. Biological Opinion

PAINTED HILLS PRD

BIOLOGICAL EVALUATION, BUFFER AVERAGING, AND HABITAT MANAGEMENT PLAN

Spokane County Tax Parcels #45336.9191 and 44041.9144
July 20, 2015 (Revised August 30, 2016)

Biology

Soil &

Water, Inc.

BIOLOGICAL EVALUATION, BUFFER AVERAGING, AND HABITAT MANAGEMENT PLAN

for the

PAINTED HILLS PRD

Spokane County Tax Parcels #45336.9191 and 44041.9144
July 20, 2015 (Revised August 30, 2016)

Retained by

NAI Black
Contact Person: Bryan Walker
107 S. Howard St., #500
Spokane, WA 99201
509.622.3593 (m)
509.623.1000 (o)
bwalker@naiblack.com

Investigated by

Biology Soil & Water, Inc.
Contact Person: Larry Dawes, Principal Biologist
3102 N. Girard Road
Spokane Valley, WA 99212-1529
Phone 509-327-2684
Email: bswinc@icehouse.net

BIOLOGICAL EVALUATION, BUFFER AVERAGING, AND HABITAT MANAGEMENT PLAN
for the
PAINTED HILLS PRD
Spokane County Tax Parcels #45336.9191 and 44041.9144
July 20, 2015 (Revised August 30, 2016)

1.0: Introduction

Biology Soil & Water, Inc. (BSW) was retained by Black Realty to complete a Biological Evaluation (BE) and Habitat Management Plan (HMP) for the proposed Painted Hills Planned Residential Development (PRD) located in the City of Spokane Valley, WA. South Dishman Mica Road defines the west boundary of the site, E. Thorpe Road defines the south boundary of the property, S. Madison Road defines the East boundary, and developed private property defines the north property boundary (Figures 1-3).

The Painted Hills Golf Course formerly occupied this location. The former club house is being renovated to expand the existing restaurant and the remainder of the site will become residential development and open space. The subject property is comprised of seven separate tax parcels including a 91.25 acre parcel where 580 residential units are proposed, and an 8+ acre parcel on the south end of the site that will be designated as a wildlife travel corridor. The Action Area was defined as a half mile radius of the 93+ acre Project Area so the site investigation would characterize adjacent areas where listed species could inhabit or be impacted by the project. This assessment addresses all Critical Areas and listed Priority Habitat and Species including Threatened, Endangered, Proposed, and Candidate Species in the Project Area.

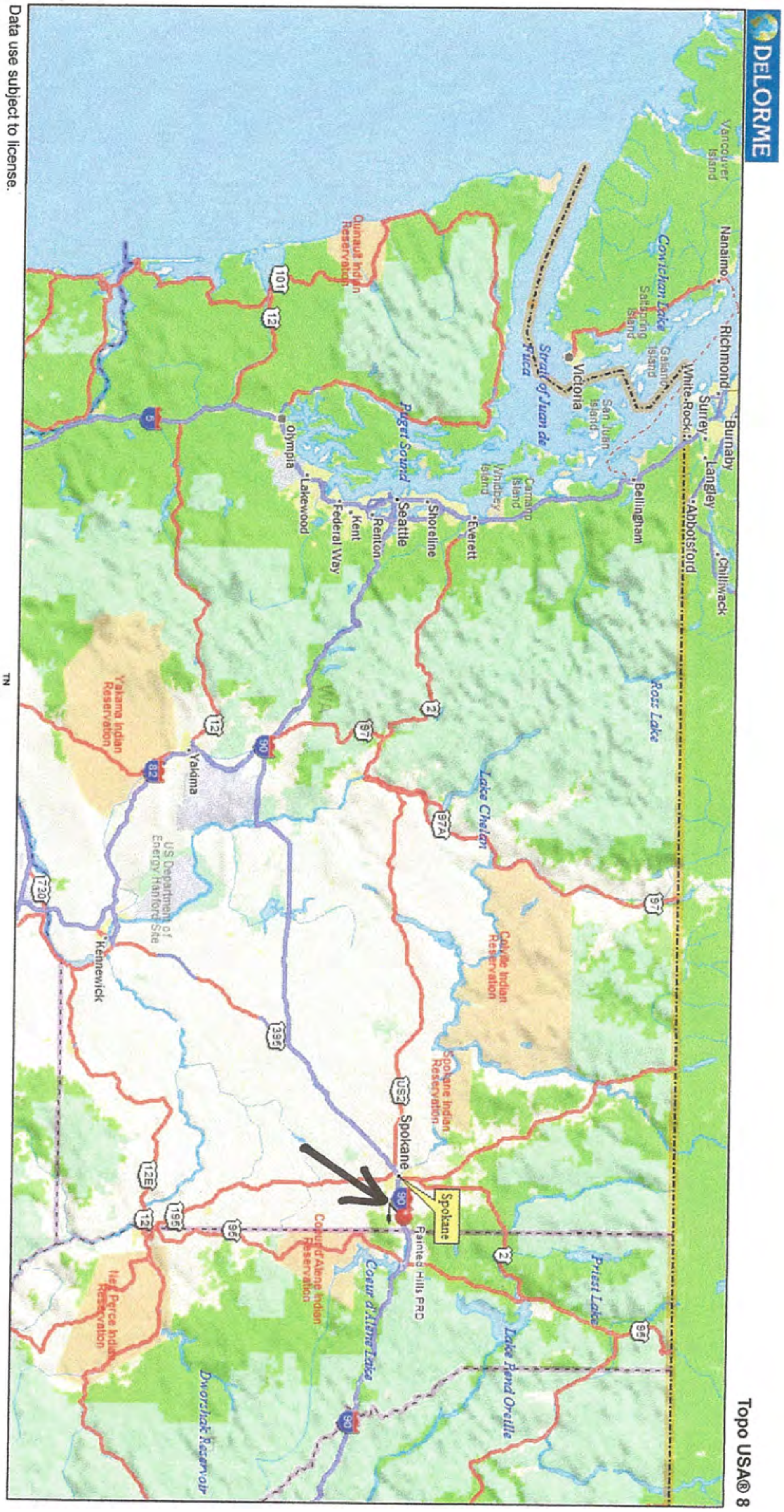
The USFWS and NMFS species lists were accessed on their websites on 4/21/2015 and updated August 29, 2016. No NMFS species are listed for the vicinity. The USF&W list indicated the potential presence of the species and critical habitat(s) shown in Table 1 (and in Appendix 1).

Table 1. USFWS listed species and critical habitats potentially present in the vicinity of

Species	ESU/DPS	Federal Status	Designated Critical Habitat
Bull trout *Salvelinus confluentus*	Columbia River DPS	*Threatened*	*Yes*
Water howellia, *Howellia aquatilis*		*Threatened*	*No*
Spalding's silene, *Silene spaldingii*		*Threatened*	*No*
Canada Lynx, *Lynx canadensis*		*Threatened*	*No*
Yellow-billed cuckoo, Coccyzus americanus,		*Threatened*	*No*

The undersigned investigated the Project and Action Areas on March 1, March 29, and April 19, 2015. The conclusions of this plan are based on an evaluation of habitat and species data for Spokane County compiled by State and Federal jurisdictions, an evaluation of construction plans and specifications for the project, a literature review, and field investigations by the author of this report. The project will have no effect on Bull Trout or proposed Bull Trout Critical Habitat. The project will not result in the destruction or adverse modification of potential, designated or proposed Critical Habitat or Essential Fish Habitat for any fish species. The project will have no effect on the threatened species Water howellia, Spalding's silene, Canada lynx, or the Yellow-billed cuckoo. There will be no significant adverse effect on any listed Species of Concern. The site plan includes an 8+ acre wildlife travel corridor for deer and elk and over 30 acres of open space.

Figure 1: Site Location



TN
MN (15.6°E)

0 18 36 54 72 90 mi
0 30 60 90 120 150 km

Data Zoom 6-0

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Figure 2

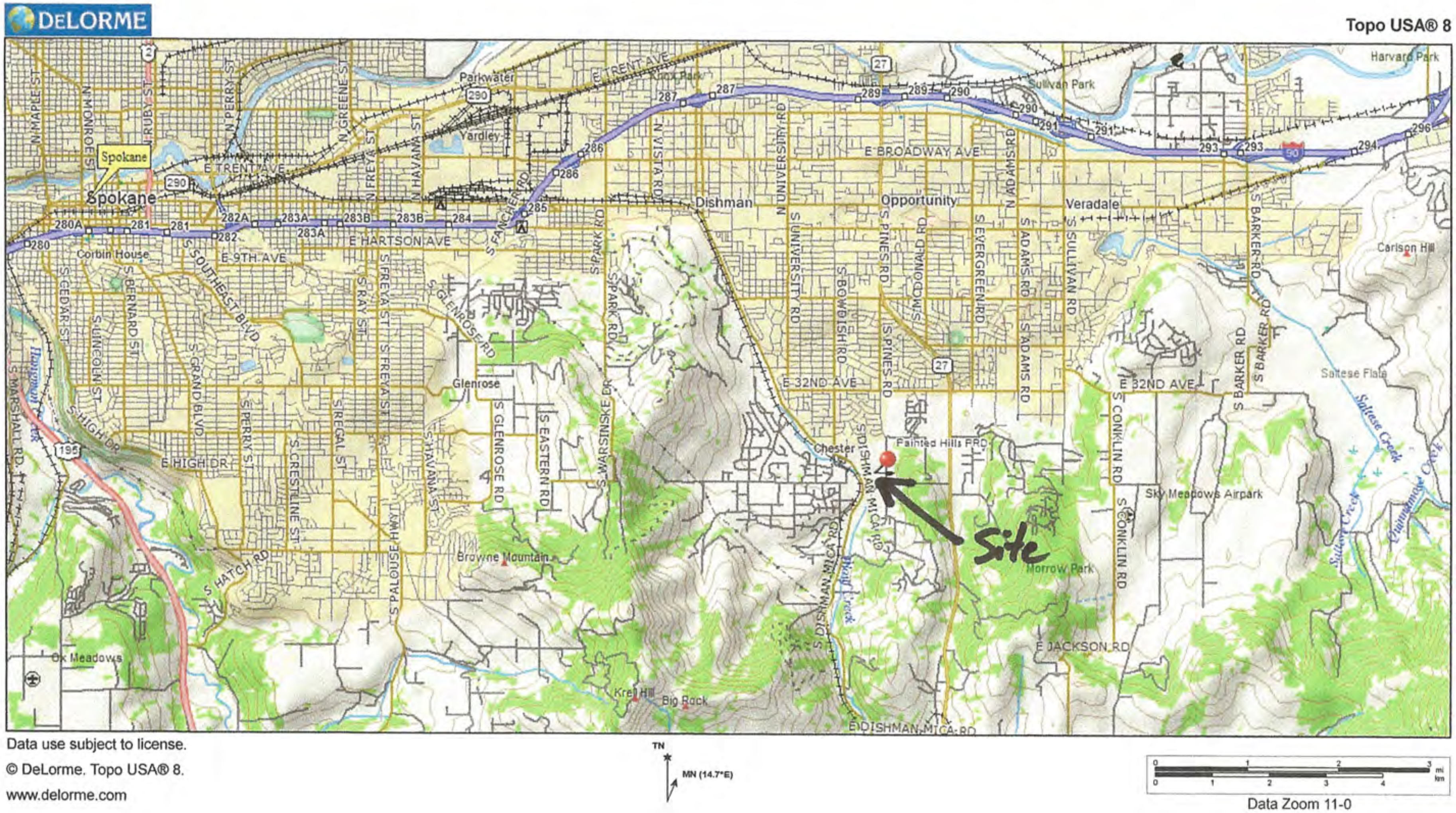

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Figure 3: Site Plan Map

The Project Area does not meet any of the Department of Natural Resources (DNR) criteria for High Quality Terrestrial Habitat. Washington Department of Fish and Wildlife (WDF&W) maps (Appendix 2: Critical Areas Maps) indicate the subject property falls within an Elk polygon (WDF&W Priority Habitat). An 8+ acre wildlife travel corridor is proposed along the entire south end of the project and the corridor will be enhanced with vegetative plantings to accommodate animals traveling through the area.

Chester Creek and its associated 100-foot buffer bisects the SW corner of the property. Buffer Width Averaging is proposed to compensate for the encroachment of two lots and foot paths in the riparian buffer. The impact mitigation also includes riparian buffer enhancement. The existing buffer is almost totally devoid of woody vegetation because it was previously a driving range and/or maintained golf course fairway. An evaluation of streams and wetlands is included in this report.

2.0: Methods of Investigation

The north parcel of the Project Area is located in Sec. 33, T25N, R44E and the south parcel is located in Sec. 4, T24N, R44E of Spokane County, WA (Figures 1-3). Biology Soil & Water, Inc. (BSW) investigated the property on March 1 and 29, and April 19, 2015 for wetlands, riparian habitat, and species protected under the Federal, State, and local regulations. The undersigned is familiar with the soils, vegetation, and hydrologic characteristics of this property from previous investigations of adjacent properties in the immediate vicinity and throughout the drainage basin.

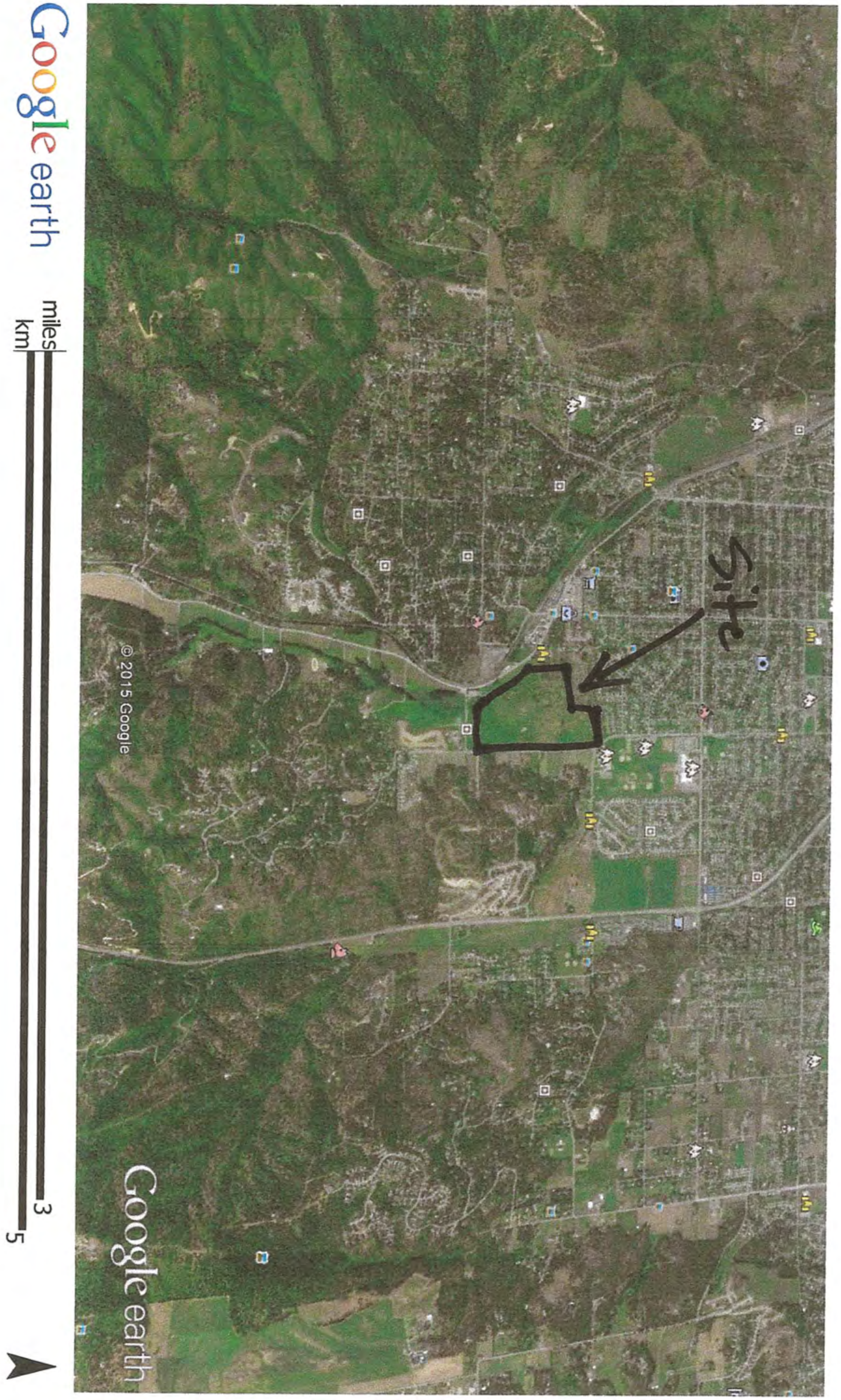
3.0: Description of the Action and Project Areas

Spokane is located in a valley at the westmost extent of the Rocky Mountains. From the north side of the Spokane River valley, the Selkirk Mountains extend north into Canada. On the south side of the Spokane River valley, a forested finger of the Bitterroot Mountains extends east from Lake Coeur d'Alene to Dishman Hills. The subject property is located in the Chester Creek valley with forested foothills on the east and west sides of the valley. The Painted Hills PRD is surrounded primarily by residential development with varying degrees of housing density, a few small undeveloped tracts of agricultural land in the Chester Creek valley, and forested land with varying densities of residential development (Figure 4).

3.1: Description of the Action Area

For purposes of describing habitat in the surrounding area, the Action Area is defined as a half mile radius of the project area. Habitat types in the Action Area would be described as a mosaic of urban developed, fragments of conifer forest, and small tract agriculture. From the north property line, dense residential development extends north into the City. A church and residential development border the painted Hills PRD at the NW corner. Horizon Middle School is located NE of the site. From the east property line (S. Madison Rd) hay fields and pasture extend 250-500 feet toward the toe of the surrounding forested slopes. Sparse residential extends east up the forested hillsides. Commercial and single family residential development extends south from Thorpe Road except for the Chester Creek drainage and associated flood plain that is mainly forested and small tract agriculture. Undeveloped forested hillsides extend about 1200 feet east to the densely developed Ponderosa neighborhood. A mixture of commercial and residential land uses extend NW along Dishman-Mica Road.

Figure 4



Land uses in the Action Area are a mosaic of dense residential development on former agricultural land, remaining undeveloped small tracts of agricultural land, and forested land with varying densities of residential development. Large mammals that are willing to cross highways and residential developments interspersed with open farm land will find connectivity to a few hundred acres of wooded and sparsely populated foothills extending south and west from the Painted Hills PRD site to Dishman Hills.

3.2: Description of the Project Area

The 93+ acre Painted Hills PRD property was formerly a golf course. Black Realty Inc. bought the property in a trustees auction in the fall of 2013 after the owners filed for bankruptcy in 2012. Except for cart paths, sand traps, and man-made water hazards, the entire property was planted in non-native turf grasses with sparse conifer and deciduous trees lining some of the fairways. The turf grass was maintained by treatment with herbicides and regular mowing of the greens, fairways and rough. These practices virtually eliminated the native herbaceous plant community.

Honey willows were planted inside the OHWM of Chester Creek whose channel was historically dredged and maintained for flood control. The banks of the channel are covered with Reed canarygrass. Outside the OHWM of the stream channel where the vegetation was not mowed or maintained, the vegetative community is dominated with Canarygrass. Teasel, tansy, thistle, wormwood, and lettuce are also well represented.

4.0: Project Risk Assessment and Impacts

Listed threatened and endangered species identified by jurisdictions for potential occurrence in Spokane County include the Yellow-billed Cuckoo (*Coccyzus americanus*), Canada Lynx (*Lynx canadensis*), Bull trout (Salvelinus confluentus), Water howellia (*Howellia aquatilis*) and Spalding's silene (*Silene spaldingii*). A BSW field investigation determined that the project would have NO EFFECT on any of the above listed species.

4.1: Yellow-billed Cuckoo (*Coccyzus americanus*), Federal Status: Threatened

The yellow-billed cuckoo was formerly a very rare summer visitor to western Washington, especially in the Puget Sound area (Roberson 1980). Jewitt et al. (1953) described the former breeding range in Washington as ranging north to Bellingham, east to Ellensburg, south to Vancouver, and west to Grays Harbor. There are only two published records of yellow-billed cuckoo in eastern Washington. Yellowbilled cuckoos were detected on July 21, 1956, 20 miles north of Grand Coulee Dam in Okanogan County (Weber and Larrison 1977) and in June 1978 at George, Grant County (Roberson 1980).

The March and April investigations occurred before the Yellow-billed cuckoo would have migrated into the Spokane County area if it seasonally utilized the area for breeding or nesting. The investigation for the Yellow-billed cuckoo focused on specific habitat requirements of that species. Cuckoos prefer to nest in areas with at least 10 hectares (ha) (25 acres) of contiguous (riparian) woodland (Laymon 1998). The typical patch size is 20 ha (50 acres) or greater, and the likelihood of occupancy increases dramatically with increasing patch size, but they have been found breeding in patch sizes as small as 4 ha (10 acres) along the Colorado River in southern California (Johnson, Matthew J., 2007). Yellow-billed cuckoo's nest in undisturbed stands of cottonwood/willow galleries greater than 10 acres in total area and greater than 100 meters wide along waterways.

The project area does not contain, and is not in close proximity to, adequate habitat patches for that species. The largest habitat patch consisting of species utilized by the yellow-billed cuckoo is less than one tenth of the minimum patch size utilized by this reclusive species. The yellow-billed cuckoo is known not to utilize any habitat with characteristics of those found along Chester Creek adjacent to this project. This project will not impact yellow-billed cuckoo populations or habitat components. There is no suitable habitat for the yellow billed cuckoo in the vicinity of this project.

4.2: Bull Trout (*Salvelinus confluentus*) Threatened

The U.S. Fish and Wildlife Service (USF&WS) lists the Columbia River population of bull trout as threatened. Small pockets of bull trout are present in isolated habitat fragments in the main stem and tributaries of the Columbia River. One isolated fragment of the Columbia River segment includes Coeur d'Alene Lake, its tributaries in the drainage basin, and the Spokane River. Bull trout populations have been identified in Coeur d'Alene Lake and three tributaries in its sub-basin, but no bull trout populations are known to occur presently, or have been noted historically, in the Spokane River downstream from the Post Falls Hydroelectric Dam (PBTTAT, 1998).

The Post Falls dam stops the migration of fish out of the Coeur d'Alene basin downstream into the Spokane River. Waterfalls and dams prevents the upstream and downstream migration of bull trout into the segment of the Spokane River and its tributaries in the vicinity of the project area. No dam on the Spokane River has a fish passage facility and all dams create fish barriers for upstream and downstream migration. EPA fact sheets for 1999 NPDES permits for wastewater treatment plants discharging to the Spokane River state that bull trout cannot get past the Post Falls Dam (EPA 2008). There is no known population of bull trout in the Spokane River downstream of the Post Falls dam (FERC 2006). The USFWS does not include the Spokane River and its tributaries located downstream from the Post Falls dam in bull trout recovery planning efforts (Federal Register / Vol. 75, No. 200 / Monday, October 18, 2010). The project will have No Effect on Bull Trout.

Bull Trout Critical Habitat

Activities that may adversely modify critical habitat include those that alter the primary constituent elements to an extent that the value of critical habitat for both the survival and recovery of the bull trout is appreciably reduced. The proposed project will not destroy or adversely modify critical habitat by altering primary constituent elements. The value of critical habitat for both the survival and recovery of the bull trout will not be reduced as a result of this project. The project will not alter the minimum flow or natural flow regime of the subject stream, alter any segment of the stream, riparian vegetation, or any chemical parameters so as to reduce water quality, alter channel morphology or create instream barriers to bull trout movement. No decrease in water quantity will occur because of the project. **The project will cause no significant and detrimental alterations to water quality and will have NO EFFECT on proposed Bull Trout Critical Habitat.**

4.3: Spalding's catchfly (*Silene spaldingii*), Federal Status: Threatened

The range of Spalding's silene (*Silene spaldingii*) includes eastern Washington, northeast Oregon, Idaho, and western Montana. Spalding's silene occurs primarily in open grasslands with minor shrub and/or (occasionally) scattered conifer components. Spalding's silene is found most commonly in Idaho fescue/snowberry associations at elevations of 1900-3050 feet. These sites are typically dominated by Idaho fescue and have sparse cover of snowberry where the total vegetative cover is greater than 100%. Some of these sites occur in a mosaic of grassland and ponderosa pine forest. Spalding's silene populations have been found on all aspects, although there seems to be a preference for slopes that face north. On drier sites, the species can be found on the bluebunch wheatgrass/Idaho fescue association.

Spalding's silene can occupy habitats that vary from sagebrush plains to mountain ridges. Spalding's silene generally occurs in native grasslands that are in reasonably good ecological condition, although populations have persisted in areas that have had moderate grazing pressure. Populations tend to be quite small and are currently quite fragmented, raising questions about their long-term viability. Fire may have historically played a role in maintaining habitat particularly in sites that are interspersed with ponderosa pine forest. Much of the historically suitable habitat has been lost through conversion or degradation.

The timing of the site investigation did not coincide with the flowering of listed plant species. The project biologist is a qualified botanist and wetland professional that routinely completes site investigations during all seasons when snow does not cover vegetation. Site investigations often occur when salient plant flowering parts are senescent or may not be sufficiently preserved to allow taxonomic identification beyond genus to the species level. Twenty years of experience in plant identification during all life history and seasonal growth habits has equipped the project biologist to conduct accurate plant identifications and wetland investigations in accordance with best available science and consistent with the accepted professional practices for the conditions at the time the work was performed.

Individual plants exhibit essential identification characteristics unique to their genera, but display sufficient variation so it is possible to categorize and differentiate each species within a genus using taxonomic keys. During plant senescence, individual characteristics often become blurred making it difficult or impossible for a botanist to differentiate among species within the genus. The sepals of the genus *Silene* form a bulbous calyx that is easily recognized and sufficient to identify the plant to genus. The Threatened species *Silene spaldingii* overlaps in range and is somewhat similar in appearance with some other species in the genus.

The field biologist is familiar with the species and has observed it at other locations. During the field investigation, the *Silene* genus was not identified in the Action or Project Areas. Previous years of cultivation, followed by the planting of turf grasses, years of mowing, and herbicide applications is sufficient grounds for discounting effects on Spalding's silene when considered alone. No populations of Spalding's silene were identified in the Project Area during the field investigation. **The project will have NO EFFECT on Spalding's Silene and will not result in the destruction or adverse modification of potential, designated or proposed Spalding's silene Critical Habitat.**

4.4: Water howellia (Howellia aquatilis)

Howellia is found in seasonal wetlands, ponds and lakes because its seeds do not germinate under water. Since seeds germinate in the fall and over-winter as seedlings Howellia requires a dry autumn followed by a wet spring in order to establish for the year. In addition to seasonally fluctuating ponds, Howellia requires fertile, highly organic soils, which are generally maintained by deciduous trees surrounding the ponds. Research indicates that Howellia does not form a persistent seed bank, making this annual especially dependent on year to year reproductive success in order to persist.

No Howellia was observed in the Project Area. Howellia is found in seasonal wetlands, ponds and lakes. No Howellia habitat occurs in the Project Area. **The project will have NO EFFECT on the Howellia aquatilis species and will not result in the destruction or adverse modification of potential, designated or proposed Howellia Critical Habitat.**

4.5: Canada lynx (Lynx canadensis) Federal Status: Threatened

Lynx prefer dense coniferous forest with sapling/pole thickets, rock outcrops, and wetlands at elevations of around 4000' to 4500'. The elevation of the Action Area is around 2010-2015 feet. Denning usually occurs in mature old growth stands with lots of deadfall. These forested stands do not occur in the Action Area. Lynx prefer snowshoe hare habitat, as they are dependent on snowshoe hare as a staple food item. Snowshoe hare prefers dense lodgepole stands that do not occur in the Project or Action Areas. BSW did not find any evidence of Canada lynx in the low elevations associated with the Project Area. **The project will have NO EFFECT on the Canada lynx or Canada lynx habitat.**

4.6: Species of Concern

The site was also investigated for the presence of species from the Species of Concern list for Spokane County published by the U.S. Fish and Wildlife Service. Most of these species are also included in the WDF&W list of priority species that was adopted by the City of Spokane Valley. Each species is listed below, followed by an evaluation of available habitat, observed habitat utilization, and potential project effects.

Bald eagle ***(Haliaeetus leucocephalus)***

The Bald eagle is listed as a State Sensitive species. Eagles do not nest near the Project Area. Human activity associated with major roads and urban development are limiting factors for Bald eagles in the Action Area. At any location in Spokane County road kill can provide food for transient opportunist eagles. However, Bald eagles do not routinely forage in the Action Area and no nest sites were observed by BSW within one-half mile of the Project Area. BSW concludes that noise and human activity during construction will not impact eagle nesting as no nests were identified in the Action Area. Perching and foraging opportunities occur on the stream bank and eagles could utilize the stream corridor. **The project will have NO EFFECT on the Bald eagle.**

Western Burrowing Owl ***(Athene cunicularia)*** No historical observation in the vicinity. No individuals, nests, or sign observed during the site survey. **No Effect from project.**

California floater ***(Anodonta californiensis)*** freshwater mussel. **No Effect from project.**

Ferruginous hawk ***(Buteo regalis)*** nests on rocky ledge or high ground vantage on prairie. **No Effect from project.**

Giant Columbia spire snail ***(Fluminicola columbiana)*** cold, unpolluted, medium to large streams. **No Effect from project.**

Loggerhead shrike ***(Lanius ludovicianus)*** A robin sized gray, black, and white bird of open areas. Community types not dominated by shrubs, such as grasslands and riparian areas, are not used. Loggerhead Shrikes prefer nesting in big sagebrush and antelope bitterbrush, and avoid spiny hopsage, rabbitbrush, and green rabbitbrush (*Chrysothamnus viscidiflorus*). Nest shrubs are taller, closer to an edge, and contain denser cover and fewer main stems than unoccupied shrubs. Roost shrubs are large, dense live shrubs, whereas tall, dead shrubs that provide good visibility are used for perching. **No Effect from project.**

Longeared myotis ***(Myotis evotis)*** Roosts are sometimes found in crevices in small basalt rock formations. Compared to random plots, roosts are in more open, rocky habitats, closer to edge of forest stands, and relatively distant from sources of permanent water. Often roost in Ponderosa pine trees >30 cm in diameter and >12 m high. Less use of grasslands and closed pine than expected. **No significant effect if present in vicinity.**

Northern goshawk ***(Accipiter gentilis)*** goshawks select relatively closed-canopy conifferous/boreal forest habitat for nesting - **No significant effect.**

Olivesided flycatcher ***(Contopus cooperi)*** found in boreal and western coniferous forests - **No Effect**

Pallid Townsend's bigeared bat (Corynorhinus townsendii pallescens) Eastside mixed conifer forest, shrub-steppe, and riparian-wetlands. In Washington, old buildings, silos, concrete bunkers, barns, caves, and mines are common roost structures. **No effect on roosting or hibernicula**

Peregrine falcon (Falco peregrinus) Two subspecies of peregrine falcons (Falco peregrinus) occur in Washington state at present, (F. p. pealei and F. p. anatum). Peale's peregrine falcon is a coastal subspecies so our concern in Spokane County is with F. p. anatum (Continental peregrine falcon). DDT exposure totally eliminated this subspecies from former breeding sites in eastern Washington. Following a ban on the use of DDT, captive-reared young birds have been released at several sites in Spokane County in an attempt to augment natural reintroductions by wild birds. There is no potential for degradation or loss of critical habitat for peregrine falcons in the project area. Peregrine falcons nest on cliffs or even man-made structures such as buildings or bridges that do not occur in the project area so no action is required to protect nest sites from human disturbance. The primary method used to reintroduce falcons to the wild is called "hacking". WDF&W does not currently use any hack sites in the vicinity. **No significant effect**

Redband trout (Oncorhynchus mykiss) No Effect from project.

Sagebrush lizard ***(Sceloporus graciosus)*** **No Effect from project.**

Westslope cutthroat trout ***(Oncorhynchus clarki lewisi)*** **No Effect from project.**

Palouse goldenweed ***(Haplopappus liatriformis)*** palouse, not in our area **No Effect**

4.7: WDF&W Priority Species Deer, Elk, and Gray Wolf

Impacts to the WDF&W Priority Species White-tailed deer and Elk will be minimized by protecting a travel corridor through the site. The subject property is not mapped as White-tailed deer priority habitat. Wooded lands to the east and south are mapped as priority white-tailed deer habitat. However, deer utilize the site as they do all undeveloped parcels in the area. The site falls within the northern extent of the mapped Elk Habitat polygon in the Spokane Valley. The site does not provide cover or refugia required by elk and is not elk habitat, but Elk moving through the general area between Mica Peak and Dishman Hills could potentially cross the subject property on east/west treks. The developer will protect and enhance an east/west 8+ acre deer and elk travel corridor across the property. Woody vegetative plantings prescribed for the corridor will provide some habitat value and protective cover where none currently exists. Deer will continue to use the area set aside as a travel corridor.

The site is also mapped as Gray wolf habitat. It is possible that wolves could travel through the area in search of prey. There are deer and abundant small (domesticated) mammals available in this residential area so their presence would not be well received in the surrounding neighborhoods. Wolves could also utilize the 8+ acre travel corridor for safe east/west passage through the property.

4.8: Wetlands

Wetland Inventory Maps of the site show two wetlands on the property (Appendix 2). Both of the wetlands are shown to occur on the west side of Chester Creek. BSW investigated the mapped wetlands on March 1, 2015 and in each mapped wetland, dug a test hole on top of the creek bank in close proximity to the Chester Creek OHWM. On March 1, neither of the test holes had saturated soils in the top 16 inches of the soil profile. In Test Hole #1 the water table was at 21 inches and saturation occurred at 16 inches. In Test Hole 2, there was no saturation in the top 24 inches of the soil profile. The test holes were inspected again on March 29th and the water level in test holes was lower than on March 1st. This result was expected due to the landscape position of the mapped wetlands. The year to date precipitation for Spokane was hovering slightly above normal for the year to slightly below normal for the year to date so wetland hydrology should have been present in what was a normal year at the time of the investigation if the subject areas were wetlands. The argument that Spokane was below normal for the hydrologic year is not valid for this drainage basin because it has a low elevation and runoff comes earlier in the year than many other drainages as will be explained in detail below.

The wetland hydrologic criteria was not met in either test hole at the start of the growing season when the water table should have been at its annual high. Stream high water conditions consistent with a high water table does not typically occur during the growing season on Chester Creek. Seasonal high water occurs in the winter during rain on snow and frozen ground conditions. During the growing season, wetland conditions do not occur outside of the stream OHWM where the National Wetland Inventory Map indicates the wetlands occur. David Moore, DOE, investigated the site on June 8, 2016 and concurred with that finding.

4.8.1: Chester Creek Flood Frequency

A hydrologic and hydraulic analysis for Chester Creek was completed by Michael Baker Jr., Inc. and approved by Spokane County in a letter to the Federal Emergency Management Agency dated August 6, 1990. There are no long-term gage records for Chester Creek. The limited gage measurements on Chester Creek were collected near the Dishman-Mica Road crossing of Chester Creek from December 1994 through March 1995 and November 1995 through February 1996 when no flood events occurred. In February 2006, the hydraulic analysis for Chester Creek was revised by West Consultants, Inc. under a FEMA contract. The analysis established flood magnitude-frequency estimates for the watercourse. A steady flow model has been developed for Chester Creek.

The reports conclude that spring floods in the upper Spokane River basin are due to snowmelt runoff from high elevation watersheds. Such floods are of less significance on Chester Creek because the lower elevation of the watershed limits the size of the snowpack so spring runoff occurs about a month earlier and at more gradual rates than on the Spokane River. Nearly all maximum annual flood peaks on Chester Creek occur during the winter. Warm winds and rain can melt the snow rapidly. The May 1948 flood on Hangman Creek was a non-typical flood caused by a heavy snowpack, a late, cold spring, and heavy rains during the critical snow melting period. All other maximum annual flood peaks on Hangman Creek occurred during the winter. When winter rain causes snowmelt on frozen soil conditions, short-duration, intense runoff generates a flood peak during winter storms. During the more extreme events, Chester Creek runs over its banks filling depressions in the flood zone.

The duration of flooding is generally between 100 hours and 1000 hours, or between four days and forty days with smaller events occurring with greater frequency than large events.

Hydric soils form under saturated soil conditions. Wetlands have to exhibit saturated soils during the growing season, but those conditions seldom occur outside of the stream channel on Chester Creek because flooding usually happens in the winter. Floods are typically of a small magnitude so when over bank flow fills depressions outside of the channel, the water has usually infiltrated before the growing season begins. The subject areas may have been exposed to more frequent flooding in the past, but good planning and flood control measures designed to minimize flooding have moderated those historical flood events to some degree. Chester Creek does not follow the same hydrograph as snowmelt dominated systems.

4.8.2: Flood Protection Measures

Channel geometry for Chester Creek were developed from surveys conducted in March 2003. Overbank geometry were developed from topography developed by TerraPoint (2003). Flood plain boundaries for Chester Creek and Unnamed Tributary to Chester Creek were delineated using 2 foot contour interval maps developed by TerraPoint from LiDAR data.

Previously, a watershed plan for Chester Creek was designed with management recommendations for drainage, flooding, water quality, and riparian habitat. As a result, flood control improvements have been implemented along Chester Creek. The improvement area began at the Painted Hills Golf Course. In 1998, a project to install new culverts and extensive dredging of the channel between Thorpe Road and Schaffer Road was implemented. Two large volume borrow pits were constructed downstream. Each pit was designed for the retention and infiltration of Chester Creek floodwaters up to a 25 year event. One borrow pit was constructed just north of E. 40th Avenue and the other just south of 28th Avenue.

The Chester Creek channel has been historically maintained as has been reported in the literature and supported by direct evidence of spoil piles on the channel banks. Dredging makes the channel deeper and the dredging spoil piles make the channel banks higher. As a result of channel dredging, the surrounding areas are dewatered faster and the water table falls a corresponding distance deeper below the soil surface. Soils in the areas mapped as wetland exhibit some relic hydric characteristics from infrequent historical flooding, but with the exception of rare flood events, the water table is too far below the soil surface at the start of the growing season to meet the wetland hydrologic criteria.

The two mapped wetlands do not meet the hydrologic criteria so they are not wetlands. They are low lying areas adjacent to Chester Creek that have been historically flooded, but flooding is far too infrequent for the subject areas to meet the wetland hydrologic criteria. Even if they were wetlands, they are on the opposite side of the creek from where development is proposed so the riparian buffer would be more restrictive and extend further east into the development than a wetland buffer.

The undersigned filled out the current Wetland Rating Form and determined that if the mapped wetlands were actually wetlands, they would be Category 2 with a total point score of 19 points. The City Code assigns buffer widths based on points scored on the previous rating form. Using the previous rating form, the wetland scores 18 points for habitat functions so the buffer width would be 100 feet. The 100-foot buffer applied from the "(non)wetlands" located on the west side of the creek would only extend about 70 feet east of the creek so the 100-foot riparian buffer would be more restrictive to development and extend further east, even if wetlands did occur on the site as mapped. There are no wetlands on the subject property.

Additional flood control measures are being incorporated into the project design (see the Painted Hills Flood Control Plan). In the original version of this report, shallow ponds and subsurface gravel galleries were proposed at the south end of the property in the proposed wildlife travel corridor. The stormwater plan was subsequently revised to eliminate the ponds and gravel galleries. A three foot box will be installed in the Right of Way to prevent back up on the Haase property south of Thorpe. On the north side of Thorpe, water will proceed east in a concrete channel to Madison Road where it will be piped north to an infiltration field at the north end of the development. This plan revision will eliminate potential wetland impacts on the south side of Thorpe.

Other flood control measures will be required by FEMA as part of the levee certification process. To my knowledge, the channel was last dredged and maintained in 1998. Since that time honey willows planted in the Chester Creek channel have grown quite large. Roots of the honey willow compromise the integrity of the levee and their removal is required by FEMA as part of the levee certification process. Those riparian zone impacts cannot be mitigated in the stream channel or on the stream banks so the mitigation (replacement plantings) will occur in the riparian buffer and in the wildlife travel corridor. Replacement plantings of trees and shrubs will be installed as detailed later in this report.

4.9: Riparian Areas

The DNR Water Type Map (Figure 5) defines Chester Creek as a Type F Water. Chapter 21.40 of the City of Spokane Valley Municipal Code, titled Critical Areas, bases stream buffer widths on the DNR Riparian Management Zones. Chester Creek is greater than 15 feet in width (bankfull) so the appropriate buffer width can be found in Table 21.40-10 of the City Code. The DNR guidance states that in Eastern Washington, if there is no site index information, as in this case, assume Site Class III unless site specific information indicates otherwise. The table indicates that a Type F Natural Water not classified as a Shoreline of the State, having a Site Class 3 designation, has a total buffer width of 100 feet. BSW delineated the Chester Creek OHWM in the field on March 31, 2015. The OHWM flags were surveyed and plotted on the site plan map along with the 100-foot riparian buffer by Whipple Consulting Engineers.

The DNR Water Type Map also identified a Type F Water located about one mile east of the subject property. The map showed the stream crossing SR27 and running NW across a cultivated field before disappearing. There is no stream in that location so a Water Type Modification Form was submitted to Spokane County. The form was circulated to all appropriate agencies, the Water Type change was approved, and that stream segment was removed from the map. However, the FEMA map shows potential flood waters traveling toward the proposed development from that general direction. So additional work is being required by FEMA to raise the levee of an unregulated, man-made ditch located on adjacent property to the north. Several years ago, the ditch was proposed, approved, and created to convey stormwater to a borrow pit. After the levee improvements now required by FEMA, floodwater will have the same fate as stormwater and be conveyed into the borrow pit where it will infiltrate and have no impact on the proposed development. No impacts are proposed to regulated waters by this FEMA requirement so no mitigation is required.

5.0: Riparian Buffer Impacts, Buffer Averaging, and Impact Mitigation

Chester Creek and its associated 100-foot buffer bisects the SW corner of the property. Buffer Width Averaging and buffer enhancement are proposed as mitigation for proposed riparian buffer impacts. The existing buffer is almost totally devoid of woody vegetation because the site was previously utilized and maintained as a golf course and driving range.

Figure 5: FOREST PRACTICE WATER TYPE MAP

TOWNSHIP 0 NORTH HALF undefined, RANGE 0 (W.M.) HALF undefined, SECTION 0

Application #:________________________________

4/1/2015 9:23:14 AM
NAD 83
Contour Interval: 40 Feet

Buffer impacts are proposed in six areas (Figure 6) with a total buffer impact of 23,877 sq. ft. (0.55 acres). The impacts will be mitigated in several ways. Buffer Averaging will be employed to insure no net loss of buffer occurs. The existing buffer will be enhanced by the planting of tree and shrub patches. The buffer replacement area will be enhanced by the planting of tree and shrub patches. The proposed 8+ acre wildlife habitat/travel corridor will be enhanced by the planting of tree and shrub patches.

5.1: Buffer Impacts from Two Homes

Part of the buffer impact (8725.60 ft2) results from two lots located in close proximity to the southmost bridge across Chester Creek. The subject area experienced the highest intensity human activity on the property during the years of golf course operation. Foot and golf cart traffic from the club house was directed by cart paths over two bridges to the fairways, driving range, and practice areas across the creek where the buffer impact from two lots is proposed. The only remaining woody vegetation is located inside the Chester Creek channel where honey willows were planted in the channel thirty years ago. FEMA requires all woody vegetation and roots to be removed within 15 feet of the levee so no woody vegetation will remain in the subject area. The removal of woody vegetation and continued use of the two bridges and trails crossing the stream and buffer has the effect of funneling, controlling, and limiting human access to this narrow corridor or choke point.

The existing bridges will be utilized and the cart paths will be extended east to connect the housing development on the east side of the creek to the bar and restaurant located in the former golf course clubhouse on the west side of the creek. This part of the riparian buffer will continue to experience high intensity human activity. This part of the buffer historically experienced the highest degree of degradation and will continue to experience the greatest intensity of human activity. The proposed impacts occur in an existing disturbed area that will benefit the least from protection, while the mitigation is proposed where it will have the greatest benefit for wildlife.

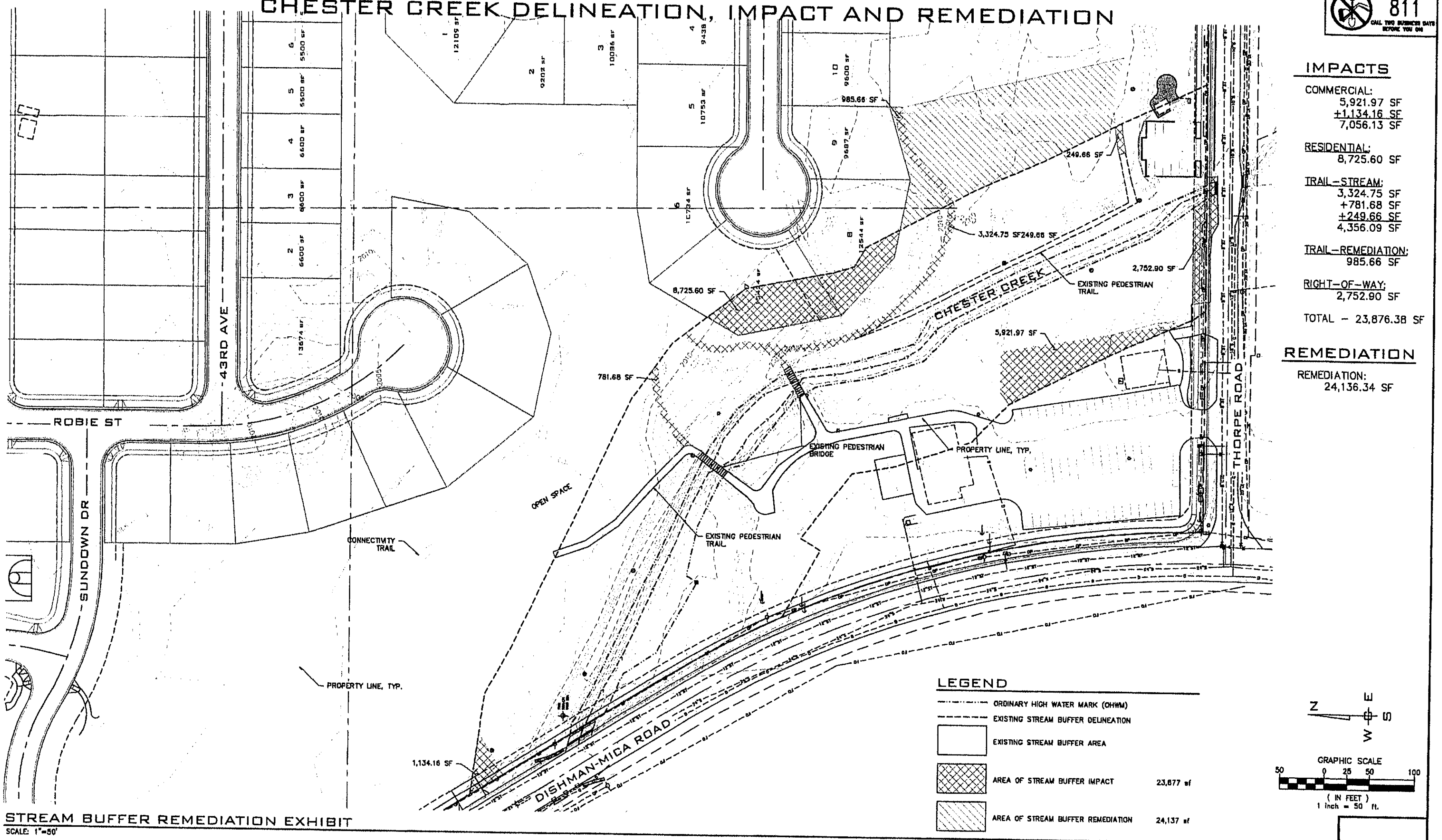
The Critical Areas Ordinance states that buffer areas may be modified by the director if "the riparian area contains variations in sensitivity due to existing physical characteristics which justify the averaging." The variation in habitat physical characteristics and sensitivity in the riparian buffer are a result historical land uses and variation in the intensity of human activity. The area around the two bridges will benefit least from protection or habitat enhancement due to historical and continued high intensity human activity in this existing disturbed footprint.

Some vegetative plantings will be installed between the proposed buffer encroachment and the creek, but there will be little wildlife activity in this area. Woody vegetation plantings will function mainly as human esthetic improvements but will have some benefit for birds. The vast majority of the vegetative plantings prescribed as mitigation for the buffer reduction will be installed in patches throughout the rest of the buffer where there will be little human activity and the vegetative enhancements will provide greater function for wildlife habitat. In the proposed buffer replacement area there is currently little woody vegetation so native trees and shrubs will be planted densely to improve habitat quality. Habitat enhancement will also occur in the designated wildlife travel corridor and where wildlife will benefit the most from the enhancement.

Figure 6

SE¼, SEC.33, T.25N., R.44E., W.M.
SW¼, SEC.34, T.25N., R.44E., W.M.
NE¼, SEC. 4, T.24N., R.44E., W.M.

CHESTER CREEK DELINEATION, IMPACT AND REMEDIATION



UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

IMPACTS

COMMERCIAL:
5,921.97 SF
+1,134.16 SF
7,056.13 SF

RESIDENTIAL:
8,725.60 SF

TRAIL-STREAM:
3,324.75 SF
+781.68 SF
+249.66 SF
4,356.09 SF

TRAIL-REMEDIATION:
985.66 SF

RIGHT-OF-WAY:
2,752.90 SF

TOTAL - 23,876.38 SF

REMEDIATION

REMEDIATION:
24,136.34 SF

STREAM BUFFER REMEDIATION EXHIBIT
SCALE: 1"=50'

◆ DATUM: NAVD - 88
TBM S-5 OF THE SOUTH PONDEROSA SEWER PROJECT WITH AN ELEVATION OF 2005.87 (NAVD29) = 2009.67 (NAVD88) WAS USED FOR THE VERTICAL DATUM FOR THIS MAP.

NO.	DATE	BY	REVISIONS
-	05/13/14	SLB	ORIGINAL PREPARATION

SCALE:
HORIZONTAL: 1"=50'
VERTICAL: N/A

PROJ #: 13-1166
DATE: 05/23/16
DRAWN: SLB
REVIEWED: TRW

☐ CIVIL
☐ STRUCTURAL
☐ SURVEYING
☐ TRAFFIC
☒ PLANNING
☐ LANDSCAPE
☐ OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
2528 NORTH SULLIVAN ROAD
SPOKANE VALLEY WA 99216
PH 509 893 2617 FAX 509 926 0227

P R D PAINTED HILLS
STREAM BUFFER EXHIBIT
DISHMAN-MICA RD.
SPOKANE VALLEY,WA

SHEET
1 OF 1

JOB NUMBER
13-1166

Variations in sensitivity are created by the existing physical characteristics (bridges and trails), historical land uses (vegetation removal and intense human activity), and the continued concentration of human activity on trails and bridges through that narrow corridor across the stream and buffer on both sides. That corridor has the least habitat function because it has the least wildlife activity. The proposed buffer impact will occur in the least sensitive area from the perspective of wildlife presence, use, and function. Buffer enhancement will occur where there is the least human activity and the greatest benefit for wildlife from the perspective of wildlife presence, use, and function. The total area contained within the buffer after averaging is greater than that contained within the standard buffer prior to averaging.

5.2: Buffer Impacts from the Trails and Road Improvement

Three separate buffer impacts will occur from trails. Two of the impacts will result when the existing trails are extended from the bridges into the development and connected to a proposed trail in the 8+ acre wildlife travel corridor. A third impact will occur when an existing parking lot at the south end of the property is connected to the trail system. The three buffer impacts result in an additional 4356.09 sq. ft. of riparian buffer impact. The buffer impact areas will be replaced in the remediation area shown in Figure 6. The required improvement of Thorpe Road will result in an additional 2,752 sq. ft. of buffer impact. Those impacts are listed under the heading of Right-of-Way impacts on Figure 6. The total riparian buffer impact area of 23876.38 sq. ft. will be replaced with 24,136.34 sq. ft. of new buffer. The proposed 8+ acre Wildlife Travel Corridor is basically an extension of the buffer replacement area and will also be enhanced with vegetative plantings (Figure 7).

5.3: Mitigation of Willow Removal from the Chester Creek Levee

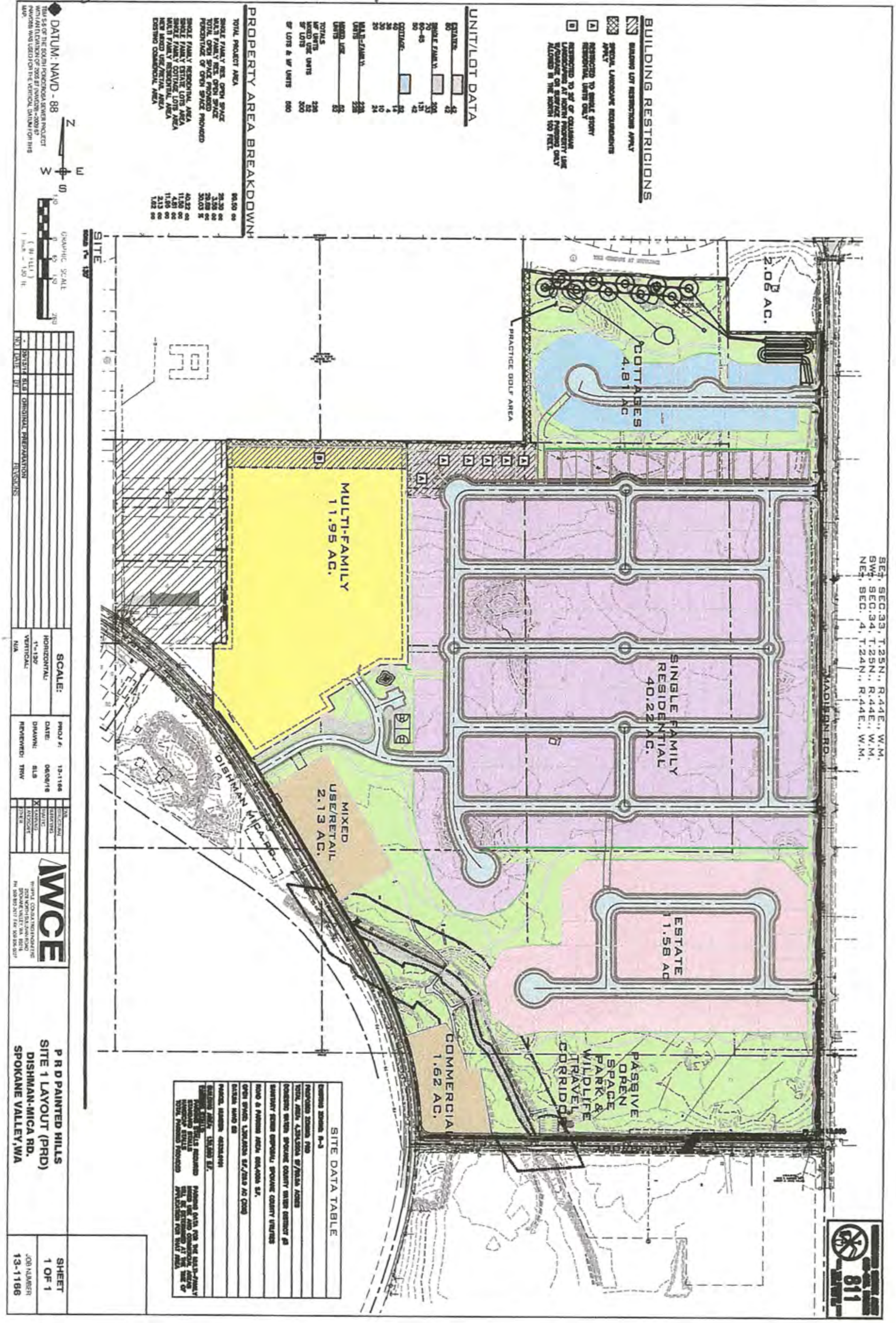
As previously stated in Section 4.8.2 of this report (titled Flood Protection Measures) the creek banks in the project area are defined as a levee and are subject to a certification process. The channel may not have been dredged or maintained since 1998. Since that time, willows have grown taller in the Chester Creek channel. Willow roots compromise the integrity of the levee and their removal is required by FEMA as part of the levee certification process.

The impacts associated with willow removal will be temporary. The equipment will operate when the channel is dry so water quality impacts are not an issue. Best Management Practices and spill control protocols will be strictly adhered to and peripheral impacts will be held to a minimum. The channel may be dry, but the equipment operators must respect the sensitivity of the area, install construction fences to identify minimized work areas, and take all prudent measures to minimize impact in the buffer. All temporary impact areas will be restored at the earliest possible moment to prevent soil erosion. The replacement woody vegetation plantings cannot be placed in the stream channel or within 15 feet of the levee so the replacement planting will occur in the riparian buffer and wildlife travel corridor as detailed later in this report.

5.4: Temporary Buffer Impact Mitigation

Since the original HMP was submitted in 2015, it was determined that the height of the levee must be increased in two places. The purpose of raising the levee is to provide an additional one foot of freeboard at existing crossings. Starting at, and extending 100 feet north from Thorpe Road, the levee height will be raised one foot on the east side of the creek. The levee will also be raised one foot in height on the east side of the creek between and around the

Figure 7: Site Plan Map



two foot bridges. This work will be completed in strict accordance with the Best Management Practices and comply with FEMA specifications. All areas with exposed soils on the new levee and peripheral disturbed soils will be planted with a native seed mix as specified by FEMA to prevent erosion and facilitate future levee inspection.

5.5: Buffer Impacts in the Two Commercial Triangles

One small area of buffer impact could occur where Chester Creek exits the property and flows under Dishman-Mica Road (Figures 6 & 7). The riparian buffer extends slightly into an 1134.16 sq. ft. triangle of a commercially zoned lot. The triangle may never be impacted, but if the adjacent commercial area is developed, the adjacent land use will effectively destroy the buffer function. BSW is identifying that as an impact and relocating the small triangle of buffer to the proposed buffer averaging replacement and enhancement area that will provide greater benefit than leaving it in place in its current condition along the road where it has no habitat value.

The same is true for a commercially zoned 5921.97 sq. ft. triangle of buffer located east of the restaurant parking lot (west side of the creek). An existing building in that general area may be torn down so the existing parking lot could be expanded at some future date. The subject triangle was historically mowed adjacent to the parking lot and provided no habitat function. The vegetative community is dominated by canarygrass with lettuce, tansy, knapweed, and wormwood also represented. The commercially zoned triangle may never be impacted, but if the adjacent area is developed, that land use will effectively destroy the buffer function. BSW is identifying it as an impact and relocating the buffer to the proposed buffer replacement and enhancement area that would provide greater benefit than leaving it in its current condition where it has no habitat value. The area between the potential future impact and the stream will be enhanced as part of the mitigation plan. The buffer will be smaller in that area, but the resulting mitigation and vegetative enhancement will represent an improvement over the existing condition and justifies moving it instead of leaving it at the present location.

5.6: Mitigation Area Summary

The proposed buffer mitigation provides very generous compensation for the proposed impacts. Buffer impacts are proposed in six areas with a total buffer impact of 23,877 sq. ft. (0.55 acres). The impacts will be mitigated in several ways. Buffer Averaging will be employed to insure no net loss of buffer occurs. The 23,877 sq. ft. impact area will be replaced with a 24,137 sq. ft. area that is contiguous with the existing riparian buffer. The area of proposed buffer reduction will be enhanced by the planting of tree and shrub patches. The remaining riparian buffer will also be enhanced by planting patches of native woody vegetation on both sides of the stream. The buffer replacement area will be enhanced by planting native tree and shrub patches. The buffer replacement area will be contiguous with the 8+ acre Wildlife Travel Corridor where additional tree and shrub plantings are proposed to mitigate the approximate 200 lineal feet of temporary impacts to the levee. All proposed temporary impact areas will also be restored with native vegetation as prescribed by FEMA (COE guidelines).

The proposed vegetative enhancement of the remaining buffer areas, replacement buffer areas, and wildlife travel corridor provides generous mitigation to offset the impacts. The proposed vegetative enhancement represents a significant improvement compared to the existing condition and historical land uses of the last several decades, so buffer averaging results in the necessary biological, chemical, and physical support necessary to protect fish and wildlife.

Monitoring of the vegetative plantings will continue for 5 years or until the City of Spokane Valley is satisfied that the conditions of the mitigation plan have been met. Reinforcement plantings and weed control will be prescribed by the project biologist as determined by annual site monitoring.

The minimum container size shall be one half gallon. Vegetation shall be planted at the landscapers discretion according to conditions on the ground and the location of existing vegetation. Plantings shall be interspersed around existing vegetation, and where possible, in patches of 15-25 plants of mixed size and species as indicated in the plan.

5.7: Noxious weed control

The dominant invasive species that were identified on the site include tumble mustard and knapweed. These species are known for their ability to propagate and spread rapidly with catastrophic impacts on native species. As required by Washington State Noxious Weed Control law, RCW 17.10, and the Spokane County Noxious Weed Board, invasive species will be managed through control measures that do not adversely impact native vegetation. Funds will be allocated for noxious weed monitoring and herbicide control as part of the proposed mitigation for this project. Black Realty shall contract their preferred weed control specialist to monitor the site and provide weed control in the enhancement area at the appropriate intervals throughout the growing season to prevent seed set.

5.8: Revegetation with Woody Plants

In addition to noxious weed control, mitigation for buffer impacts will include the planting of native trees and shrubs. The buffer will be re-vegetated with native plants including species from the tree, shrub, and grass vegetative strata. The replication of natural spatial relationships, structural complexity, vertical stratification, and microhabitat diversity will be stressed in the planting design to achieve a mosaic of open areas and dense tree/shrub clusters. Vegetation will not be planted in a uniform manner. Shrubs will be planted in grouped patches and interspersed with other shrub species and height classes. Patch size will be variable with curving edges. The incorporation of these elements will increase landscape diversity and promote habitat elements that are often scarce or absent at sites that have been disturbed. Native species and endemic plant materials will be selected for site revegetation to help maintain ecotypes that are adapted to local climatic and soil conditions and preserve local genotypes.

5.9: Objectives for the Restored Riparian Buffer

Restoration will be achieved by planting native trees, shrubs and grasses primarily to provide food and cover for wildlife. The Vegetation Plan will incorporate as many design features as possible for each function in order to increase the value for that function.

Objective a: Re-establish species diversity and structural diversity in the buffer by replanting native tree and shrub species from each vegetative class.

Objective b: Re-establish vegetative species and structural diversity to re-establish bird and mammal habitat values in the enhanced buffer areas.

Objective c: Re-establish vegetative density in the riparian buffer area.

5.10 Planting Strategy

Woody plant materials will be installed at the industry standard density of 360 stems per acre. The buffer replacement area is 0.55 acres X 360 stems/acre = about 200 containers. The Buffer Replacement Area shall have 200 containers planted within that polygon. An additional 200 containers will be distributed throughout the east and west sides of the creek in the existing buffer and buffer reduction areas (Zone 1 and Zone 2, Figure 8). An additional 400 containers shall be planted in patches of 20 containers throughout the designated wildlife travel corridor. The replication of structural complexity, vertical stratification, and microhabitat diversity will be emphasized in the planting design. Shrubs will be planted in the buffer with the goal of providing wildlife habitat and enhancing the functions and values of the buffer. The vegetation will be planted in patches, have curving edges, and will not be planted in a uniform manner.

5.11: Rationale

Structural complexity refers to the arrangement and degree of interspersion of plant community types throughout the system. Complex structural patterns (such as variable patch size, curving edges, and high degree of interspersion between species) increase the value of a system for wildlife. Good wildlife habitat consists of open areas interspersed with clusters of vegetation, several horizontal layers, and a variable structural pattern. **Vertical stratification** describes a community with good structural diversity and several horizontal layers (logs, woody debris, forbs, shrubs, and trees). Woody debris provides travel routes, perch sites, cover, and thermal refuge for a variety of small mammals and ground nesting birds. **Microhabitat diversity** refers to variety in microhabitat types. Examples of microhabitat types include herbaceous cover and shrubs that provide food, habitat, and substrate for a variety of animals.

6.0: Mitigation Planting Plan

6.1: Materials Specification

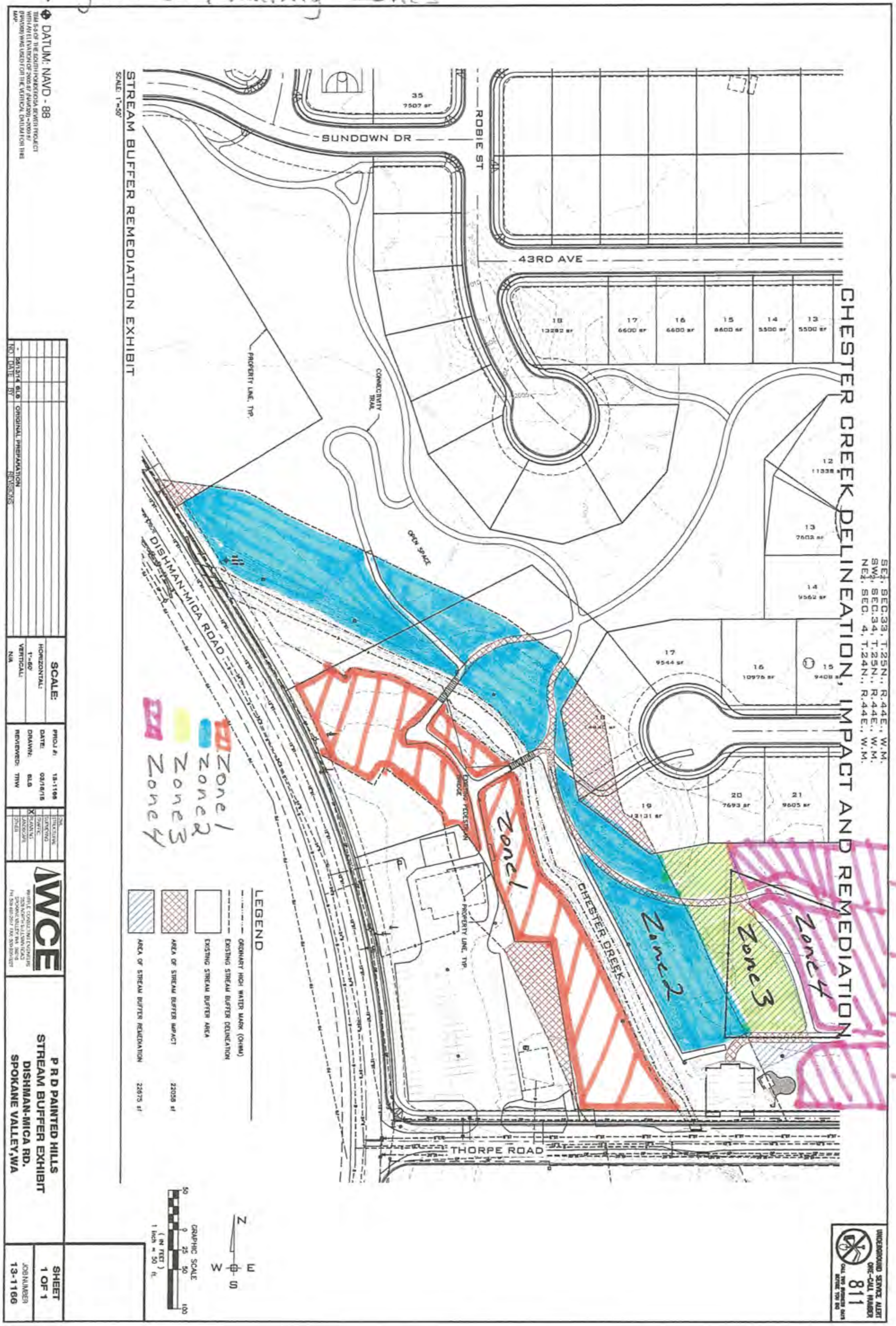
Clusters of vegetation will be planted according to the guidelines prescribed above. The specified number of containers will be planted within each zone as shown in Figure 8.

Zones 1 and 2: Riparian Buffer on East and West Sides of Chester Creek

A total of 200 containers planted in existing buffer areas

	Common Name	Scientific Name	# Planted
Trees	Ponderosa pine	*Pinus ponderosa*	20
Large shrubs	serviceberry	*Amelanchier alnifoloia*	40
	mock orange	*Philadelphus lewisii*	40
Small shrubs	Wood's rose	*Rosa woodsii*	30
	common snowberry	*Symphoricarpos albus*	50
	Phlox sp.	*Phlox speciosa or longifolia*	20
Total			200

Figure 8: Planting Zones



Zone 3 - Buffer Replacement Area on East Side of Chester Creek

200 plants in patches

	Common Name	Scientific Name	# Planted
Trees	Ponderosa pine	*Pinus ponderosa*	22
Large shrubs	serviceberry	*Amelanchier alnifoloia*	33
	Rocky mountain juniper	*Juniperous scopulorum*	30
	chokecherry	*Prunus virginiana*	20
	mock orange	*Philadelphus lewisii*	30
Small shrubs	Wood's rose	*Rosa woodsii*	20
	common snowberry	*Symphoricarpos albus*	25
	Phlox sp.	*Phlox speciosa or longifolia*	20
Total			200

Zone 4 - Wildlife Travel Corridor on East Side of Chester Creek

400 plants in patches

	Common Name	Scientific Name	# Planted
Trees	Ponderosa pine	*Pinus ponderosa*	50
Large shrubs	serviceberry	*Amelanchier alnifoloia*	60
	Rocky mountain juniper	*Juniperous scopulorum*	30
	chokecherry	*Prunus virginiana*	50
	mock orange	*Philadelphus lewisii*	60
Small shrubs	Wood's rose	*Rosa woodsii*	70
	common snowberry	*Symphoricarpos albus*	80
Total			400

Shrubs shall be planted in the approximate prescribed quantities depending on plant availability. Large shrubs should be planted in clusters on 10-foot centers. Small upland shrubs should be clustered on 3-6 foot centers around large shrubs.

Depending on availability, the mixture of grass species listed below should be drill seeded or hydroseeded at a density of 22 pounds PLS per acre in all disturbed areas. Grasses should be planted during the growing season when precipitation and temperature levels will insure germination and survival. Grasses should be planted early in the fall so that the crop is well established by October 15. If germination, growth, and root development are substantial before the end of the growing season, some degree of erosion control will be provided during the winter and spring months that follow. **It may be necessary to irrigate the soil surface to keep it in a moist condition for the first two weeks after seeding. Irrigation should supplement rainfall as required to achieve a total from combined sources of 2 inches per week and no more than 0.25 inches per hour.** Seed can also be installed to lie dormant over the winter and germinate in the spring.

Grasses

Common Name	Scientific Name	Bunch or Sod	PLS (lb/acre)
bluebunch wheatgrass	*Agropyron spicatum*	B	8.0
Idaho fescue	*Festuca idahoensis*	B	6.0
prairie junegrass	*Koeleria cristata*	B	8.0
Total			22.0

6.2: FEMA Mitigation Requirements

All work on the levee and embankment shall be completed in strict compliance with FEMA requirements using the US Army Corps of Engineers manual titled Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures (ETL 1110-2-583 dated 30 April 2014). The manual states that all vegetation not in compliance with the ETL shall be removed. The removal of noncompliant vegetation includes trunk, stump, root ball, and roots greater than 1/2 inch diameter in the levee, or within 15 feet of the flood damage reduction structure. The following paragraphs have been inserted from COE manuals for reference. The conditions listed below shall be strictly adhered to, but project construction shall not be limited to the conditions listed below, but must be in compliance with all conditions in the referenced COE manual.

"The only acceptable ground cover in the COE mandated vegetation free zone is perennial grasses to prevent erosion. Noxious weeds are not tolerable. The grass species must not grow to exceed 12 inches in height and be tolerant of mowing to a height of 3 inches to allow levee inspection at least once per year. It will be necessary to mow, burn, or graze to inspect for and control pests, weeds, and burrowing animals, repair damage to the embankment, and maintain the grass cover crop. Woody vegetative plantings prescribed for mitigation in this report shall not be placed in the levee, or within 15 feet of the flood damage reduction structure.

The native grass species selected for the project shall be appropriate to the local climate, conditions, and surrounding or adjacent land uses. BSW recommends a sod type species, not a bunch grass type, should be selected or prescribed by COE, will tolerate mowing to heights as low as 3 inches as follows: "at least once each year for inspection, and in anticipation of flood conditions and associated monitoring and flood-fighting activities. b. If the local climate, hydraulic and hydrologic environment, soils, or other conditions will not support such grass species, then non-vegetative means of erosion control shall be employed, e.g., riprap, pavement, articulating concrete mats, or other engineered surface. c. A maximum grass height is specified for embankment dams and their appurtenant structures (see Paragraph 3-4c, "Vegetation-Free Zones")." "Paragraph 3-4c. Vegetation-Free Zones. Vegetation-free zones shall, when dry, be mowed to a height of 3–6 in. at any time the grass reaches a height of 12 in.. Mowing shall be triggered by grass heights of less than 12 in. if important to the health maintenance of the particular grass species. The maximum height of grasses shall be 12 in."

"5-2. Operations and Maintenance Manual. For each project, it is important that the O&M manual include an annual maintenance program to control animal burrows and vegetative growth. It is also important that vegetation be managed in such a manner as to avoid the need for mechanized removal and associated embankment repair, and avoid any incidental growth and subsequent presence of endangered species that might prohibit access and activities necessary for O&M. 5-3. Removal of Non-Compliant Vegetation. a. All vegetation not in compliance with this ETL shall be removed. A detailed removal plan shall be submitted to the local USACE District Levee Safety Officer for review and comment before removal of vegetation. The removal plan shall expand on the following basic requirements. (1) By excavation, remove the trunk (or stem), stump, rootball, and all roots with diameters greater than ½ in. All such roots in, or within 15 ft of, the flood damage reduction structure shall be completely removed. (2) Assure that the resulting void is free of organic debris. (3) Fill and compact the void according to the original soil and compaction specifications: or, if no specifications exist, match adjacent soil and compaction. b. Removal of non-compliant vegetation can create significant issues for the owner/operator, as maintenance may require environmental permits. The local sponsor must coordinate with the Corps and other appropriate agencies and obtain all the required environmental permits (including Corps of Engineers 404 permits) before conducting work within the levees. Mechanized land clearing below the plane of the "Ordinary High Water Mark" will normally require Clean Water Act permits before work can commence. (Note that "Ordinary High Water Mark" is defined in 33 CFR Part 328.3(e)."

A grass seed mixture recommended or approved by FEMA and/or COE must be applied on the approximate 200 lineal feet of levee that will be raised by one foot and all peripheral embankment areas where the vegetation is temporarily disturbed by equipment. The agencies should prescribe one grass seed mixture for the Riparian Area (wetland species) and one for the adjacent upland.

A list of suppliers who will prepare the prescribed grass seed mixtures and supply nursery stock specified in the vegetation plan follows.

Grass seed: Grassland West 1-800-582-2070
PO Box 489
908 Port Drive
Clarkston, WA 99403

Trees, & Shrubs:

Plants of the Wild
PO Box 866
Tekoa, WA 99033
509-284-2848

Wildlife Habitat Institute
1025 East Hatter Creek Road
Princeton, ID 83857
208-875-8704

6.3: Ponderosa Pine Planting

ALWAYS plant after December 15 and before March 31. Plant ONLY conservation grade seedlings 20-24 feet from fast growing deciduous trees. Plant seedlings **on 30 foot centers** with no shrubs inter-planted close to the trees to prevent shading and competition that greatly reduces survival. A mulch of Ponderosa pine needles applied in a 3-6 foot radius around the tree trunk at planting will greatly reduce competition and increase tree survival.

Ponderosa pine out-planting survival following *Rhizopogon rubescens* inoculation is 2-3 times higher compared to non-inoculated. Numerous studies have shown that ectomycorrhizal fungi can profoundly affect conifer performance by facilitating nutrient and water uptake, maintaining soil structure, and protecting roots from pathogens and environmental extremes. A specific ectomycorrhizal fungus, *Rhizopogon rubescens*, inoculated onto the root systems of Ponderosa pine seedlings greatly increase survival. Irrigation options are being explored at this mitigation site, but the landscaper should buy plants that have been inoculated or dust the planting holes with this fungi if it is available.

6.4: Additional Planting Guidelines

Depending on availability, the mixture of grass species listed above should be seeded at a density of 25 pounds PLS per acre. Grasses should be planted during the growing season when precipitation and temperature levels will insure germination and survival. Grasses should be planted in early April so that the crop is well established before dry weather, in the fall so that the crop is well established before October 15, or dormant seeded late in the fall so the seed will not germinate until spring. Site preparation and planting should occur in the fall and winter.

Seeding rates of live, germinable seed or Live Pure Seed (LPS) are a product of seed lot purity and germination percentage. LPS calculations are based on the number of seeds per pound and the number of seeds per square foot at one pound per acre. A nursery will prepare a custom seed mix with the prescribed LPS for each species.

Trees and shrubs should be planted after the end of the growing season when the plants are dormant. The best time to plant is late winter when sub-zero temperatures are over but plants are still dormant. Plants may be planted any time during the growing season when the daytime high temperatures are 70F or cooler if irrigation is available from the time of planting through the rest of the growing season. Each tree or shrub planted should be clearly identified with an easy to identify tag that identifies the species. Without such identification it is impossible for the monitoring biologist to tell which plants are enhancement plantings and which are native to the site.

6.5: Additional Site Protection Measures

Many people drive, park and passively enjoy recreation in the area so the enhancement areas must be protected from human traffic after planting. Signs should be posted every 100 feet to explain the sensitivity of the newly planted areas and discourage foot traffic in newly seeded areas. Permanent signs with Riparian Buffer Area, Natural Area Do Not Disturb, or similar language should be posted around the areas protected as riparian buffer.

6.6: Timeline for Construction

Due to the appeals process, it is very difficult to predict when construction will be permitted. It is very unlikely that construction will begin in 2016, more likely that construction will begin in 2017. Regardless of which year construction begins, it is known that the first construction phase will include the stormwater plan and the levee work. When that work is completed, disturbed areas will be reclaimed and planted in accordance with the terms of this mitigation plan. BSW will monitor site impacts and mitigation work to insure the work is completed as specified in this plan. The five year monitoring requirement for each phase will be implemented as described below.

6.7: ESA and FEMA Compliance

The purpose of this report is to confirm that the project is in compliance with Sections 9 and 10 of the Endangered Species Act. The proposed flood control and floodplain changes will have no effect on any listed species. For the Chester Creek Main Channel (golf course overflow reach) most of the 1% annual-chance floodplain within the project site is effectively being intercepted and directed to the infiltration facilities located on the north end of the project area, rather than entering the existing golf course and infiltrating. For the Chester Creek Unnamed Tributary, the floodway and 1% annual chance floodplain are being intercepted by the gravel pit infiltration facility just north of 40th, and are being removed from the FEMA mapping. These actions are simply enhancement of the existing facility and the proposed changes will have no effect on any listed habitat or species.

7.0 THE MONITORING PLAN

All monitoring plans require that a mitigation site be monitored annually to determine whether the goals and performance standards have been met. Monitoring typically lasts for 5 years or until the City of Spokane Valley is satisfied that the conditions of the mitigation plan have been met. The site should be monitored in the spring to evaluate the success of weed control from the previous year and prescribe weed control for the current year. The monitoring will also evaluate plant survival to insure that performance standards for percent ground cover of native vegetation are met. Planting of the original grass seed mixture will be repeated to fill in problem areas if they occur.

The City of Spokane Valley will be notified immediately after diagnosis of failing functions, hydrologic systems, or biological vitality and integrity of the plantings as determined through annual monitoring. The vegetation will be managed to insure 80% areal cover with native grasses after five years (year 1=20%, year 2-30%, year 3=50%, year 4=70%, year 5=80%). Tree and shrub stock will be monitored to insure 80% survival after 5 years. Reinforcement plantings will be performed annually as necessary to insure performance standards are met at the end of five years.

This above Monitoring Plan refers only to mitigation plantings prescribed by BSW and does not apply to levee monitoring and maintenance that will be continued indefinitely and is outside of the professional capabilities of the undersigned.

8.0 LIMITATIONS

Within the limitations of scope, schedule, and budget, BSW services have been executed in accordance with best available science and generally accepted professional practices for the conditions at the time the work was performed. This report is not intended to represent a legal opinion. Specifically, there is no positive or negative recommendation towards the purchase, sale, lease, or construction on the subject property. No warrant, expressed or implied, is made.

Larry Dawes 8/30/2016
Larry Dawes Date
Principal Biologist
Biology Soil & Water, Inc.
3102 N. Girard Road
Spokane Valley, WA 99212-1529
Phone 509-327-2684
Email: bswinc@icehouse.net

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Appendix 1
U.S. Fish & Wildlife Service
SPOKANE COUNTY
Updated 8/29/2015

LISTED

Threatened
Salvelinus confluentus) (Bull trout) – Columbia River distinct population segment
Howellia aquatilis (Water howellia), plant
Silene spaldingii (Spalding's silene), plant
Spiranthes diluvialis (Ute ladies'-tresses), plant
Lynx canadensis (Canada lynx)
Coccyzus americanus (Yellow-billed cuckoo)

SPECIES OF CONCERN
Bald eagle *(Haliaeetus leucocephalus)* (delisted, monitor status)
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*, mussel
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis (*Myotis evotis*)
Northern goshawk *(Accipiter gentilis)*
Olive-sided flycatcher *(Contopus cooperi)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)
Redband trout *(Oncorhynchus mykiss)*
Sagebrush lizard *(Sceloporus graciosus)*
Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*

Vascular Plants
Haplopappus liatriformis (Palouse goldenweed)

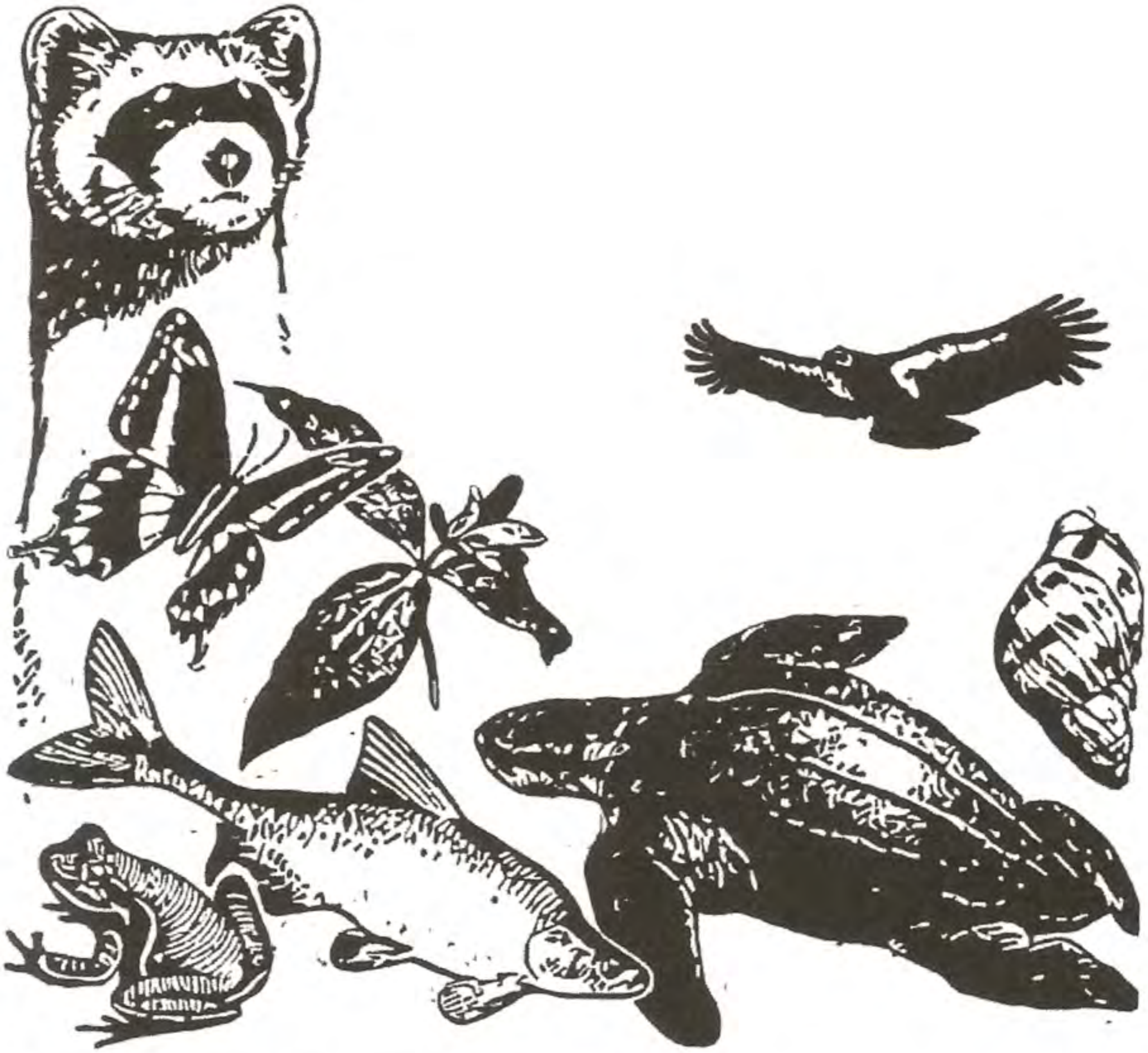
Appendix 2
Critical Areas Maps

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

Generated August 29, 2016 07:52 PM MDT, IPaC v3.0.8

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Trust Resources List

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of **5** threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

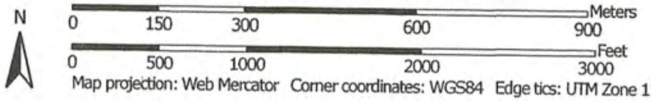
Birds	Status		Has Critical Habitat	Contact
Yellow-Billed Cuckoo (*Coccyzus americanus*) Population: Western U.S. DPS	Threatened	species info	Proposed critical habitat	Washington Fish And Wildlife Office
Fishes				
Bull Trout (*Salvelinus confluentus*) Population: U.S.A., conterminous, lower 48 states	Threatened	species info	Final designated critical habitat	Washington Fish And Wildlife Office
Flowering Plants				
Spalding's Catchfly (*Silene spaldingii*)	Threatened	species info		Washington Fish And Wildlife Office
Water howellia (*Howellia aquatilis*)	Threatened	species info		Washington Fish And Wildlife Office
Mammals				
Canada Lynx (*Lynx canadensis*) Population: (Contiguous U.S. DPS)	Threatened	species info	Final designated critical habitat	Washington Fish And Wildlife Office

Critical habitats within your project area:

There are no critical habitats within your project area.

Soil Map—Spokane County, Washington

Map Scale: 1:12,700 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

☐ Area of Interest (AOI)

Soils

☐ Soil Map Unit Polygons

〜 Soil Map Unit Lines

■ Soil Map Unit Points

Special Point Features

Blowout

☒ Borrow Pit

Clay Spot

◇ Closed Depression

Gravel Pit

Gravelly Spot

● Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

○ Perennial Water

Rock Outcrop

\+ Saline Spot

Sandy Spot

Severely Eroded Spot

◇ Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

△ Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

〜 Interstate Highways

〜 US Routes

Major Roads

Local Roads

Background

🟩 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Spokane County, Washington
Survey Area Data: Version 5, Sep 4, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 4, 2011—Jul 5, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Spokane County, Washington (WA063)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1040	Hardesty ashy silt loam, 0 to 3 percent slopes	14.4	2.3%
1080	Narcisse silt loam, 0 to 3 percent slopes	108.4	17.7%
1200	Endoaquolls and Fluvaquents, 0 to 3 percent slopes	61.9	10.1%
3022	Bong ashy sandy loam, moist, 0 to 8 percent slopes	14.3	2.3%
3054	Clayton ashy fine sandy loam, 0 to 8 percent slopes	7.2	1.2%
3130	Phoebe ashy sandy loam, 0 to 3 percent slopes	29.2	4.8%
5040	Spokane-Swakane complex, 3 to 15 percent slopes	7.9	1.3%
5041	Spokane-Swakane complex, 15 to 30 percent slopes	43.1	7.0%
5073	Lenz-Rock outcrop complex, 15 to 30 percent slopes	37.6	6.1%
7101	Pits-Dumps complex	12.0	2.0%
7110	Urban land-Opportunity, disturbed complex, 0 to 3 percent slopes	11.4	1.9%
7122	Urban land-Marble, disturbed complex, 8 to 15 percent slopes	0.1	0.0%
7170	Urban land-Springdale, disturbed complex, 0 to 3 percent slopes	153.0	24.9%
7181	Urban land-Phoebe, disturbed complex, 3 to 8 percent slopes	112.9	18.4%
Totals for Area of Interest		**613.5**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

May 14, 2015

Wetlands

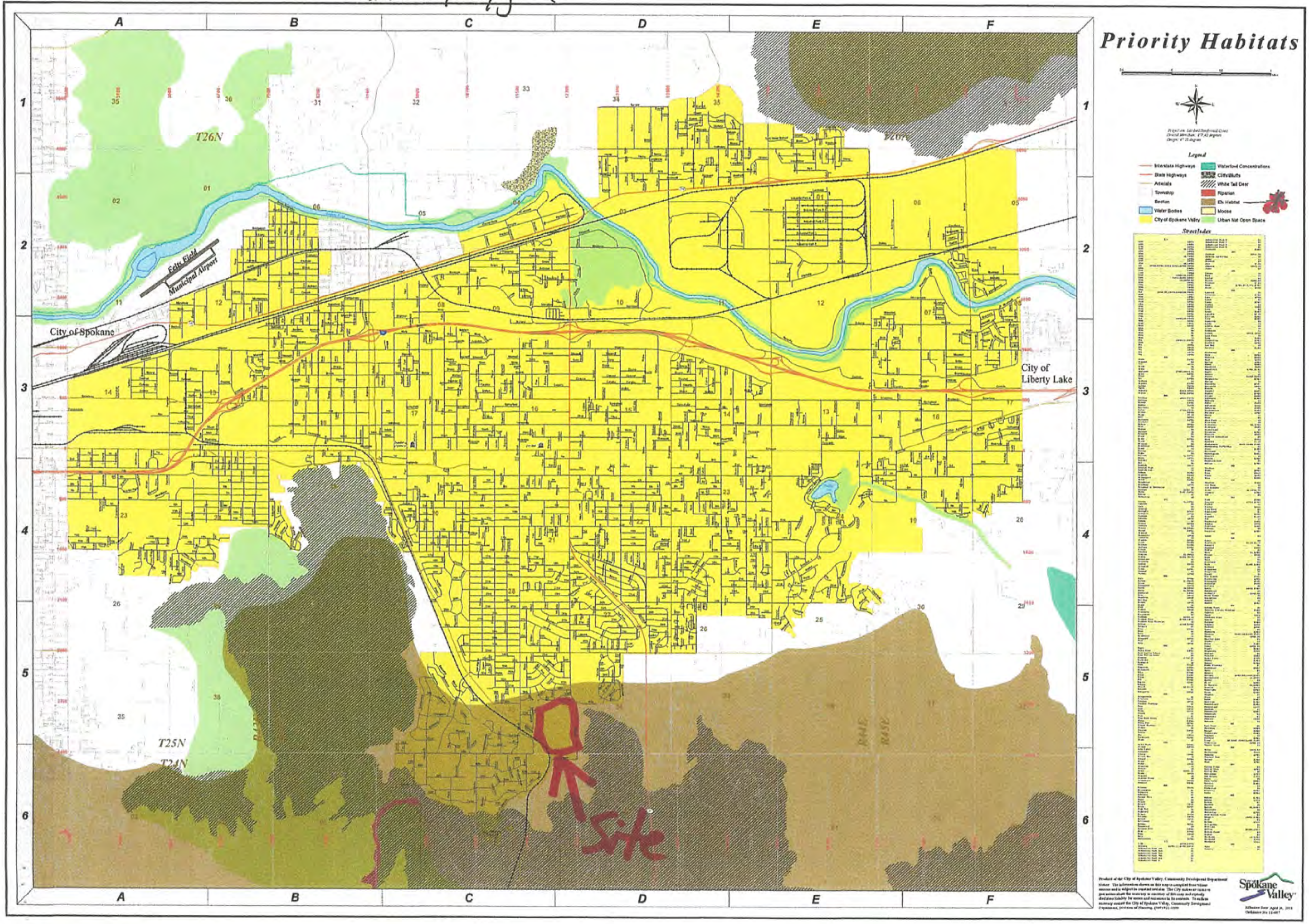
- 🟩 Freshwater Emergent
- 🟩 Freshwater Forested/Shrub
- 🟦 Estuarine and Marine Deepwater
- 🟩 Estuarine and Marine
- 🟦 Freshwater Pond
- 🟦 Lake
- 🟦 Riverine
- 🟫 Other

User Remarks:

No wetland hydrology at either location. NOT a wetland.

Elk habitat polygon

Priority Habitats



Product of the City of Spokane Valley, Community Development Department

Notice: The information shown on this map is compiled from various sources and is subject to constant revision. The City makes no claims or guarantees about the accuracy or currency of this map and expressly disclaims liability for errors and omissions in its contents. To confirm accuracy contact the City of Spokane Valley, Community Development Department, Division of Planning, (509) 921-1000

Spokane Valley

Effective Date: April 26, 2011
Ordinance No. 11-007