APPENDIX N

TECHNICAL MEMORANDA, AS-BUILTS, AND IMPORTANT RECORDS

APPENDIX N.1

TECHNICAL MEMORANDUM
WILLOW CREEK STREAM INFLOW AND TIDAL HYDROLOGY BOUNDARY CONDITIONS

MEMORANDUM

TO**:** David Cline, PE (Shannon & Wilson, Inc.)
Kathy Ketteridge, PhD, PE (Anchor QEA LLC)

CC**:** Jerry Shuster (City of Edmonds)
Keeley O'Connell (EarthCorps)
Paul Schlenger (Confluence Environmental)

FROM: Alex Hallenius, PE

DATE**:** January 7, 2013

RE: WILLOW CREEK STREAM INFLOW AND TIDAL HYDROLOGY BOUNDARY CONDITIONS

This memo summarizes the Willow Creek stream and tidal inflow hydrology information related to the hydraulic modeling for the Willow Creek Early Feasibility Study.

The project survey vertical datum is the North American Vertical Datum of 1988 (NAVD88). Elevations in tidal environments (and from NOAA tidal gauges) are often reported in Mean Lower Low Water (MLLW) datum. For the project, the NAVD88 elevation can be approximated from the MLLW datum by subtracting 2.09 feet. This transformation was calculated using NOAA's VDatum v3.1 computer program. We recommend a professional surveyor confirm this transformation prior to development of project final design plans.

The tidal data from the NOAA Seattle Elliot Bay gage was compared with the LTC-1 logger installed at the Edmonds Marina for the time period September 1 through 14, 2012. There was little noticeable period (time) shift between the locations. In general, the amplitude of the LTC-1 location was diminished compared to the Seattle Elliot Bay tidal data by -0.2 feet. This may be attributable to the breakwater effect of the Edmonds Marina jetty. Therefore, it appears reasonable to use the Elliot Bay tidal data as a boundary condition for the Edmonds Marsh hydraulic modeling tidal boundary conditions. Figure 1 is a graph of the comparison.

Inflow hydrology modeling results, provided from the Dayton St. / SR-104 stormwater study, were reviewed. Based on our review of the modeling data, and information regarding recent historical flooding in the marsh, we recommend a modeling period of October 1, 2007 through September 30, 2008 for the Willow Creek Early Feasibility Study. This period corresponds to an observed flood event in December 2007 that had documented flooding, including overtopping of the Chevron/Unocal stormwater pond banks (Rasar, 2012).

The estimated 100-year flood event flows are 69cfs for Shellabarger at the SR-104 culvert, and 49cfs for Willow Creek at the 216th St. culvert (Geisburt, 2012). Data provided from the Dayton

St. / SR-104 study for the October 2008 through September 2008 period have peaks inflows of 52cfs and 36cfs, for Shellabarger and Willow Creek respectively, which is on the order of a 25-year flood event. We did not identify inflow peak events on the order of the 100-year flood event. Therefore, we recommend using the large storm event of December 2007, with field documentation for flood overtopping of the Chevron stormwater pond as the project design flood hydrology.

Input files were created for the period October 1, 2007 through September 30, 2008. The data is provided in a file named “Boundary Conditions_20130107.xlsx”. The worksheet “Elliot Bay” contains recorded tidal data from the Seattle Elliot Bay tidal gage for the time period, in one-hour time steps. The worksheet “Upstream” contains modeled flows from the SR-104 HSPF model for the time period, in 15-minute time steps. The designations RCH 200 and RCH 300 represent Shellabarger Creek and Willow Creek, respectively. A graph of the upstream boundary conditions is shown in Figure 2.

APPENDIX N.2

TECHNICAL MEMORANDUM
EDMONDS MARSH COMPOSITE EXISTING GIS SURFACE CREATION
EDMONDS, WASHINGTON

MEMORANDUM

TO**:** file

FROM: Alex Hallenius, Bo Lewis

DATE**:** September 18, 2012 (revised 3-7-2013)

RE: EDMONDS MARSH COMPOSITE EXISTING GIS SURFACE CREATION EDMONDS, WASHINGTON

This memo describes the process used to create a composite GIS TIN surface of the Edmonds Marsh area. File paths are referenced to the Shannon & Wilson network. Project datum is NAVD88.

The following data sources were used to create the composite surface. Data was provided electronically by the client.

- LIDAR-generated contours for marsh area
  - I:\WIP\21-1\12393 Willow Creek Daylight\02. BACKGROUND_REPORTS\DAYTON_SR-104_DATA\MCD\Site Information\2005 Edmonds Lidar contours
  - ArcGIS shapefile, contains contours with elevations
  - Datum: NAVD88
- 2004 Willow Creek channel survey along BNSF ROW (by CH2M Hill?)
  - I:\WIP\21-1\12393 Willow Creek Daylight\02. BACKGROUND_REPORTS\DAYTON_SR-104_DATA\MCD\2004 CH Willow Creek survey\Edmonds_Willow-Creek SURF.dwg
  - AutoCAD Drawing contains 3d faces and contours
  - Datum: NAVD88
- 2008 Marsh Area survey
  - I:\WIP\21-1\12393 Willow Creek Daylight\02. BACKGROUND_REPORTS\DAYTON_SR-104_DATA\MCD\Site Information\Survey\Marsh Topo\Deliverables\XL1981_Vargot01.dgn
  - Microstation Drawing contains points and breaklines
  - Datum: MLLW
- 2012 Perteet survey
  - I:\WIP\21-1\12393 Willow Creek Daylight\02. BACKGROUND_REPORTS\SURVEY\Perteet Survey 2012-6-6.zip
  - AutoCAD drawing contains points and lines of channels in the marsh

- Datum: NAVD88

The following procedure was used to create the composite surface:

- Create Base surface TIN from LiDAR contours in ArcGIS
- Create AutoCAD Civil3d surface from 2004 data, export in *.xml format
- Import 2008 survey data from Microstation to AutoCAD. Create AutoCAD Civil3d surface from data, adjust surface elevation by -2.28 feet for NAVD88 datum. Export in *.xml format.
- Create 3d polylines from 2012 survey data, save in *.dwg format
- Import *.xml files (2) and *.dwg file (1) into ArcGIS.
- Trim areas of overlap between surfaces
- Create composite surface from data.

The surface was spot-checked to verify the transitions between the inserted surfaces.

The final GIS surface is named “2012_Surface_Combined” and is located in: I:\WIP\21-1\12393 Willow Creek Daylight\GIS\Existing_CombinedSurface

APPENDIX N.3

TECHNICAL MEMORANDUM
EDMONDS MARSH COMPOSITE EXISTING GIS SURFACE CREATION
EDMONDS, WASHINGTON

MEMORANDUM

TO**:** file

FROM: Alex Hallenius, Bo Lewis

DATE**:** March 7, 2013

RE: EDMONDS MARSH PROPOSED CONDITIONS GIS SURFACE CREATION EDMONDS, WASHINGTON

This memo describes the process used to create a composite GIS TIN surface of the Edmonds Marsh area that includes proposed channel grading. File paths are referenced to the Shannon & Wilson network. Project datum is NAVD88.

The following data sources were used to create the composite surface:

- Composite existing ground surface created by Shannon & Wilson on March 5, 2013, and located at: I:\WIP\21-1\12393 Willow Creek Daylight\GIS\Proposed_Grading
- Proposed channel features created in AutoCAD Civil3d to represent grading for:
    - The beach outfall channel and daylight channel
    - Willow creek marsh dredging
    - Shellabarger creek marsh dredging

  The surfaces are located in: I:\WIP\21-1\12393 Willow Creek Daylight\CAD\Proposed Grading_2013_03_01\Proposed_2013_03_01.dwg

The following procedure was used to create the composite surface:

- Start with composite existing ground TIN surface (Existing_CombinedSurface)
- Import *.xml file into ArcGIS using the AcGIS 3D Analyst Extension.
- Trim areas of overlap between surfaces.
- Create composite surface from data.

The surface was spot-checked to verify the transitions between the inserted surfaces. A few cross-sections were cut to compare the existing and proposed surfaces in the marsh area and verify that the surface was created correctly.

The final GIS surface is named “willowcreek_prop_2013_03_05” and is located in: I:\WIP\21-1\12393 Willow Creek Daylight\GIS\Proposed_Grading

APPENDIX N.4

SOUND TRANSIT – BNSF BRIDGE DESIGN AGREEMENT

WILLOW CREEK BRIDGE FUNDING AGREEMENT

This Funding Agreement is dated June 17, 2010, and is between BNSF Railway Company, a Delaware corporation, with its principal place of business in Fort Worth, Texas ("**BNSF**") and the Central Puget Sound Regional Transit Authority, a Washington regional transit authority organized under RCW 81.112 ("**Sound Transit**").

On December 17, 2003, Sound Transit entered into a Purchase and Sale Agreement with BNSF to purchase commuter rail agreements for the operation of commuter rail trains between Seattle and Everett (that agreement, the Purchase and Sale Agreement).

On December 17, 2003, Sound Transit also entered into a Joint Use Agreement with BNSF to regarding joint operation of freight and commuter rail between Seattle and Everett (that agreement, the Joint Use Agreement).

Federal and State natural resource agencies with jurisdiction over the property where some of the Third Commuter Rail Easement Improvements (as defined in the Joint Use Agreement) will be constructed have required Sound Transit to mitigate for the loss of wetlands and streams filled as a result of such Third Commuter Rail Easement Improvements. One of the required mitigation projects ("Willow Creek Bridge Project") will provide a new two-bridge structure for the future realignment and daylighting of Willow Creek. Under the Joint Use Agreement, Sound Transit is responsible for the incremental cost of any improvements that are constructed for the Willow Creek Bridge Project.

BNSF is willing to construct Sound Transit's Willow Creek Bridge Project as part of its improvements to the Everett to Seattle rail corridor, provided that Sound Transit reimburses BNSF for the incremental costs of additional design and construction.

The parties therefore agree as follows:

1.0 Willow Creek Bridge Project.

1.1 Willow Creek Bridge Project. The Willow Creek Bridge Project will be a new two-bridge structure through the BNSF right of way in the vicinity of Sta 998+50 and as more clearly outlined in **Schedule A.** Work done in furtherance of the Willow Creek Bridge Project by BNSF or its contractors is "Willow Creek Bridge Project Work."

1.2 Services Performed. Willow Creek Bridge Project Work may include, but are not limited to the following:

1.2.1 Furnishing flaggers as necessary in connection with any construction services or activities as outlined below, including all flagging determined by BNSF to be necessary to protect any people and/or property and/or continued train operations on and along the Service Property;

1.2.2 Relocating and realigning any tracks, switches, crossovers and signals that BNSF reasonably determines to be appropriate in connection with construction of the Willow Creek Bridge Project;

1.2.3 Grading and constructing necessary improvements related to the Willow Creek Bridge Project, including structural improvements, retaining walls and Bridges;

1.2.4 Removing and salvaging tracks and/or other improvements, as required to accommodate, or as a result of construction of, the Willow Creek Bridge Project;

1.2.5 Purchasing construction materials, or supplying them from BNSF's own stock, transporting them, storing them;

1.2.6 Relocating fiber optic facilities and other utilities in connection with construction of the Willow Creek Bridge Project; and complying with all applicable environmental, land use and construction permits and conditions in connection with construction of the Willow Creek Bridge Project (including complying with permits and conditions voluntarily accepted by BNSF);

1.2.7 Supervising the activities described in this section and providing regular reports to Sound Transit as reasonably requested by Sound Transit describing progress of the Willow Creek Bridge Project Work and any related issues that arise; and

1.2.8 Billing Sound Transit for the activities described in this section.

1.3 **Willow Creek Bridge Project Cost.** "Willow Creek Bridge Project Cost" includes, but is not limited to, the following incremental costs of constructing the Willow Creek Bridge Project over the project cost for the Third Commuter Rail Easement Improvements:

1.3.1 The cost of construction materials;

1.3.2 The payroll cost for BNSF employees including BNSF's payroll-related administrative costs and applicable additives;

1.3.3 The rental charges for equipment and vehicles used in performing the Willow Creek Bridge Project Work;

1.3.4 The cost of transporting all equipment, personnel, and construction materials to and from field sites as required to perform the Willow Creek Bridge Project Work;

1.3.5 Any costs to BNSF for storage and handling of construction materials or equipment required to perform the Willow Creek Bridge Project Work by a third party;

1.3.6 All applicable state or local taxes (including business and occupation taxes), government assessed fees or assessments by any state or local government authority that are not already included in Sound Transit's, BNSF's or its contractors' rates, but which specifically attributable to the funding or performance of the Willow Creek Bridge Project Work;

1.3.7 The cost of complying with all applicable permits and conditions required by government authorities in connection with construction of the Willow Creek Bridge Project, and permits or conditions that are, or are anticipated to be, voluntarily accepted by BNSF, including cost of filing fees, attorneys' fees and consultants' fees in seeking to contest the application of laws, regulations or ordinances to any aspect of the Work, or in seeking to obtain, modify or demonstrate compliance with any such permit or condition;

1.3.8 The cost of complying with all applicable laws, regulations, court or administrative agency decisions or ordinances;

1.3.9 The cost of performing the duties and obligations of BNSF set forth in Sections 1.3, 2.1 or otherwise in this Agreement;

1.4 Defined Terms. Capitalized terms found in this Agreement that are not defined are as defined in the Joint Use Agreement and the Purchase and Sale Agreement.

2.0 General Duties and Obligations.

2.1 BNSF.

2.1.1 BNSF shall construct the Willow Creek Bridge Project in conjunction with its construction of the Third Commuter Rail Easement Improvements and perform the Willow Creek Bridge Project Work provided in section 1.2 and as described in **Schedule A**.

2.1.2 BNSF shall allow Sound Transit the opportunity to participate in the pre-bid and pre-construction meetings.

2.1.3 BNSF shall provide Sound Transit access to the work site for purposes of inspection of the following phases of work. Any additional costs to BNSF due to delayed approval by Sound Transit of work performed, will be reimbursed by Sound Transit:

a. Staking of project limits

b. Installation of necessary Temporary Erosion and Sediment Controls
c. Final grading
d. As-built plan

2.1.4 BNSF will provide Sound Transit with 10 calendar days notice prior to the start of grading activities to allow Sound Transit adequate time to coordinate on-site inspection.

2.1.5 BNSF or the selected contractor will provide documentation depicting the as-built plans showing how the site was ultimately constructed. This will be used for permit compliance. Sound Transit will provide review and approval of the as-built plan.

2.2 Sound Transit. Sound Transit shall perform the following:

2.2.1 Funding. Fund the Willow Creek Bridge Project as provided in Section 3.0.

2.2.2 Permits and Approvals. Acquisitions of Permits and Approvals including Proprietary Permits and Approvals as defined in the Joint Use Agreement.

2.2.3 Project Oversight. Sound Transit shall oversee and approve or disapprove of the following Willow Creek Bridge Project Work stages prior to BNSF's initiation of the next phase of construction. Any additional costs to BNSF due to delayed approval by Sound Transit of work performed, will be reimbursed by Sound Transit:
a. Staking of project limits
b. BMP installation
c. Final grading
d. As-built plan preparation

3.0 Funding for the Willow Creek Bridge Project.

3.1 Funding Elements

3.1.1 Construction. Sound Transit shall reimburse BNSF under this Agreement in the amount of not to exceed $920,000.00 for the cost of the Willow Creek Bridge Project plus amounts required to be paid pursuant to Sections 2.1.7, 2.2, 4.1, 6.3, and 7; subject to Section 9.11 of this Agreement.

3.1.2 Repair and Maintenance. In lieu of any contribution toward operations, maintenance or repair of the Willow Creek Bridge in the future, Sound Transit shall pay to BNSF $138,400, as detailed in **Schedule B,** upon satisfactory completion of construction of the WCB Project.

3.2 **Invoicing.** BNSF shall submit to Sound Transit, BNSF's standard billing invoice with supporting documentation (as exemplified in the Seattle-Tacoma Construction Agreement of 2000), which sets forth BNSF's costs incurred for the Willow Creek Bridge Project Work the invoice period. BNSF shall send invoices to the following address:

Accounts Payable
Sound Transit
401 S. Jackson St.
Seattle, WA 98104

3.3 **Payment.** Sound Transit shall reimburse BNSF within 30 days of receipt of invoice in compliance with Section 3.2.

3.4 **Increases in Spending**: Notice of excess cost shall be provided by the BNSF to Sound Transit Project Manager a minimum of 60 days to facilitate Sound Transit's review and process to obtain Board authorization for additional expenditures under this Agreement.

4.0 Work Stoppage and Termination.

4.1 **Work Stoppage Requested by Sound Transit.** Sound Transit may order cessation of all Willow Creek Bridge Project Work following delivery of at least ninety (90) days prior written notice to BNSF. If Sound Transit requests a work stoppage, BNSF will cease all Willow Creek Bridge Project Work and close out the Willow Creek Bridge Project Work by performing such additional work as is reasonably necessary to return BNSF's railroad property to an operating condition that is at least as safe and efficient as prior to commencement of the Willow Creek Bridge Project Work. Sound Transit acknowledges that the least expensive alternative in such case may be to complete the Willow Creek Bridge Project Work. Sound Transit shall reimburse BNSF for any costs associated with the work.

4.2 **Work Stoppage Requested by BNSF.** BNSF may stop work on the Willow Creek Bridge Project Work if Sound Transit fails to make timely payment under Section 3.

5.0 Ownership of Real Property and Construction Material.

Sound Transit shall have no ownership interest in any real property or Construction Materials (i.e. tangible items that BNSF uses for construction of the Willow Creek Bridge Project) other than the rights acquired by Sound Transit under the Commuter Rail Easements.

6.0. Reporting Responsibilities.

6.1. Reports and Documentation. Sound Transit may require (1) work statements or payroll records, (2) invoices for materials and supplies, (3) statements from professionals for services rendered, and (4) an itemized listing of the charges supported by copies of original bills, invoices, expense accounts, and miscellaneous supporting data retained by BNSF. Sound Transit represents and warrants that no federal funds will be used to make any payments from Sound Transit to BNSF under this Agreement.

6.2 Availability of Records. All project records in support of all costs incurred and actual expenditures kept by BNSF and its contractors shall be open to inspection by Sound Transit during normal business hours, and shall be retained and made available for such inspection for a period of not less than three years from final payment of funds under this Agreement to BNSF. Copies of these records shall be furnished to Sound Transit. This requirement shall be included in all subcontracts related to the work entered into by BNSF to fulfill the terms of this Agreement.

6.3 Audit. If an audit is requested by Sound Transit, BNSF shall cooperate fully with the auditor chosen by Sound Transit at Sound Transit's expense notwithstanding Section 3.1 of this Agreement. At the time of an audit, if required, BNSF will provide documentation of all costs incurred on the project. In the event that Sound Transit has paid in excess of its final funding commitment under Section 3.1 of this Agreement (exclusive of amounts required to be paid by Sound Transit in addition to the cap listed in Section 3.1), then BNSF will refund to Sound Transit the amounts over-collected within thirty (30) days of the conclusion of the audit. Further, if BNSF had overcharged Sound Transit by more than 5 percent, then BNSF will not be eligible for the reimbursement of the cost of the audit, and will reimburse Sound Transit for Sound Transit's audit costs.

7.0 Inspection and Acceptance.

All of the Willow Creek Bridge Project Work performed by BNSF under this Agreement shall be subject to inspection and reasonable approval by Sound Transit for compliance with its environmental mitigation requirements during the course of the work as provided in section 2.1. BNSF shall upon notice from Sound Transit bring the work into compliance with the applicable standards or specifications or mitigation requirements. If such additional work is beyond the scope of the work described in Schedule A then such work shall be at Sound Transit's expense notwithstanding Section 3.1 of this Agreement. Sound Transit's representatives shall be notified of and included in all scheduled inspections of the Willow Creek Bridge Project Work.

8.0 Termination of Agreement.

This Agreement shall terminate upon the completion of construction and the payment by Sound Transit under the terms of this Agreement. Sound Transit may also terminate this Agreement if BNSF has not moved into the construction phase of the Willow Creek Bridge Project Work by January 1, 2012.

9.0 Miscellaneous

9.1 Entire Agreement. This Agreement and the exhibits that are attached constitute the entire agreement and understanding between Sound Transit and BNSF relating to the subject matter contained herein. There are no restrictions, promises, representations, warranties, covenants or undertakings, oral or otherwise, except those expressly set forth or referenced herein.

9.2 Amendments. No waiver, modification, addition, or amendment to this Agreement shall be of any force or effect unless reduced to writing and signed by the authorized employees of each party hereto.

9.3 Severability. In the event that any term, covenant, condition, or provision of this Agreement, or the application of the Agreement to any person or circumstance, is found to be invalid or unenforceable in any respect, the remainder of this Agreement, and the application of such term or provision to other persons or circumstances nevertheless shall be binding with the same effect as if the invalid or unenforceable provision were originally deleted. The parties hereto agree to bargain in good faith to reform this Agreement or replace any invalid or unenforceable provision with a valid and enforceable provision that comes as close as possible to the intention of the invalid or unenforceable provision.

9.4 Primary Contacts. The principal contacts for each party in the day-to-day dealings of this Agreement are listed in **Schedule C.**

9.5 Notices. Except as otherwise expressly provided in this Agreement, all requests, notices, demands, authorizations, directions, consents, waivers or other communications required or permitted under this Agreement shall be in writing and either shall be: **(i)** delivered in person, **(ii)** deposited postage prepaid in the certified mails of the United States, return receipt requested, **(iii)** delivered by a nationally recognized overnight or same-day courier service that obtains receipts, or (iv) delivered electronically, with confirmation of receipt by telephone, with an original being sent first class mail to the persons listed in **Schedule C.**

9.6 **Rights and Remedies.** The duties and obligations imposed by this Agreement and the rights and remedies available hereunder shall be in addition to and not a limitation of or waiver regarding any duties, obligations, rights and remedies otherwise available by law. No waiver by either party hereto of any default shall affect or impair any right arising from any subsequent default. The failure of either party hereto to insist at any time upon the strict observance or performance of any of the provisions of this Agreement or to exercise any right or remedy provided for in this Agreement shall not impair any such right or remedy nor be construed as a waiver or relinquishment thereof.

9.7 **Benefits.** This Agreement is intended for the sole benefit of the parties to this Agreement. Nothing in this Agreement is intended to give any person or entity, other than the parties any legal or equitable right, remedy, or claim under this Agreement.

9.8 **Preparation.** The parties hereto and their legal counsel have cooperated in the drafting of this Agreement. Accordingly, this Agreement shall be deemed the joint work product of the parties hereto and shall not be construed against either party by reason of such preparation.

9.9 **Counterparts.** This Agreement shall be simultaneously executed in duplicate counterparts, each of which so executed shall be deemed to be an original, and such counterparts together shall constitute one and the same instrument.

9.10 **No Waiver under Other Agreements.** Nothing in this Agreement is intended to amend or waive any obligation of Sound Transit pursuant to the Joint Use Agreement. In the event of an inconsistency between the terms of this Agreement and the Joint Use Agreement, the terms of the Joint Use Agreement shall prevail.

9.11 **Force Majeure.** BNSF will be excused from performance of any of its obligations in this Agreement, where such non-performance is caused by any event beyond BNSF's reasonable control, which may include, without limitation, an order, rule, or regulation of any federal, state, or local government body, agency, or instrumentality; work stoppage or labor dispute resulting in a strike; extraordinary unavailability of essential materials from third-party suppliers; accident; natural disaster, an act of war or terrorist attack, or civil disorder, inclement weather or unforeseen physical conditions existing on the Service Property ("**Force Majeure Event**"); provided that BNSF shall use all reasonable efforts to minimize its non-performance and to overcome, remedy, or remove such Force Majeure Event in the shortest practical time.

The authorized representatives of BNSF and Sound Transit are signing this Agreement on the date stated in the introductory clause.

Central Puget Sound Regional Transit Authority

By: Joan M. Earl
Title: Chief Executive Officer

BNSF Railway Company

6/21/10

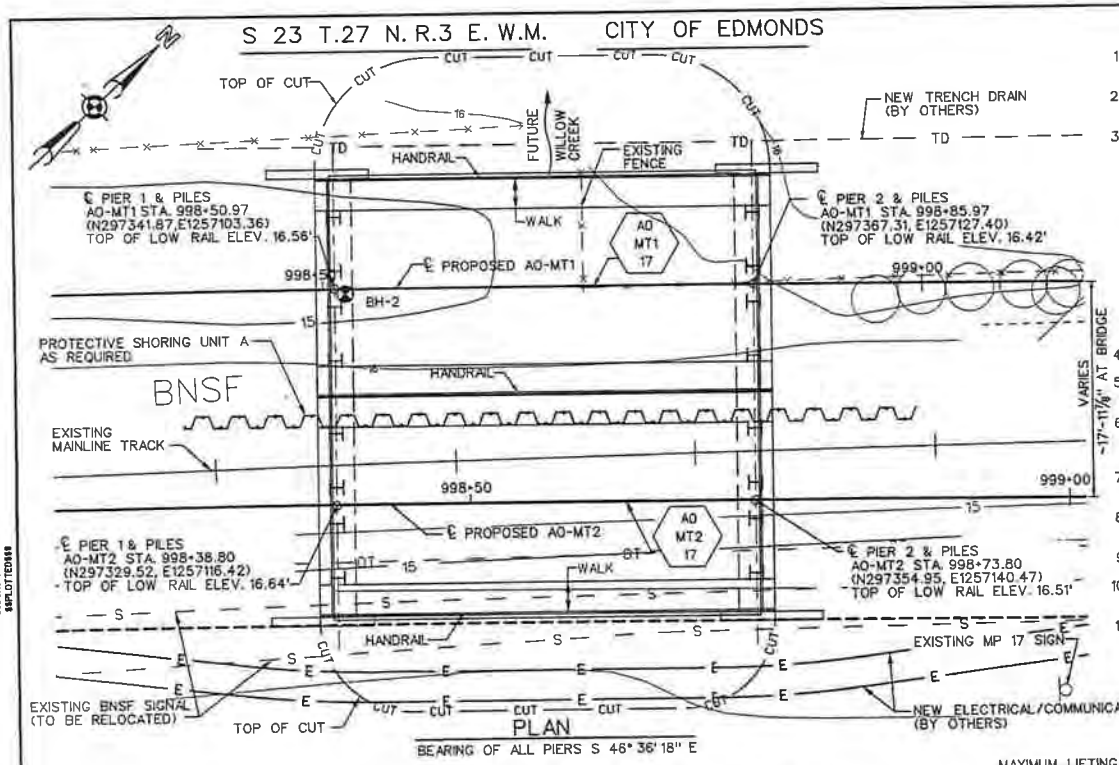
By: DAVID L. FREEMAN
Title: VP - ENGINEERING

Approved as to form:

Legal Counsel

SCHEDULE A

Willow Creek Bridge Project Plans and Specifications
Dated May 20, 2010



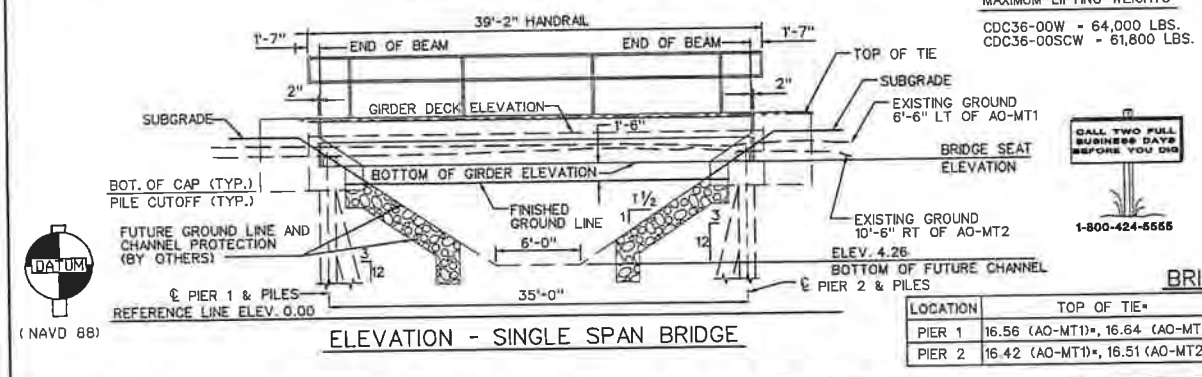
GENERAL NOTES:

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT PLANS AND CONTRACT DOCUMENTS.
2. A GEOTECHNICAL INVESTIGATION HAS BEEN CONDUCTED, A REPORT PREPARED AND IS ATTACHED AS AN APPENDIX TO THE SPECIFICATIONS.
3. THE BRIDGE SHALL BE CONSTRUCTED USING 30" X 7'-0" PRESTRESSED CONCRETE DOUBLE BOX BEAMS IN ACCORDANCE WITH THE FOLLOWING BNSF STANDARD PLANS, AND THE GEOMETRY AND MODIFICATIONS SHOWN ON THESE PLANS:

STANDARD PLAN NO.	SHEET NO.	STANDARD PLAN NO.	SHEET NO.
500000 BG1	1 OF 3	0000-17902-088	13 OF 24
500000 BG2	2 OF 3	0000-17902-091	16 OF 24
500000 BG3	3 OF 3	0000-17902-094	19 OF 24
0000-17902-076	1 OF 24	0000-17902-095	20 OF 24
0000-17902-077	2 OF 24	0000-17902-099	24 OF 24
0000-17902-078	3 OF 24	0000-17000-01B	1 OF 1

OTHER STANDARD PLANS AS APPLICABLE AND APPROVED BY THE ENGINEER.

4. THE BEAM ARRANGEMENT SHALL BE IN ACCORDANCE WITH THE TYPICAL SECTION ON DRAWING BR3.
5. PILES SHALL BE H-PILES WITH MATERIALS AS SPECIFIED IN THE BNSF STANDARD SPECIFICATIONS AND STANDARD PLANS, AND DIMENSIONS AS SHOWN IN THESE PLANS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. TEMPORARY SUPPORTS AND FALSEWORK SHALL BE GRADUALLY RELEASED TO PREVENT IMPACT OR UNDUE STRESSES IN THE STRUCTURE.
7. THE LOCATIONS OF ALL EXISTING UTILITIES WITHIN THE VICINITY OF THE STRUCTURES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO EXCAVATING OR DRIVING PILES.
8. UNLESS OTHERWISE NOTED IN THE PLANS, ALL DIMENSIONS ARE HORIZONTAL AND VERTICAL BASED ON A TEMPERATURE OF 64 DEGREES F (MEAN TEMPERATURE DURING CONSTRUCTION).
9. FOR TRACK ALIGNMENT GEOMETRY SEE BNSF EDMONDS DRAWING NO'S P207-P208 AND P216-P217.
10. SHORING SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE BNSF "GUIDELINES FOR TEMPORARY SHORING".
11. FOR SURVEY CONTROL AND BENCHMARK ELEVATIONS AND LOCATIONS, SEE BNSF EDMONDS DRAWING G206.

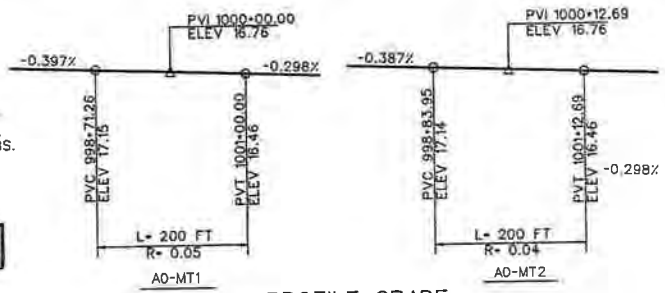


ELEVATION - SINGLE SPAN BRIDGE

MAXIMUM LIFTING WEIGHTS

CDC36-00W - 64,000 LBS.
CDC36-00SCW - 61,800 LBS.

CALL TWO FULL BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555



PROFILE GRADE

PROFILE SHOWN IS AT TOP OF LOW RAIL

BRIDGE ELEVATION TABLE

* ELEVATION IS AT TOP OF TIE AT LOW RAIL

LOCATION	TOP OF TIE*	GIRDER DECK	BOT. OF GIRDER	BRIDGE SEAT	BOT. OF CAP/PILE CUTOFF
PIER 1	16.56 (AO-MT1)*, 16.64 (AO-MT2)*	15.17	12.67	12.60	10.60
PIER 2	16.42 (AO-MT1)*, 16.51 (AO-MT2)*	15.17	12.67	12.60	10.60

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V. BACURIN	04-02-10
ENTERED BY	V. BACURIN	04-02-10
CHECKED BY	K. LINTS	04-02-10
PROJ. MGR.	K. LINTS	04-02-10

ISSUE			
NO.	DATE	BY	DESCRIPTION

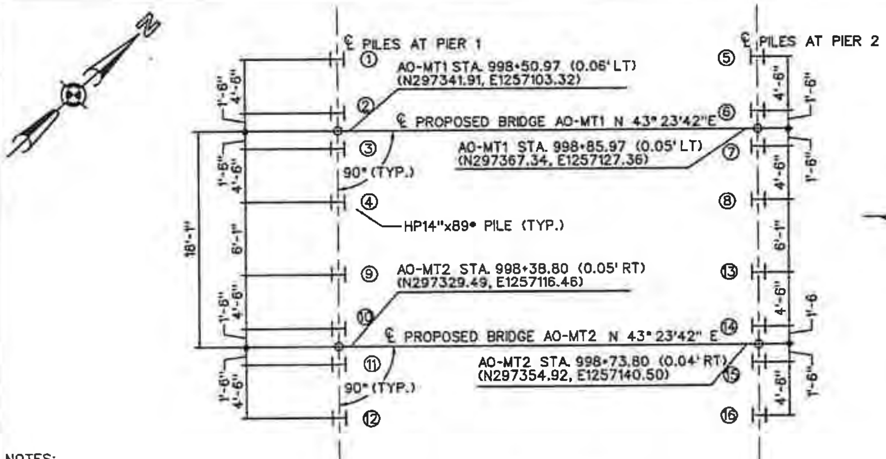
BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5800 Fax: (425) 454-0320

BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
BRIDGE LAYOUT
LS 50, BR.16.90

DWG NO. BR1
SHEET 1 OF 4 SHEETS



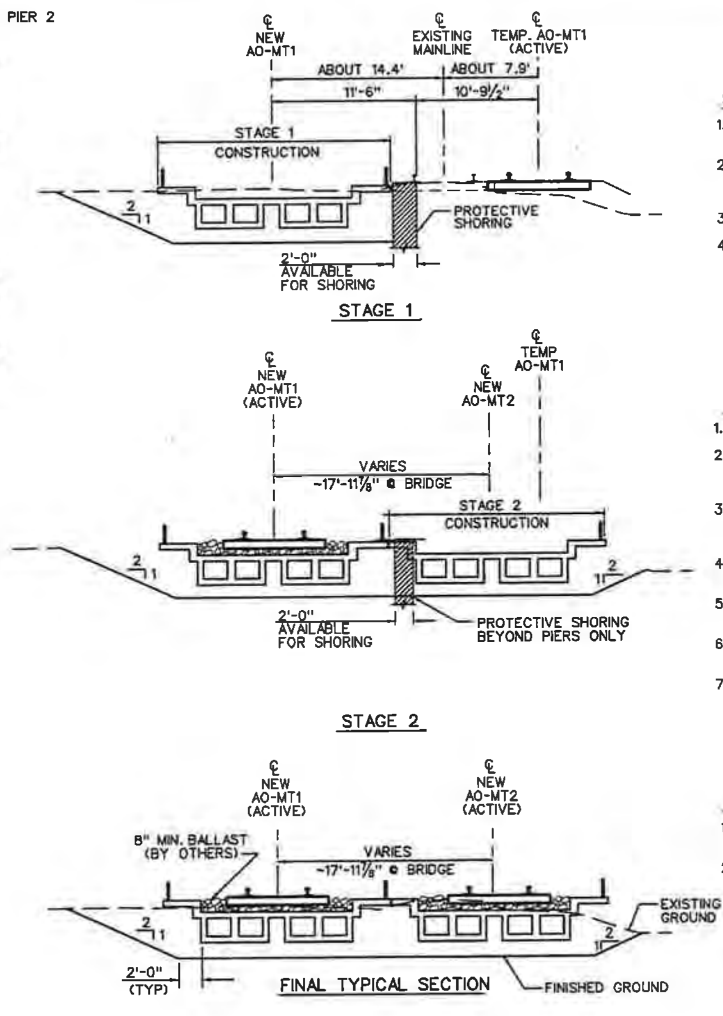
PILE LAYOUT

NOTES:

1. PILES SHALL BE DRIVEN BATTERED, AS SHOWN ON DRAWING BR4.
2. PILE LOCATIONS SHOWN ARE AT THE BOTTOM OF THE CAP BEAM.
3. ESTIMATED PILE EMBEDMENT IS 36 FEET BELOW THE BOTTOM OF THE CAP BEAM.

PILE COORDINATE TABLE

PILE NO.	NORTHING	EASTING
1	297346.03	1257098.96
2	297342.94	1257102.23
3	297340.88	1257104.41
4	297337.79	1257107.68
5	297371.46	1257123.00
6	297368.37	1257126.27
7	297366.31	1257128.45
8	297363.22	1257131.72
9	297333.61	1257112.10
10	297330.52	1257115.37
11	297328.46	1257117.55
12	297325.36	1257120.82
13	297359.04	1257136.14
14	297355.95	1257139.41
15	297353.89	1257141.59
16	297350.80	1257144.86



BRIDGE STAGING

LOOKING NORTH (RR EAST)

STAGE 1 CONSTRUCTION:

1. CONSTRUCT AO-MT1 SUBGRADE IN TEMPORARY LOCATION (BY OTHERS).
2. SHIFT EXIST MAINLINE TRACK AND TRAFFIC TO TEMPORARY AO-MT1 (BY BNSF).
3. CONSTRUCT PROTECTIVE SHORING.
4. EXCAVATE AND CONSTRUCT BRIDGE AT PROPOSED AO-MT1.

STAGE 2 CONSTRUCTION:

1. CONSTRUCT AO-MT1 SUBGRADE (BY OTHERS).
2. CONSTRUCT AO-MT1 TRACK AND SHIFT TRAFFIC FROM TEMP. AO-MT1 TO AO-MT1 (BY BNSF).
3. REMOVE PROTECTIVE SHORING BETWEEN PIERS 1 & 2. PROTECTIVE SHORING BEYOND PIERS TO REMAIN.
4. REMOVE AO-MT2 TRACK AT BRIDGE (BY BNSF).
5. EXCAVATE AND CONSTRUCT BRIDGE AT PROPOSED AO-MT2.
6. CONSTRUCT AO-MT2 SUBGRADE (BY OTHERS).
7. REMOVE REMAINING PROTECTIVE SHORING.

FINAL:

1. CONSTRUCT PROPOSED AO-MT2 AND INSTALL TRACK ACROSS BRIDGE (BY BNSF).
2. OPEN AO-MT2 TO TRAFFIC (BY BNSF).

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

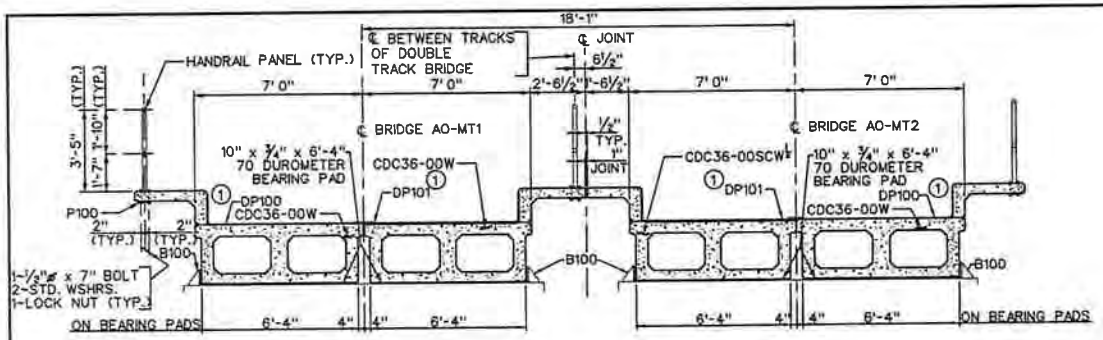
ISSUE NO.	DATE	BY	DESCRIPTION	BNSF APPROVALS DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5600 Fax: (425) 454-0220

BNSF RAILWAY

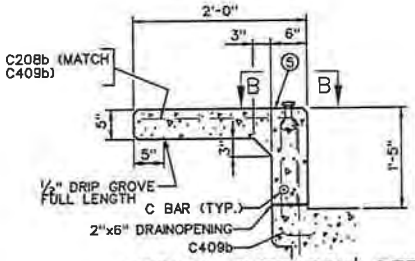
FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
PILE LAYOUT AND CONSTRUCTION STAGING
LS 50, BR.16.90

DWG ID BR2
SHEET 2 OF 4 SHEETS



TYPICAL SECTION

LOOKING NORTH



SPECIAL CURB SCW^{L} DETAIL

PRECAST CURB SCW^{R} IS OPPOSITE HAND OF SCW^{L}

NOTE: SEE BNSF-UP STANDARD PLAN SHEET 500000 BG1 FOR VIEW B AND BNSF-UP STANDARD PLAN SHEETS 500000 BG1, BG2, & BG3 FOR ADDITIONAL DETAILS

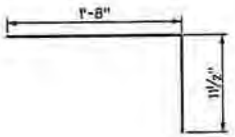
① IF GAP, EITHER BETWEEN BEAMS OR BETWEEN BEAM AND PARAPET, IS ANTICIPATED TO BE GREATER THAN 3", USE DP104 & DP105 IN PLACE OF DP100 & DP101, RESPECTIVELY. ORDER DP104 & 105 ONLY AS NEEDED.

* SEE SPECIAL CURB SCW^{L} DETAIL ON THIS SHEET

⑤ 3"x6" I.D. PLATE IS TO BE EMBEDDED FLUSH IN TOP OF CURB AND CENTERED 6" FROM END OF CURB. PLATE SHALL CONTAIN THE FOLLOWING INFORMATION IN ½" LETTERING: ITEM NAME, LENGTH, WEIGHT, DATE MANUFACTURED AND NAME OF MANUFACTURER.

BILL OF MATERIAL (SEE NOTE 1)

LINE	QTY.	UNIT	DESCRIPTION	MARK	SIZE	LENGTH	REMARKS
1	71,200	LBS.	STEEL BEARING PILE ASTM A36 (16 PIECES)		HP14X89	50'-0"	SEE NOTE 2
2							
3	4	EA.	PRECAST CONC. CAP - END BENT	CPC3W	3'-0"x5'-11¾"	18'-3"	PER DWG BR4 & PLAN 17902-090
4	4	EA.	PRECAST CONC. WINGWALL	PW103	9"x5'-11¾"	8'-6"	PER PLAN 17902-091
5	1	EA.	PRESTRESSED DOUBLE BOX BEAM WITH CUSTOM SPECIAL CURB	CDC36-00SCW^{L}	2'-6"x7'-0"	36'-0"	PER PLAN 500000 & DWG BR3
6	3	EA.	PRESTRESSED DOUBLE BOX BEAM WITH WALK	CDC36-00W	2'-6"x7'-0"	36'-0"	PER PLAN 500000
7							
8	16	EA.	SPIRAL BOLT		1¼" DIA.	1'-1"	PER PLAN 17902-078
9	16	EA.	WASHER, GALVANIZED	W100	4"x¾"	0'-4"	PER PLAN 17902-094
10	4	EA.	DECK PLATE, GALVANIZED	DP100	8"x⅜"	7'-9½"	PER PLAN 17902-094
11	4	EA.	DECK PLATE, GALVANIZED	DP101	8"x⅜"	7'-9½"	PER PLAN 17902-094
12							
13	8	EA.	RESTRAINER BRACKET	B100	PC OF HP14x89		PER PLAN 17902-094
14							
15	3	EA.	HANDRAIL PANEL, GALVANIZED	EHPM19-6.75	1½" DIA. PIPE	19'-6¾"	PER PLAN 17000-001B
16	3	EA.	HANDRAIL PANEL, GALVANIZED	EPHF19-6.75	1½" DIA. PIPE	19'-6¾"	PER PLAN 17000-001B
17	12	EA.	PLATE, GALVANIZED	P100	½"x¼"	0'-6"	PER PLAN 17902-094
18							
19	24	EA.	BOLT, HEX HEAD, GALVANIZED		½" DIA.	0'-7"	HANDRAIL POST
20	48	EA.	STANDARD WASHER FOR ½"ø BOLT, GALVANIZED		½" DIA.		HANDRAIL POST
21	24	EA.	LOCK NUT FOR ½"ø BOLT, GALVANIZED		½" DIA.		HANDRAIL POST
22							
23	8	EA.	URETHANE BEARING PAD - 70 DUROMETER		¾"x10"	6'-4"	PER PLAN 17902-077
24							
25	32	EA.	PREMOLDED JOINT FILLER, ASPH. IMPREG.		½"x28"	6'-4"	PER PLAN 17902-078



BAR C308b

SIZE IS #4

NOTE: FOR BAR DESIGNATION, SEE BNSF-UP STANDARD PLAN 500000 BG2.

NOTES:

1. BNSF TO FURNISH BRIDGE ITEMS SHOWN IN ABOVE BILL OF MATERIAL. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE PILE DRIVING, PILE SPLICES (IF NECESSARY), PAINT, AND ALL OTHER MATERIALS NOT LISTED IN THE ABOVE BILL OF MATERIALS TO PROPERLY ERECT THIS BRIDGE IN ACCORDANCE WITH THESE PLANS, SPECIAL PROVISIONS, AND BNSF STANDARD CONSTRUCTION SPECIFICATIONS.
2. ESTIMATED PILE EMBEDMENT PER GEOTECHNICAL REPORT RECOMMENDATION IS 36'-0" BELOW THE BOTTOM OF THE CAP BEAM. CONTRACTOR SHALL BE PREPARED TO SPLICE PILES OR USE LONGER PILES AS REQUIRED TO DEVELOP REQUIRED PILE CAPACITY.

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

ISSUE			
NO.	DATE	BY	DESCRIPTION

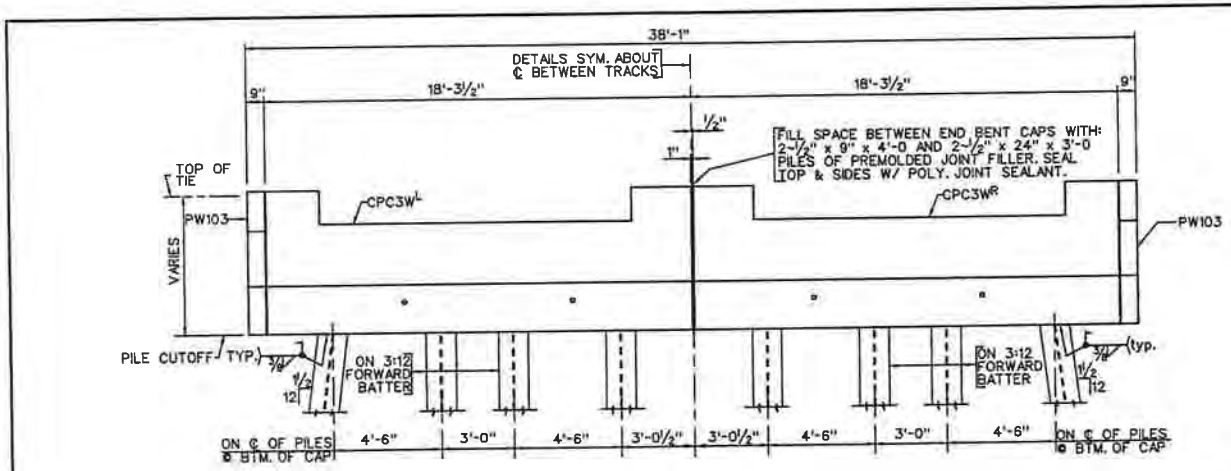
BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5600 Fax: (425) 454-0220

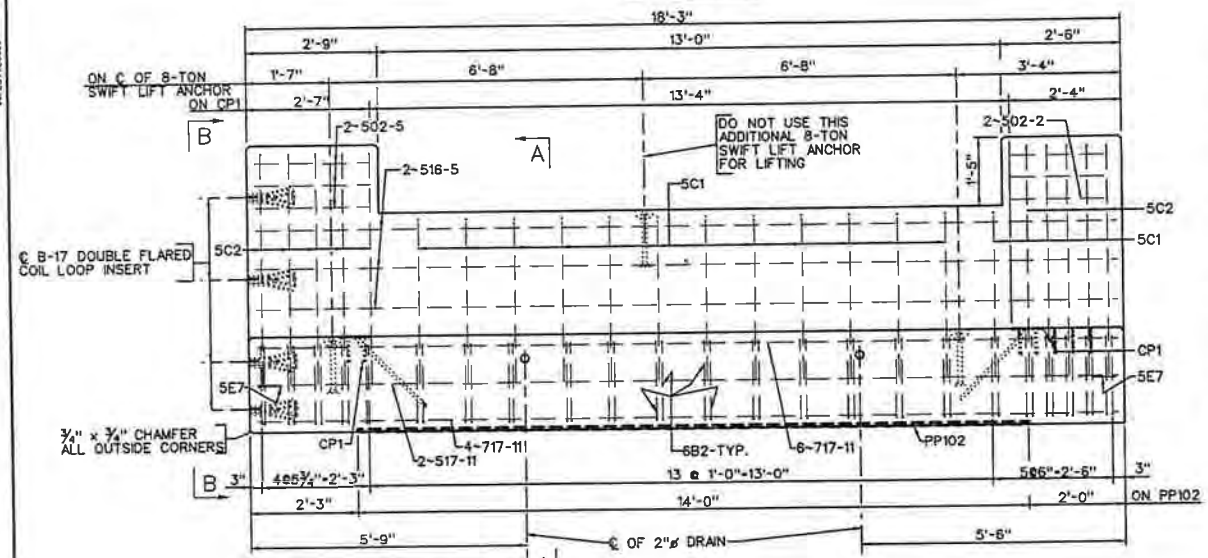
BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
PRECAST MEMBER DETAILS
LS 50, BR.16.90

DWG NO BR3
SHEET 3 OF 4 SHEETS



END BENT



NOTE:
SEE BNSF STD. PLAN SHEET 17902-091 FOR SECTION A-A AND VIEW B-B

PRECAST CAP CPC3W^L

WT.= 23,800 LBS., VOL.= 5.88 CU. YDS., REINF. STEEL= 1,440 LBS.

PRECAST CAP CPC3^R IS OPPOSITE HAND OF CPC3^L

NOTES:

ALL PILES ARE HP14" x 89# STEEL BEARING PILES SEE BNSF STD. PLAN SHEET 17902-088 FOR "TYPICAL PILE SPLICE" DETAIL.

AFTER PRECAST CONCRETE MEMBERS ARE SET, FILL RECESSES AT LIFT ANCHORS WITH CEMENT GROUT TO TOP OF SURROUNDING CONCRETE.

GENERAL: ALL MATERIAL AND WORKMANSHIP SHALL BE AS PER THE CURRENT BNSF STANDARD SPECIFICATIONS.

COIL LOOP INSERTS ARE TO BE DOUBLE FLARED TYPE B17 1¼" DIA. x 12" AS MANUFACTURED BY DAYTON-SUPERIOR AND HAVE A SAFE WORKING LOAD OF 13,500 LBS. WITH A 4 TO 1 SAFETY FACTOR. THE INSERTS ARE TO BE COMPLETELY RECESSED WITH 1¼" DIA. x 13" SPIRAL BOLTS ATTACHED TO THE CAP FOR SHIPMENT.

CONCRETE: THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE SHALL BE NOT LESS THAN 4000 P.S.I. IN 28 DAYS. CONCRETE MEMBERS SHALL NOT BE REMOVED FROM THE CASTING BED BEFORE THE CONCRETE REACHES A STRENGTH OF 2500 P.S.I.

ALL EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE CHAMFERED ¾".

REINFORCEMENT: MILD STEEL REINFORCEMENT SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A615 OR A706, GRADE 60.

FABRICATION OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH CHAPTER 7 OF THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE.

STEEL REINFORCEMENT MAY BE MOVED SLIGHTLY SO AS TO MISS PP102 OR CP1.

MINIMUM CONCRETE COVER ON REINFORCEMENT SHALL BE TWO (2) INCHES.

STEEL REQUIRED PER PRECAST MEMBER		
PRECAST MEMBER CPC3W^L	PRECAST MEMBER CPC3W^R	DESCRIPTION
REINFORCING STEEL		
46	46	6B2 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
13	13	5C1 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
10	10	5C2 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
2	2	5E7 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
6	6	502-2 (STRAIGHT, SIZE: #5, LENGTH: 2'-2")
6	6	502-5 (STRAIGHT, SIZE: #5, LENGTH: 2'-5")
8	8	517-11 (STRAIGHT, SIZE: #5, LENGTH: 17'-11")
10	10	717-11 (STRAIGHT, SIZE: #7, LENGTH: 17'-11")
STRUCTURAL STEEL		
4	4	1¼" x 12" DAYTON SUPERIOR B-17 DOUBLE FLARED COIL LOOP INSERT 1¼" x 12" LONG, 13,500 LBS. SWL (SAFE WORKING LOAD), PLAIN
3	3	8-TON SWIFT LIFT ANCHOR
2	2	PLATE CP1 (SEE DETAIL, BNSF STD. PLAN 0000-17902-094)
1	1	PILE PLATE PP102 (SEE DETAIL, BNSF STD. PLAN 0000-17902-094)

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

ISSUE				BNSF APPROVALS		
NO.	DATE	BY	DESCRIPTION	DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5800 Fax: (425) 454-0220

BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
BRIDGE TYP. SECTION & END BENT DETAILS
LS 50, BR.16.90

DWG NO. BR4
SHEET 4 OF 4 SHEETS

BNSF RAILWAY

FINAL DESIGN SERVICES
FOR
SOUND TRANSIT
WILLOW CREEK PROJECT

CONTRACT DOCUMENT AND SPECIFICATIONS

RTA/CP 95-07

5/21/10
ISSUED FOR BID

Prepared by

AECOM

10900 NE 8th Street, Suite 750
Bellevue, WA 98004

Sound Transit
Willow Creek Project

TABLE OF CONTENTS

PART 2
INSTRUCTION TO BIDDERS

PART TWO

INSTRUCTIONS TO BIDDERS

2.5 Bonds

Simultaneously with the delivery of the executed Contract, the successful Bidder shall furnish to the Company, in a form satisfactory to the Company, a fully executed performance bond and a fully executed labor and material payment bond, as required by the Company pursuant to the terms of the General Contract to be underwritten and kept in force at the cost and expense of the Contractor, which shall be placed with such sureties as may be acceptable to the Company in a penal sum of not less than the full amount of the Contract price, as security for the faithful performance of this Contract. Those companies holding certificate of authority as acceptable sureties on federal bonds and as published in the Federal Register for the current year is acceptable to the Company.

2.6 Power of Attorney

Attorneys in fact who sign Bid bonds, performance or labor and material bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

BID PROPOSAL

DATE _____

To BNSF Railway Company (hereinafter called "BNSF")

1. The undersigned (hereinafter called the "Bidder") submits this proposal in compliance with your invitation for work necessary to be done on the BNSF's Final Design for Sound Transit Commuter Rail Seattle to Everett, Washington Grading and Structures for the following locations:

   Willows Creek Project

   Having carefully examined the Contract Documents and the site of the proposed Work, and being familiar with all of the conditions surrounding the construction of the proposed Project including the availability of materials and labor, hereby proposes to furnish all labor and materials and supplies and to construct the Project in accordance with the Contract Documents and within the time set forth herein. This price covers all expenses incurred in performing the Work required under the Contract documents of which this Proposal is part. Quantities shown in this Unit Price Bid Proposal and in Alternates, if any, are estimated and actual payment will be made on the basis of confirmed quantities as constructed.

   A. Completion in no more than **[XXX months]** from Notice to Proceed:

      1) Base Bid: _____Dollars ($_____)

2. The Bidder agrees that the right is reserved by BNSF to delay the Notice to Proceed of a Contract for a period of 180 days. The undersigned agrees to hold firm on the above Bid prices and may not withdraw the Proposal for that period of time. The Bidder agrees that the right is reserved by BNSF to reject any and all Bids.

3. The undersigned Bidder hereby proposes and agrees, if the Bid is accepted, to enter into Agreement in the form attached to perform all Work, including the assumption of all obligations, duties, and responsibilities necessary to the successful completion of the Contract and furnishing of all materials and Work, tools, equipment, supplies, transportation, facilities, labor, superintendence, and services required to perform the Work; and Bonds, insurance, and submittals; all as indicated or specified in the Contract Documents to be performed or furnished by the Bidder.

4. If awarded the Contract, the undersigned hereby agrees to sign said Contract and furnish the necessary insurance certificates and bonds within 10 days of the award of said Contract, not including Sundays and legal holidays, and to begin Work within 10 days after Notification to Proceed.

CONTRACT SE BID PROPOSAL- Willow Creek

Pay Item No.	Item Description	Pay Unit	Qty	Unit Price	Amount
	01000 – GENERAL CONDITIONS				
IB.01	Performance Bond	LS	1		
IB.02	Labor and Material Payment Bond	LS	1		
1505.01	Mobilization	LS	1		
1505.02	Demobilization	LS	1		
	02000 – SITEWORK				
2025.01	Reinforced Filter Fabric Fence	LF	700		
2025.02	Construction Entrance	SF	750		
	03000 – EARTHWORK				
3200.01	Structure Excavation	CY	250		
	04000 - STRUCTURES				
4100.01	Protective Shoring – Unit A	LS	1		
4510.01	Crushed Surfacing Base Course	TN	60		
4200.01	Steel Bearing Pile Driven	LF	576		
4520.01	Bridge Installation	LS	1		
4520.02	Crane Mobilization for Bridge Component Unloading	EA	2		
6000.01	County Tax Rate 9.5%				

CONTRACT SE TOTAL MANDATORY BASE BID

_____
(In Words)

DOLLARS & CENTS

_____
(In Words)

END OF BID PROPOSAL

NOTES TO BID SCHEDULE

1. The Contractor is hereby reminded that the above Pay Items listed in this Proposal are the only items for which the Contractor will receive payment under this Contract. BNSF Railway will NOT provide payment to the Contractor for ancillary work that may be needed to complete the Project. BNSF Railway will NOT provide payment for work that may or may not be shown on the drawings or covered in the specifications but is not explicitly included in the bid schedule. Payment for any such work should be considered incidental to the various items listed as Bid Proposal Pay items, and no direct payment shall be made thereof. The contractor must complete the work as shown on the drawings and as covered in the specifications.

2. In the event that lesser or greater quantities of specific Pay Items are required to complete the construction, the total amount for Bid specific items will be adjusted by the unit price bid to actual quantities utilized as stipulated in the Proposal. In the event that an error is made in extending unit prices, the Contractor is hereby notified that the unit prices, as Bid, will govern in determining the Total Base Bid.

3. Bidders agree that the right is reserved by BNSF Railway Company to delay the award of a Contract for a period of one hundred eighty (180) days. The undersigned agrees to hold firm on the above Bid prices and may not withdraw the Proposal for that period of time. Bidders agree that the right is reserved by BNSF Railway Company to reject any and all Bids.

4. In awarding this project, BNSF Railway Company reserves the right to choose any combination of bid items or not awarding a bid item.

5. Prices must be submitted for all individual items of this Bidding Schedule. Failure to do so may be cause for rejection of the contractor's bid.

6. BNSF Railway Company will review all submitted Pricing Schedules for any unbalancing of the items. Any submitted Pricing Schedule determined to be unbalanced may be considered not-responsive and cause the bidder to be ineligible for award.

7. APPARENT CLERCIAL MISTAKES-ARITHMETIC DISCREPANCIES
   For the purpose of initial evaluation of bids/offer, the following will be utilized in resolving arithmetic discrepancies found on the face of the Pricing Schedule as submitted by bidders/offerors:
   (1) Obviously misplaced decimal points will be corrected.
   (2) In case of discrepancy between unit price and extended price, the unit price will govern.
   (3) Apparent errors in extension of unit prices will be corrected.
   (4) Apparent errors in addition of lump-sum and extended prices will be corrected.

For the purpose of bid/offer evaluation, BNSF Railway Company will proceed on the assumption that the bidder/offeror intended the bid/offer to be evaluated on basis of the unit prices, with the total arrived at by resolution of arithmetic discrepancies as provided above and the bid/offer will so reflect the summarization of bids/offers.

8. If awarded the Contract, the undersigned hereby agrees to sign said Contract and furnish the necessary insurance certificates and bonds within ten (10) business days of the award of said Contract, and to begin Work within ten (10) business days after Notification to Proceed.

9. If requested, each Bidder must be prepared to submit, within five (5) days of BNSF's request, a notarized financial statement, financial data, and other information and references sufficiently comprehensive to permit an appraisal of the Bidder's current financial condition or ability to perform the Work.

10. All of the above statements regarding experience and financial qualifications are submitted in conjunction with the Proposal, as a part thereof, and the Bidder guarantees the truthfulness and accuracy of the information.

(Sign here if individual) (Signature) _____

(Printed or Typed name) _____

Date: _____

(Address)

(Sign here if Co-partnership) (Signature) _____

(Printed or Typed name) _____

Date: _____

(Address)

(Co-partnership name of firm) _____

_____

(Address)

(Signature of members signing) _____

_____

(Address)

(Sign here if corporation) _____

_____

(Address)

(Signature of Officer of Corporation) _____

_____

(Title)

(Signature of Officer of Corporation) _____

_____

(Title)

(If executed by other than President, Vice-President, or Secretary of the Corporation, attach corporate minutes or resolution authorizing signature on behalf of the Corporation.

(Affix Corporate Seal here)

Contractor's License No. _____

Telephone No. _____

License Classification _____

INCLUDED WITH BID SUBMITTAL

List of Sub-Contractors	Workmen's Compensation Workman's Compensation Experience Factor Rating – UBI No.
General Project Schedule (Primavera P3 compatible)	Hourly Labor Rates
Bid Schedule Information	Hourly Equipment Rates (Including vactor truck equipment rates)

Bid Schedule

Bidder shall provide a bid breakdown using the Bid Schedule form attached herewith. The Bid Schedule form consists of cost in relation to unit quantities. The Total Cost line item shall be the sum of the cost for all items. Bidder shall provide complete Bid Schedule information without modification.

The successful bidder will be required to furnish, within five calendar days of acceptance of bid, a Schedule of Values based on the Bid Schedule. All lump sum bid items are to be broken down, in detail, by components of the work or stages of construction. Materials and equipment for which partial payment is expected, when on site, are to be identified and valued in the Schedule of Values. The approved Schedule will be the basis for measuring progress for payment.

Safety Action Plan

The awarded contractor shall submit to the BNSF a Safety Action Plan for BNSF review and approval prior to initiating work on the site. This Safety Action Plan shall incorporate all related safety guidelines specific to working at BNSF facilities.

List of Subcontractors

The name and location of place of business of each Subcontractor who will perform Work or labor or render service to the General Contractor in or about the construction of the Work, or improvements in an amount in excess of one percent (1%) of the General Contractor's total bid, and the portion of the Work which is to be done by each Subcontractor is set forth as follows:

Name	Location of Business	Portion (Type of Work and % of Total Contract Amount)

_____

_____

_____

_____

_____

_____

Addenda
Bidder acknowledges receipt of addenda to Plans and Contract Documents listed below, if any, and agrees this Proposal is submitted on the basis of all changes in the Work specified herein and said Addenda are by this reference made a part hereof.

Addenda to Specifications Received:

No.	Date
_____	
_____	
_____	
_____	
_____	

(Sign here if individual) _____

Date: _____

Address: _____

_____

_____

BID FORM - Labor Rates

Type of Labor	Hourly Rate

(Attach Additional Sheets If Needed)

BID FORM - Equipment Rates

Equipment	Hourly Rate (including operator)

PART 4
SPECIAL PROVISIONS

PART 4

SPECIAL PROVISIONS

The special provisions of the BNSF Railway Edmonds Double Track Project shall be part of the Willow Creek project except as supplemented or revised below.

01300 Part 1.1 General Intent (Supplemented)

The work site includes layout and storage areas inside BNSF right-of-way lines between Station MT2 996+50 to Station MT2 999+30.

The work to be performed by the Contractor shall consist of, but not limited to the following work:

A. Install prestressed concrete bridge over future Willow Creek.

01500 Part 1.3 Materials Furnished By the Company (Revised)

The Company will provide the Contractor the items listed in the Bill of Materials shown on drawing BR3 in Appendix C.

01600 Part 1.9 Access Roads and Construction Roads (Supplemented)

Access to the Work Site is available from Admiral Way, Edmonds, WA.

04100 Structure Excavation and Backfill

Figure 04100-1 showing limits lines where protective shoring is required shall be replaced per the guidelines shown in the "BNSF/UP Guidelines for Temporary Shoring", October 25, 2004.

END OF SECTION

PART 5
SUPPLEMENTAL SPECIFICATIONS

SECTION 04520

BRIDGE INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION

This work consists of installing precast concrete members, hand rails and associated bridge accessories at locations shown on the plans or as directed by the engineer, and in close conformity to the lines, grades, and dimensions shown on the plans and shall conform to the requirements herein.

1.2 RELATED SECTIONS

Coordinate related work specified in other parts of the Contract Documents and Specification including the following:

A. Section 03200 – Excavation and Embankment
B. Section 04100 – Structure Excavation and Backfill
C. Section 04200 – Piles
D. Section 04500 – Precast Concrete Construction
E. Section 04600 – Steel Construction
F. Section 04700 – Protective Coatings
D. Section 04900 – Elastomeric Bearing Pads

1.3 SUBMITTALS

A. Before beginning to erect any precast concrete members, the Contractor shall submit to the Engineer for review an erection plan and procedure per Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction, 2010. Section 6-02.3(25)N and BNSF Standard Specification section 04500.

PART 2 - PRODUCTS

2.1 MATERIALS PROVIDED BY THE COMPANY

See Section 01500 for the Company provided materials.

The Contractor shall be responsible for; coordinating the delivery of materials with the Company, offloading the materials & storing the materials as required. All materials, with the exception of piling, will arrive at the project site by rail car at a time and date to be determined by the Company and coordinated with the Contractor. Piling will

arrive by either rail car or freight truck at a time and date to be determined by the Company and coordinated with the Contractor.

2.2 HANDLING, STORAGE, AND SHIPPING

Handle precast members per section 04500.

2.3 ACCEPTANCE OF MATERIALS PROVIDED BY THE COMPANY

A. Acceptability of materials provided by the Company will be by the Contractor and the Company at delivery of member to the job site. The Contractor shall notify the Engineer immediately of any materials that are defective or not acceptable for use on this project.

B. Upon acceptance of the materials the Contractor shall be responsible for them. Any damage that occurs to the materials shall be repaired by the Contractor at his expense to the satisfaction of the Company.

PART 3 - EXECUTION

3.1 PREPARATION

The Contractor shall install steel piles as shown on the plans per BNSF Railway standard plans shown in Appendix B, and in accordance with section 04200.

3.2 BRIDGE INSTALLATION

Install precast concrete members and all associated bridge accessories per Section 04500 in locations shown on the plans.

3.3 COORDINATION

The Contractor shall coordinate his work based on the Company's proposed track shifting as shown in Appendix D and delivery of materials.

PART 4 - MEASUREMENT AND PAYMENT

4.1 BRIDGE INSTALLATION

A. Measurement: No specific unit of measurement will apply, but measurement will be for the sum of all items to be installed.

B. Payment: Bridge Installation will be paid lump sum which shall include all labor, materials, tools, equipment, transportation, supplies, and incidentals required to construct and install the bridge, including but not limited to precast components, handrails, deck plates, and bearing pads.

Bridge Installation shall include all labor, materials, tools and equipment necessary to offload and store materials provided by the Company excluding "CRANE MOBILIZATION FOR BRIDGE COMPONENT OFFLOADING" as specified below.

The above provision shall not be interpreted to provide payment for "Piles Driven" which shall be paid for per Section 04200.

4.2 CRANE MOBILIZATION FOR BRIDGE COMPONENT OFFLOADING

A. Measurement: Crane Mobilization for Bridge Component Offloading: Crane Mobilization for Bridge Component Offloading shall be measured per each time it is necessary to mobilize and demobilize a crane to offload the bridge components delivered to the project site via rail car.

B. Payment: Crane Mobilization for Bridge Component Offloading: The unit price for CRANE MOBILIZATION FOR BRIDGE COMPONENT OFFLOADING per each will be full compensation for all work and costs involved with mobilizing, setting up and demobilize the crane to the project site specifically for the purpose of offloading bridge components. Should the crane be used to accomplish other tasks excluding, offloading the bridge components, the mobilization shall be considered incidental to the other item of work and no payment shall be granted for "CRANE MOBILIZATION FOR BRIDGE COMPONENT OFFLOADING".

END OF SECTION

PART 6
STANDARD CONSTRUCTION SPECIFICATIONS

SECTION 04200

PILES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piles

B. Test Piles

C. SAFETY

1. Contractor is responsible for performing all pile operations in compliance with the current state, federal, local, FRA and OSHA regulations, specifically with respect to fall protection.

(Note: See General Provisions for utility and permitting requirements and sections that apply)

1.2 DESCRIPTION

A. Piles: These specifications shall govern the furnishing, driving, building up and cutting off of timber, steel bearing, steel sheet, steel pipe, and concrete (precast and prestressed) piles in accordance with the lines, grades, and locations shown on the plans or as directed by the Engineer.

B. Test Piles

1. When shown on the plans or when directed by the Engineer, test piles shall be driven to determine the necessary lengths of piles to be ordered for the work.

2. The number and location of test piles to be driven shall be as shown on the plans or as established by the Engineer; in general, at least two test piles shall be driven at each structure.

C. Unless otherwise directed by the Engineer, the embankment at bridge ends shall be constructed to grade and thoroughly compacted to the full amount required by Section 03200, Excavation and Embankment, prior to the driving of piling in the embankment area.

Foundation piling shall not be driven until the excavation is complete.

1.3 SUBMITTALS

A. The Contractor shall provide to the Engineer a description of all pile driving equipment to be employed in the work, prior to commencement of pile installation. This shall include details including weights of pile hammer, power plant, leads, pile cushion, cap block and

helmet.

B. The Contractor shall provide to the Engineer drawings demonstrating compliance of driving equipment and steel casing with Contract Documents. Drawings shall include shop and erection details, casing details, and enclosures, splices, driving helmets, and reinforcement.

C. The Contractor shall submit to the Engineer a complete report on the load test, within seven days of completion of load test, including, but not limited to, a description of the pile driving equipment, driving records for both test piles and reaction piles, complete test data, analysis of test data, and recommended allowable design loads based on the load test results. The report shall be prepared by or under the direct supervision of a registered professional or structural engineer experienced in pile load testing and load test analysis. In Addition, a "Test Pile Record Form" in accordance with Figure 04200-1 shall be submitted to the Engineer.

Figure 04200-1

BURLINGTON NORTHERN SANTA FE RAILWAY
Test Pile Record Form

BR: _____ LS: _____ TRACK: _____ PLAN NO _____ AFE: _____ PILE TYPE: _____

BENT/PIER/ABUT NO.: ____ ROW NO: ____ PILE NO: ____ DATE/TIME START: _____ DATE/TIME END: _____

R/L IS _____ FT. ABOVE OR BELOW T/T HAMMER MODEL: _____ RAM WEIGHT: _____ LBS.

DIST. T/T TO G/L: _____ FT. CUSHION MATERIAL(S) – TYPES & THICKNESSES:
HAMMER (IF OTHER THAN MANUFACTURER'S STANDARD): _____

TOTAL PILE LENGTH UNDER HAMMER (INCLUDE (FOLLOWER: _____ FT. CONCRETE PILE: _____

DISTANCE T/ T TO P/ T AT END OF DRIVING: _____ FT. DISTANCE T/T TO SPLICE AT END OF DRIVING: _____ FT.

R/L = REFERENCE LINE - POINT FROM WHICH PENETRATION IS RECORDED, USUALLY T/T OR G/L.

COMMENTS: G/L = GROUNDLINE T/T = TOP OF TIE P/T = PILE TIP BPM =BLOWS PER MINUTE

R/L To P/T	# BLOWS	Sor TR OBKP EM	R/L To P/T	# BLOWS	Sor TR OBKP EM	R/L To P/T	# BLOWS	Sor TR OBKP EM	R/L To P/T	# BLOWS	Sor TR OBKP EM	R/L To P/T	# BLOWS	Sor TR OBKP EM

Foreman/Inspector: _____ Page __ of __

Test Pile Record Form 12-00.doc

D. The Contractor shall submit to the Engineer a complete and accurate record of each driven pile, within 3 days of completion of driving. The record shall indicate the pile location, driven length, embedded length, final elevations of tip and top, pile weight, butt and tip diameter, quantity and strength of concrete used in each pile, number of splices and locations, blows required for each foot of penetration throughout the entire length of the pile and for the final 6 inches of penetration, and the total driving time. The record shall also include the type and size of the hammer used, the rate of operation, and the type and dimensions of driving helmet, pile cushion, and cap block used. Any unusual conditions encountered during pile installation shall be recorded and immediately reported to the Engineer. In Addition, a "pile Driving Summary Form" in accordance with Figure 04200-2 shall be submitted to the Engineer.

Pile Drive Summary Form

Br: ______ LS: _____ Track: ____ Plan No: ____________ AFE: _______ Pile Type: ____________________

Hammer Make & Model: ______________ Ram Weight:________ * Last Foot for friction pile, last inch for bearing on rock.

Determine Bent No., Pier No. and Row No., and Pile No. using the "Structures Diagrams" in the SIR Reference Menu.

G/L = Groundline T/T = Top of Tie BPM = Hammer Blows per Minute Ru = Ultimate Resistance

Date	Bent No. or Pier No. &	Pile No.	Length of Pile (Ft.)		Last Foot (or Inch) of Penetration *				Remarks
			Penetration (GL to Tip)	T/T To G/L	Stroke Or BPM	No. Blows	Resistance Ru (Tons)	Required Ru (Tons)	

Foreman/Inspector: ___________________________ Page ___ of ___

Pile Driving Summary Form 12-00.doc

PART 2 MATERIALS

2.1 TIMBER PILES

A. Timber piles shall be in accordance with Chapter 7, Part 1, Article 1.9 of the AREMA Manual for Railway Engineering for first-class piles with a minimum tip circumference of 25 inches.

B. If preservative treatment is specified in the special provisions or on the plans, it shall be in accordance with Chapter 3, Part 6 of the AREMA Manual for Railway Engineering.

C. The method of storing and handling timber piles shall be such as to avoid damage to the piles. Piles shall be handled with hemp or synthetic fiber slings or wire rope encased in rubber hose whenever possible, taking care to avoid dropping, bruising, breaking or penetrating the outer fibers.

2.2 STEEL PILES

A. Steel Bearing Piles: Steel bearing piles shall be of the section shown on the plans and shall be structural steel, containing no less than 0.2% copper, conforming to ASTM Designation: A 36. Piles shall not be painted before driving.

B. Steel Sheet Piles: Steel sheet piles shall be of the section and length shown on the plans and shall conform to ASTM Designation: A 328 unless otherwise shown on the plans.

C. Steel Pipe Piles:

1. Steel pipe piles shall be of the outside diameter and wall thickness shown on the plans and shall conform to ASTM Designation: A 252, Grade 2 unless other material is specified on the plans. Piles shall have a 3/4 inch thick steel (ASTM Designation: A 36) closure plate of the same outside diameter as the pile groove welded to the pile on the tip end. Piles shall not be painted before driving.

2. All concrete materials and reinforcing steel and their preparation and placement, used in filling steel pipe piles, shall be in accordance with Section 04400, Concrete Construction. All concrete shall have a minimum compressive strength equal to that shown on the plans.

D. Reinforced Pile Tips: If shown on the plans or directed by the Engineer, steel bearing piles shall be equipped with a cast steel reinforced driving tip in accordance with details shown on the plans. The tips shall be installed in accordance with the manufacturer's recommendations.

E. Storing and Handling: Piles to be stored shall be placed on skids above ground and a sufficient number used to prevent visible deflection in the stored piles. Piles shall be kept clean and fully drained at all times. The method of handling shall be such that no damage will result to the piles.

2.3 CONCRETE PILES

A. Precast

1. Precast concrete piles shall be of the type, size and length shown on the plans.

2. All concrete materials and steel reinforcing and their preparation and placement shall be in accordance with Section 04500, Precast Concrete Construction. All concrete shall have a minimum compressive strength equal to that shown on the plans.

B. Prestressed: Prestressed concrete piles shall meet the requirements, and shall be of the type, size, and length shown on the plans, manufactured in accordance with Section 04500, Precast Concrete Construction.

C. Defects and Breakage: Piles cracked in the process of curing, handling or driving, which in the opinion of the Engineer can be satisfactorily repaired, shall be repaired at the Contractor's expense and under the direction of the Engineer. If repair is not possible in the opinion of the Engineer, the piles shall be replaced at the Contractor's expense.

D. Storing and Handling

1. The method of storing and handling piles shall be such as to minimize the danger of fracture by impact or undue bending stresses. Unless otherwise provided, piles shall be handled by means of a suitable bridle or sling attached to the pile at the pick-up points marked on the pile. Use of rubberized cables is also acceptable. The use of chain slings will not be permitted.

2. Piles shall be stored above ground on adequate blocking located within 1 foot of the pick-up points marked on the pile that will prevent undue stresses in the piles. When piles are only partially supported during hauling, the overhang shall not exceed the lengths permitted for pick-up. If piles are stacked for storage, blocking for all layers shall be in the same vertical plane.

PART 3 EXECUTION

3.1 DRIVING PILES

A. Driving Equipment

1. Piles shall be driven with steam, air, or diesel powered hammers approved by the Engineer prior to use. The use of drop hammers will not be permitted. The weight of the ram of the hammer shall not exceed 7000 lb. unless approved in writing by the engineer. The hammer to be used shall have the approval of the Engineer. Steel sheet piles and steel H piles may be driven with vibratory hammers under conditions approved by the Engineer.

2. The minimum acceptable hammer energy for use with various pile types is as follows:

Pile Type	Minimum Energy (ft-lbs)
Timber, less than 60 ft long	8,000
Timber, more than 60 ft long	13,000
Steel Bearing and Steel Pipe	30,000
Concrete	15,000 (but not less than 1.5 ft-lb per pound of pile).
Steel Sheet	As necessary to drive the piles to the required depth without damage to the piles.

3. The hammer shall be operated at all times at pressures and speeds recommended by the manufacturer. If steam or air hammers are used, boiler or air compressor capacity shall be adequate to maintain full rated pressure throughout the driving period of any pile. The boiler or air compressor shall be equipped with an accurate pressure gage at all times.

4. Pile drivers shall be equipped with leads which are constructed in such a manner as to afford freedom of movement of the hammer and to provide adequate support of the pile during driving. The longitudinal axis of the leads and hammer shall coincide with the longitudinal axis of the pile. Except where piles are driven through water, the leads shall be long enough so that a follower will not be necessary. Where a follower is required for driving piles underwater, one pile in each group of ten shall be long enough to permit driving without a follower. This pile shall be used as a test pile for proper correlation of the follower-driven piles bearing capacity. This pile shall be paid for as a permanent pile and not as a "test pile."

B. Driving Tolerances

1. Piles for bent construction shall be driven with a degree of accuracy that will permit framing into bents with a minimum of pulling or jacking. Under ordinary conditions, timber piles, after driving and before framing, shall not vary from the vertical or from the required batter by more than 1/4 inch per foot of pile above finished ground. Other types of piles, after driving and before framing, shall not vary from the vertical or from the required batter by more than 1/8 inch per foot of pile above finished ground, except that under ordinary conditions, the maximum deviation of the top of the pile from the plan location shall be 2 inches in the direction of the structure centerline and 4 inches in the direction along the centerline of the bent.

2. Foundation piles shall be driven to the vertical or batter line shown on the plans and the top of the completed pile shall not be more than 4 inches in any direction from the position shown on the plans. The center of gravity of the completed pile group shall not vary by more than 3 inches from the center of gravity determined from plan location.

3. If necessary to meet the required tolerances, pilot holes or guide templates may be used. Generally, the diameter of pilot hole shall be as specified in Paragraph 3.1.F.1.

C. Protection of Pile Heads

1. A steel driving head suitable for the type and size of piles being driven shall be used. Steel bearing piles and steel sheet piles shall be driven with a driving head compatible with the specific pile shape driven.

2. For concrete piles, a cushion block shall be provided between the driving head and the top of the pile. Wood cushion blocks, wire rope mat, belting, or other suitable material shall be used, subject to the approval of the Engineer, to prevent damage to the pile. Cushion blocks shall be changed as necessary to maintain an effective cushion.

D. Pile Damage and Misalignment: Care shall be exercised to avoid damage to piles from overdriving. Any pile that is damaged to the extent that, in the opinion of the Engineer, it will not perform its design function; any pile that is driven off location or alignment beyond the allowable tolerances; or any timber pile that is driven below cut-off elevation shall be pulled, if possible, or cut off below ground line and another pile driven as close as possible to the proper location. Splicing of timber piles will not be permitted. If the defective pile condition is due to Contractor's negligence, the cost of replacement and redriving shall be borne by the Contractor.

E. Pile Penetration

1. All piles shall be driven to a penetration satisfactory to the Engineer. The length of the piles shown on the plans is the length which is estimated to give the minimum required penetration and bearing, and is for estimating purposes only.

2. When test piles are required by the contract, the pile lengths and penetration required will be established by the Engineer on the basis of the test pile data. These lengths and elevation of pile tips shall supersede requirements shown on the plans.

3. Unless otherwise shown on the plans or directed in writing by the Engineer for cases where piles penetrate into competent rock, foundation piles shall be driven to a penetration of a minimum 10 feet below bottom of footing, and other piles to a penetration of at least 15 feet below natural or finished ground line, whichever is lower. Piles in streambeds or on the banks of streams, where marked erosion is expected, shall be driven to such penetration as the Engineer deems necessary for protection against scour.

4. When the specified penetration cannot be obtained without overdriving the piles, the Contractor shall provide either pilot holes or jetting equipment or a combination of both, as directed by the Engineer.

F. Pilot Holes

1. If piles cannot be driven to the required penetration and the material is not suitable for jetting, the Engineer may permit pilot holes to be drilled to facilitate driving. The Engineer will designate the diameter and depth of the drilled hole. Ordinarily, a drill diameter of 12 inches will be satisfactory for timber piles and typically a drill diameter 4 inches less than the diagonal of square piles, 2 inches less than the diagonal of octagonal piles, and 1 inch less than the diameter of round piles will be satisfactory for steel pipe and concrete piles.

2. Where pilot holes are required in granular material which cannot be sealed off by ordinary "mudding" drilling methods, a casing pipe of sufficient diameter shall be placed around the boring device. The casing shall be of sufficient length to extend through the loose materials and shall be held in position until the pilot hole is completed and the pile placed ready for driving.

3. If the hard material extends below the desired penetration, the drilling shall be stopped 1 foot above that level and the pile driven the remaining distance if it is possible to do so without damaging the pile. If the pile does not completely fill the pilot hole, the space between the pile and the wall of the hole shall be filled with dry granular material prior to driving as directed by the Engineer.

4. Pilot holes shall be considered as incidental to piles and no direct payment will be made for this work.

G. Jetting

1. For jetting operations sufficient power shall be provided, in addition to that used for operating the hammer, to supply water volume and pressure sufficient to freely erode the material adjacent to the pile.

2. Jetting shall be stopped a minimum of 2 feet above the desired tip elevation and the final penetration obtained by driving without jetting. In silty soils it is possible that jetting may loosen the soil around piles already driven. If such a condition is considered possible, piles shall be redriven after all jetting within 25 feet has been completed.

3. Jetting shall be considered as incidental to piles, and no direct payment will be made for this work.

H. Shooting Pilot Holes: The use of explosives for drilling of pilot holes will not be permitted.

I. Bearing Capacity

1. All piles shall be driven to the ultimate bearing capacity specified on the plans, in the special provisions, or by the Engineer. The bearing values shall be determined

using the wave equation method or the following formula as directed by the Engineer:

$$Ru = \frac{12eE}{s+c} \times \frac{W + n^2P}{W + P}$$

Ru = Ultimate dynamic pile resistance (pounds)
e = Hammer efficiency = 0.9
E = Hammer energy per blow = Wh for single acting steam or air hammer or open cylinder Diesel hammer.
s = Penetration of pile per hammer blow (inches)
c = Average temporary compression (inches). The value of c shall be determined from test pile rebound graphs or as specified by the Engineer.
W = Weight of striking parts of hammer (pounds)
h = Hammer ram stroke (feet) average during 1 inch of pile penetration
n = Coefficient of restitution = 0.7
P = Weight being driven (pounds) includes pile and pile follower, anvil, drive cap and adapter as applicable

2. When measuring penetration per blow to determine if adequate bearing capacity has been obtained, the hammer shall be running freely and at the speed specified by the manufacturer for full rated energy output.

3. If, for some unavoidable reason, driving must be interrupted before final penetration is reached, the penetration per blow to determine bearing capacity shall not be measured until 12 inches of penetration or refusal has been obtained after driving has been resumed.

J. PILE DRIVING NEAR FRESH CONCRETE

1. Piles shall not be driven within 150 feet of concrete that was placed within the previous 24 hours. If piling are driven within 150 feet of concrete that has not attained its specified 28-day strength, the following distances, based on the concrete strength and pile hammer rated energy, shall be maintained between the concrete and the nearest pile.

Distance to Concrete

Percent of 28 Day Strength	Energy less than 40,000 ft-lb	Energy 40,000 ft-lb to 60,000 ft-lb	Energy 60,000 ft-lb or greater
20	60 feet	70 feet	85 feet
40	35 feet	45 feet	50 feet
60	25 feet	25 feet	30 feet
80	10 feet	15 feet	15 feet

3.2 TEST PILES

A. The furnished length of test piles shall be a minimum of 10 feet longer than the estimated length of the permanent piles shown on the plans or as directed by the Engineer.

B. Wherever possible, test piles shall be driven in a location such that they can become part of the permanent structure. If not so used, test piles shall be cut off or extracted as directed by the Engineer. Extraction of test piles shall be considered incidental to the test pile item, and no separate compensation will be made for this work.

C. Ground elevations shall be brought to finished grade wherever possible prior to driving test piles, so that the test pile will be comparable to the piles used in the permanent structure.

D. Equipment used for driving test piles shall be adequate for handling the lengths provided without splicing. The hammer used shall be the same make and model as that to be used in driving the permanent piles.

E. Driving of a test pile shall continue until a penetration and bearing capacity is obtained which is satisfactory to the Engineer. Typically, test piles shall be driven to not less than 125% of the ultimate pile capacity required for permanent piles in the bridge structure.

3.3 TIMBER PILES

A. Pile Preparation

1. When the furnished length is much longer than the required length, the Engineer may permit shortening the tip end before driving so as to have the desired diameter at the cut-off.

2. Pile tips shall be cut perpendicular to the axis of the pile.

3. The piles for bents shall be matched as much as possible in diameter to facilitate framing and bracing.

B. Cut-offs

1. Piles which are to be encased in concrete shall be cut-off square with a saw to the elevation shown on the plan or established by the Engineer. The pile heads shall then be swabbed with preservative as specified on the plans.

2. Piles which are to support steel or timber caps shall be brought into final position and held while cut-off is made. Any chains or jacks used in positioning the piles shall be arranged so that the surface of the pile below cut-off will not be damaged. Cut-off shall be made with a saw to a true plane and to the exact elevation shown on the plans or established by the Engineer so that the cap will bear on the entire cross section of each pile in the bent. No shims will be permitted between the pile and the cap. Piles must show a solid head at the plane of cutting, and after cut-off, the pile caps shall be protected with preservative, fabric, and plastic cement as specified on the plans.

3. Cut-off portions of piles furnished by the Company remain the property of the Company, and shall be hauled to and loaded into rail cars by the Contractor. In the event rail cars are not available, the cut-offs will be stockpiled at a location designated by the Engineer. Stubs under 5 feet in length shall be disposed of by the Contractor in accordance with all applicable environmental laws and regulations. No extra payment will be allowed for this work.

C. Treatment of Damaged Surfaces: Any pile surface below cut-off that has been scuffed, torn or otherwise damaged shall be treated in accordance with the requirements of the applicable plans.

3.4 STEEL BEARING PILES AND STEEL SHEET PILES

A. Splices and Build-ups: The length of steel bearing piles and steel sheet piles shown on the plans or ordered by the Engineer may be built up in sections either before or during driving operations. The sections, unless otherwise shown on the plans, shall be of identical cross-section. Pile splices shall be made by full penetration butt welding the entire cross-section or as otherwise shown on the plans. All welding shall be in accordance with ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Care shall be taken to properly align the sections connected so that the axis of the pile will be straight. Pile splices above a point 15 feet below finished ground line shall be reinforced as shown on the plans, unless otherwise directed by the Engineer. Field splices shall be avoided for lengths under 60 feet.

B. Cut-Offs: Piles shall be cut off, with a cutting torch, or by other acceptable methods, to the elevation shown on the plans or established by the Engineer. Where caps are required, piles shall be brought into final position and held while cut off is made and the end surface of the piles shall be made as smooth as practicable with maximum gap of 1/8 inch between pile and pile cap.

3.5 STEEL PIPE PILES

A. Splices and Build-ups

1. The length of a steel pipe pile may be built up in sections either before or during the driving operation. The minimum length of a section measured between welded splices shall be 5 feet, and between drive splices shall be 30 feet. Only one welded splice and no drive splices will be permitted in that portion of the pile exposed above ground line or normal water line. Drive splices shall be 15 feet below the ground line, unless directed by the engineer.

2. Care shall be taken to properly align the sections to be spliced to insure a straight axis. The sections shall be spliced together in accordance with details shown on the plans. All welding shall be in accordance with the ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

B. Cut-Offs: Piles shall be cut off, with a cutting torch, or by other acceptable methods, to the elevation shown on the plans or established by the Engineer. Where caps are required, piles shall be brought into final position and held while cut off is made and the end surface of the piles shall be made as smooth as practicable with maximum gap of 1/8 inch between pile and pile cap.

C. Placement of Concrete

1. After all driving, splicing, and positioning of pile is completed, the pile shall be free from buckles, splits, distortions, water or other foreign matter. The Contractor shall provide equipment, lighting, and facilities necessary for the proper inspection of the piles. Any damaged, improperly driven, or otherwise defective pile shall be removed and replaced at the Contractor's expense.

2. The tops of piles shall be kept covered after driving until the concrete is placed. No concrete shall be placed in the piles in any unit until the driving of all piles in that unit has been completed. No concrete shall be placed until the Engineer has inspected the completed pile and reinforcing steel, when required, and given his approval to proceed. Unit is defined as a pier, bent or abutment.

3. Concrete shall be placed in a continuous operation taking care to prevent segregation. Special placing devices shall be used if necessary.

3.6 PRECAST AND PRESTRESSED CONCRETE PILES

A. Build-ups

1. Build-ups shall be made in accordance with the details shown on the plans or provided by the Engineer. The concrete used for the build-up shall be of the same quality as that used originally in the pile. Just prior to placing the concrete, the top of the pile shall be coated with an epoxy bonding compound approved by the

Engineer.

2. When additional driving of precast non-prestressed piles is required, the built-up portion shall obtain a compressive strength equal to the design compressive strength of the original pile prior to redriving.

B. Cut-Offs: Concrete at the end of a pile terminating in cast-in-place concrete shall be cut back the required amount leaving the reinforcing steel or prestressing steel exposed. The final cut of the concrete shall be normal to the axis of the pile. Any damage to the pile below the plan cut-off elevation shall be remedied by further cut-back and built-up.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT OF PILES

A. General

1. Piles delivered of the various kinds, sizes, types, and weights will be measured by the lineal foot, except steel sheet piles will be measured by the square foot, of acceptable pile delivered at the site of work and furnished in accordance with the lengths specified on the plans.

2. Piles driven of the various kinds, sizes, types, and weights will be measured to the nearest 1/10 lineal foot of net length of pile in place, except steel sheet piles will be measured by the square foot of acceptable pile in place, after all cut-offs and build-ups have been made.

3. That portion of piles driven below the elevation required by the plans or as directed by the Engineer and piles driven below the elevation at which the minimum penetration and bearing requirements were first obtained will not be measured for payment.

B. Timber Piles

1. Piles supplied by the Company which fail during driving, due to an inherent weakness in the pile and not due to negligence on the part of the Contractor, and which are extracted or cut-off at the direction of the Engineer, will be measured for payment by the lineal foot of pile in the leads. Piles supplied by the Company and broken during driving due to Contractor's negligence will not be measured for payment. Piles supplied by the Contractor and broken during driving will not be measured for payment.

2. Cut-off portions of piles will not be measured for payment.

C. Steel Piles: Cut-off portions of piles will not be measured for payment.

D. Concrete Piles, Precast and Prestressed

1. Two feet will be added to the length of piles, measured for payment in accordance with Paragraph 4.1.A.1, for each authorized build-up made, other than those made necessary by improper casting, handling or driving of piles.

2. Cut-off portions of piles, when piles are supplied by the Contractor in the lengths shown on the plans or ordered by the Engineer, will be measured by the lineal foot of cut-off above design elevation. Cutbacks made below design elevation for the purpose of making build-ups will be considered incidental to the work and will not be measured.

3. When piles of extra length are furnished to eliminate protrusion of reinforcing steel required for splicing, such extra length will not be measured for payment as either piles or cut-off portion of piles.

4.2 PAYMENT FOR PILES

A. Piles Delivered: Piles delivered shall be paid for at the contract unit price per lineal foot or square foot, as designated in Paragraph 4.1, of the various kinds, sizes, types, and weights. This price shall include full compensation for all work and costs involved for furnishing the piles, unless otherwise specified; unloading, storing, and transporting the piles. This price shall not include compensation for concrete or reinforcing steel in steel pipe piles which will be paid for under Section 04400, Concrete Construction.

B. Piles Driven: Piles driven shall be paid for at the contract unit price per lineal foot or square foot, as designated in Paragraph 4.1, of the various kinds, sizes, types, and weights. This price shall include full compensation for furnishing all labor, materials, tools, equipment, jetting, pilot holes, and incidentals necessary to drive and cut-off the piles and complete the work. The Contractor shall accept the contingencies of driving greater or lesser length of piles or other changes of features in construction which this may involve, all without modification of the unit price fixed by the contract.

C. Timber Piles: The contract price per lineal foot of acceptable timber pile shall also include full compensation for preparing the piles, disposing of the pile heads, treating the pile tops as specified in Paragraph 3.3.B. and the treating of damaged surfaces, splits, and checks as specified in Paragraph 3.3.C.

D. Steel Bearing Piles and Steel Pipe Piles: Payment for the work and materials, exclusive of additional length of pile, required in making each pile splice shall be made at a unit price per splice equal to two times the unit price bid for "Steel Bearing Piles Driven" or "Steel Pipe Piles Driven," as applies, of the size and weight on which the splice is made except that no payment will be made for any splice on any pile whose actual length left in place, after all cut-offs, splices, or build-ups have been made, is not greater than the length shown on the plans or specified by the Engineer, nor will payment be made for more than one splice on any one pile less than 120 feet long.

E. Steel Sheet Piles: No direct payment will be made for cut-off portions of piles.

F. Concrete Piles, Precast and Prestressed: Cut-off portions of piles, measured in

accordance with Paragraph 4.1.D.2, will be paid for at one half the unit price bid per lineal foot for concrete piles.

4.3 MEASUREMENT OF TEST PILES

A. Test piles of the various kinds, sizes, types and weights, when the piles do not become a part of the permanent structure, will be measured by the lineal foot of pile in the leads and driven in accordance with these specifications and in the location specified on the plans or by the Engineer. When test piles becomes a part of the permanent structure, they will be measured by the lineal foot of acceptable pile in place after all cut-offs and build-ups have been made in accordance with the provisions of Paragraph 4.1 covering the various kinds of piles.

4.4 PAYMENT FOR TEST PILES

A. Test piles shall be paid for at the contract unit price per lineal foot of test pile of the various kinds, sizes, types, and weights. This price shall include full compensation for furnishing the piles, unless otherwise specified; unloading, storing, and transporting the piles; and for furnishing all labor, materials, tools, equipment, jetting, pilot holes, and incidentals necessary to drive the piles and complete the work. Payment will be made for splices authorized by the Engineer at the rate specified in Paragraph 4.2.C.

4.5 MEASUREMENT FOR REINFORCED PILE TIPS

A. Reinforced pile tips will be measured by the number of reinforced tips installed on steel bearing piles and driven in place.

4.6 PAYMENT FOR REINFORCED PILE TIPS

A. Payment for reinforced pile tips on steel bearing piles, if required, shall be made at the contract unit price per each which shall be full compensation for furnishing all material, labor and equipment required to install the tips. Payment will be made only for reinforced tips required as shown on the plans or as requested by the Engineer.

END OF SECTION

SECTION 04600

STEEL CONSTRUCTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel Construction

B. SAFETY

1. Contractor is responsible for performing all steel construction operations in compliance with the current state, local, federal, FRA and OSHA regulations, paying special attention to the fall protection.

1.2 DESCRIPTION

A. These specifications shall govern the furnishing, fabricating, and erecting of steel structures including the furnishing, erecting and removal of falsework and special erecting devices, as required, and structural steel portions of other structures in accordance with these specifications, the special provisions, and the details shown on the plans.

1.3 SUBMITTALS

A. The Contractor shall submit drawings and design calculations showing the proposed design, method of construction and removal of falsework and special erecting devices, as required. These drawings and design computations, stamped by a licensed professional structural engineer in the state where the work is to be done, shall be submitted to the Engineer and approved prior to the start of construction. This approval shall not relieve the Contractor of responsibility for the falsework or special erecting devices.

PART 2 MATERIALS

2.1 STRUCTURAL STEEL

A. All design, material erection and its fabrication shall be in accordance with Chapter 15, Parts 1 and 3, of the AREMA Manual for Railway Engineering and as specified in the special provisions or on the plans.

B. Steel construction shall be cleaned and painted or galvanized, as applicable, in accordance with Section 04700. Protective Coatings for Steel Surfaces.

2.2 STRUCTURAL BOLTING

A. Bolts and nuts shall be furnished by the same supplier to ensure proper fit.

B. Rotational-capacity tests shall be performed on all black or galvanized bolt, nut and washer assemblies by the manufacturer or distributor prior to shipping. Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly and a rotational-capacity lot number assigned to each combination of the lots tested. The manufacturer or distributor shall furnish, to the Engineer, a manufacturer's certified test report (MCTR) or a distributor's certified test report (DCTR) for each rotational-capacity lot furnished. The MCTR or DCTR shall include the results of all tests; location of where bolt assembly components were manufactured; the date and location of the tests; results of the R-C tests and a statement that the materials represented by the test report conform to the specifications.

C. Bolts shall be of such length that they will extend entirely through their nuts and approximately 1/4 inch beyond them and the full threads shall extend no more than 3/8 inch into the grip.

2.3 FALSEWORK

A. Falsework materials shall be in accordance with the Contractor's drawings, when applicable, and approved by the Engineer.

2.4 LIQUID TYPE EPOXY

A. The liquid type epoxy shall be a two component, epoxy-resin bonding system conforming to the requirements of ASTM Designation: C 881, Type IV, Grade 2, Class B or C. The class supplied shall be governed by the range of temperatures for which the materials is to be used.

2.5 HANDLING AND STORING MATERIALS

A. All material shall be handled in a manner which will prevent members from being distorted or damaged. Stored material shall be piled securely, and no material shall be placed closer than 25 feet to the centerline of the nearest tracks. Material shall be placed on level platforms, skids, or other supports above the ground and shall be kept clean and properly drained. Girders and beams shall be placed upright and shored. Long members, such as columns and chords, shall be supported on skids placed near enough together to prevent damage from deflection.

B. For those members designated as fracture critical members (FCMs); the following shall apply: extraordinary care shall be taken in the handling of FCMs. Lifting dogs, tongs, grips, chains, cables, or other lifting devices placed in direct contact with the FCM which may gouge, scratch, score, scrape, or otherwise damage the surface, edges or corners of FCMs shall not be used. Procedures for handling FCMs using lifting straps, timber

cushions or other protective devices shall be developed, submitted to the Engineer, and receive written approval by the Engineer before handling any material for or members designated as FCM.

C. All materials shall be carefully loaded so as to avoid injury in transit. Members weighing more than 3 tons shall have the weight marked thereon. All small parts such as rivets, bolts, pins, washers, and small connection plates shall be packed in containers, of adequate strength. The contents of each unit shall be plainly marked on the top of each container.

D. Girders shall be shipped in an upright position and adequately blocked and braced to prevent damage during shipping. The Fabricator shall submit girder loading diagrams to the Engineer for approval well in advance of the anticipated shipping date. These diagrams shall include proposed blocking, bracing and tie-down details.

PART 3 EXECUTION

3.1 ERECTION

A. Methods and Equipment:

1. Before staring work, the Contractor shall advise the Engineer fully as to the method he proposes to follow, and the amount and character of equipment he proposes to use, which shall be subject to the approval of the Engineer. The approval of the Engineer shall not be considered as relieving the Contractor of the responsibility for the safety of his method or equipment or from carrying out the work in full accordance with the plans, specifications and special provisions.

2. No field welding or flame cutting will be allowed on the steel spans unless shown on the plans or authorized in writing by the Engineer. Tack welding, for the purpose of eliminating field erection bolts or for holding steel parts together while bolting, will not be permitted.

3. The Contractor shall provide the falsework, special erecting devices and all tools, machinery and appliances, including drift pins and erection bolts, necessary for the expeditious handling of the work. Drift pins sufficient to fill at least 1/4 of the bolt holes for main field connections shall be provided.

4. All steel beams or girders placed shall be securely tied and/or braced to prevent overturning immediately after erection, and until diaphragms, floor beams or cross frames are permanently in place. The methods to be used shall be submitted on the erection drawings. When railroad or roadway traffic must be maintained beneath girders or beams already placed, traffic shall be protected against falling objects during the erection of diaphragms and other structural members, during the placing of cast-in-place concrete and during the erection and dismantling of

forms. The protection shall consist of nets and/or flooring with no larger than 1-inch openings.

B. Falsework:

1. The falsework shall be constructed in accordance with the Contractor's plans, approved by the Engineer, and shall be properly maintained.

2. Equipment for removing falsework shall not be operated upon or attached to any portion of the new structure.

C. Assembling Steel:

1. All parts shall be accurately assembled as shown on the plans and any match marks carefully followed. The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will injure or distort the members will not be permitted. Drifting done during erection shall be only such as required to bring the parts into position and enlarging the holes or distorting the metal will not be permitted.

2. Bearing surfaces shall be cleaned of all dirt, loose rust and mill scale, grease, and paint just before the members are assembled. Wire brushes, scalers, solvents or flame shall be used to clean the surfaces under the direction of the Engineer.

3. Fitting up bolts shall be 1/16 inch less in diameter than the hole, and cylindrical erection pins shall be 1/32 inch less in diameter than the hole.

4. Unless erected by the cantilever method, truss spans shall be erected on blocking so placed as to give the trusses proper camber until all lower chord splices are fully connected, as called for on the plans, and all other connections are made with pins and fitting up bolts. Trusses erected by the cantilever method shall have all lower chord splices fully connected before the span is swung on intermediate falsework or permanent shoes. If necessary, such as in the case of high falsework subject to settlement, jacks shall be provided under panel points to enable making necessary adjustments to facilitate fitting up without heavy drifting. Splices of butt joints in compression members shall not be fully connected until the span has been swung. Full bearing shall be secured on milled surfaces that are designed to bear.

5. Sole plates on beams and girders shall be in full contact with bearings before diaphragm, cross frame, or floor beam connections are made. Connections shall be adjusted as necessary, under the direction of the Engineer, to obtain full contact.

6. Bridge handrails shall be erected plumb and in line in accordance with the drawings. Maximum vertical tolerance is +/- ¼ inch from plumb line over the full vertical height. Maximum horizontal tolerance is +/- ½ inch over the full length of the bridge rail.

D. Misfits and Straightening of Bent Material:

1. The correction of minor misfits involving harmless amounts of reaming, cutting, and chipping and the straightening of minor cases of bent bars, plates, and the outstanding legs of angles, etc., shall be considered a legitimate part of the erection and shall be done by the Contractor at his expense. However, any error in the shop fabrication, or deformation resulting from handling and transportation which prevents the proper assembling and fitting up of parts by the moderate use of drift pins, or by a moderate amount of reaming, slight chipping or cutting, shall be reported immediately to the Engineer who will specify the method of correction to be used by the Contractor. The correction shall be made in the Engineer's presence.

2. The straightening of bent materials, when permitted by the Engineer, shall be done by methods that will not produce fracture or other injury. Distorted members shall be straightened by mechanical means or, if approved by the Engineer, by the carefully planned and supervised application of a limited amount of localized heat. The temperature of the heated area shall not exceed 1200 degree F (a dull red which may not be visible in bright sunlight) as controlled by temperature indicating crayons, liquids or bimetal thermometers. Parts to be heat straightened shall be substantially free of stress and from external forces, except stresses resulting from mechanical means used in conjunction with the application of heat. After heating and straightening, the metal shall be cooled as slowly as possible. Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fracture.

3. When, in the opinion of the Engineer, excessive misfits and deformed material are not due to the Contractor's negligence, the correction of the misfits and straightening of the deformed material shall be done by the Contractor, when directed by the Engineer, and will be paid for by the Company as "Force Account Work," providing the material was furnished by the Company.

E. Bearings and Anchorage:

1. Bearings shall be set level in exact position and shall have full and even bearing upon the bridge seat areas. All bearings shall be set so as to be at the proper location at a temperature of 60 degree F under full dead load. At this temperature, rockers shall be vertical, bearings shall be centered under the structure center line of bearing, and sliding plates shall be centered on the bearing plates.

2. The area of concrete under bearings shall be bush-hammered if necessary to provide a full and even bearing at the correct elevation. When the bridge seat is more than 1/8 inch below plan elevation, the bearings shall be raised to grade on steel plate of the same size as the bearing. The plates shall be provided by the Contractor at his expense and attached to the bearings in a manner satisfactory to

the Engineer.

3. Portland cement in a stiff paste form shall be spread over the bush-hammered areas just before the bearings are set. The maximum amount of cement which will be permitted will be no more than necessary to remove irregularities in the concrete with no intent of raising the bearings.

4. Finished surfaces of bearings in moving contact shall be cleaned and greased when the bearings are placed.

5. Holes for anchor bolts shall be drilled in the bridge seat in exact locations. Holes shall be approximately 1/4 inch larger in diameter than the bolt. An approved liquid type epoxy supplied by the Contractor at his expense shall be used to set the anchor bolts. Before placing the bolts, the holes shall be cleaned of all dust and loose material by flushing with water, after which holes shall be blown dry. After all steel is in place and the bearings are set, the anchor bolts shall be set accurately with sufficient epoxy placed in the bottom of the holes so that after a bolt is inserted, the hole will be completely filled. The bolts shall not be disturbed in any way for at least 24 hours, or until the epoxy is set. Mixing and use of epoxy shall be as recommended by the manufacturer of the epoxy.

F. Pin Connections: All packing washers, if any, must be in place when the work is assembled. While pins are being driven into place, threads shall be protected by pilot and driving nuts supplied by the Contractor. After nuts are tightened, the threads adjacent to the nut shall be burred a minimum of two threads at two locations opposite of each other.

G. High Strength Bolted Connections:

1. Connected Material:
   a. Connections shall be accurately fitted up before high strength bolts are placed. A sufficient number of the holes at a connection point shall be filled with erection pins to "fair-up" all holes. Light drifting will be permitted, but drifting to match unfair holes will not be permitted. Such holes shall be reamed or drilled under the direction of the Engineer.
   b. All material within the grip of the bolt shall be steel. There shall be no compressible material such as gaskets or insulation within the grip.
   c. Unless otherwise indicated on the plans, bolts oriented vertically shall be installed with the heads on top of the connected pieces.

2. Surface Conditions:
   a. All joint surfaces, including those adjacent to the bolt heads, nuts or washers, shall be free of dirt, loose rust, loose scale, burrs and other matter that will prevent solid seating of the parts.
   b. Unless otherwise shown on the plans, faying surfaces of all nongalvanized joints, including splice plates, shall be given a blast cleaning, in accordance with the requirements of the Steel Structures Painting Council Specifications SSPC-SP7 Brush-Off Blast Cleaning, and shall be free of loose rust prior to final bolting.
   c. Galvanized faying surfaces shall be roughened by hand wire brushing prior to final bolting.
   d. When shown on the plans, faying surfaces shall be blast cleaned and coated with a paint that provides the specified mean slip coefficient as determined by the "Test Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints" as adopted by the Research Council on Structural Connections. Coated joints shall not be assembled before the coating has cured for the minimum time used in the qualifying test.

3. Handling and Storage of Fasteners: Bolts and nuts shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work day shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the day. Fasteners shall not be cleaned of lubricant that is present in the as-delivered condition. Fasteners that show signs of rust or dirt shall be cleaned and relubricated prior to installation. Any additional lubrication required must be applied prior to installing bolts in the holes. ASTM Designation: A 325 or A 490 bolts and associated nuts and washers shall be identified by rotational-capacity lot number and stored in a manner that will retain this identification.

4. Bolt Installation:
   a. Bolts shall be installed with a hardened washer under the nut or bolt head, whichever is the element to be turned in the tightening. In addition, a hardened washer shall be used under the non-turned element of ASTM Designation: A 490 bolts if the material against which it bears has a specified minimum yield point less than 40 ksi. Bolts must be used with nuts and washers from the same rotational-capacity lot. Unless Lock-Pin and collar Connections are utilized according to paragraph 3.1.H, tightening of high strength bolts shall be accomplished by the "turn-of-nut" method according to paragraph 3.1.G.5. A Skidmore-Wilhelm Bolt Calibrator or equal is required on each job per paragraph 3.1.G.5.a.
   b. If the hole diameter is more than 1/16 inch greater than the nominal bolt diameter, hardened washers shall be placed under both head and nut.
   c. Where necessary, washers may be clipped on one side to a point not closer than seven-eighths of the bolt diameter from the center of the washer.
   d. Surfaces of bolted parts in contact with the bolt head, nut or flat hardened washer shall not have a slope of more than 1:20 with respect to a plane

normal to the bolt axis. When an outer face of the bolted parts has a slope of more than 1:20, a smooth hardened beveled washer shall be used to compensate for the lack of parallelism.

e. If required because of bolt entering and wrench operation clearances, tightening may be done by turning the bolt while the nut is prevented form rotating.

f. All bolts shall be tightened to give at least the required minimum bolt tension values shown in Table 1 on completion of the joint:

TABLE 1
Bolt Tension

Nominal Bolt Size, Inches	Minimum Tension in Pounds	
	ASTM A 325 Bolts	ASTM A 490 Bolts
1/2	12,000	15,000
5/8	19,000	24,000
3/4	28,000	35,000
7/8	39,000	49,000
1	51,000	64,000
1-1/8	56,000	80,000
1-1/4	71,000	102,000

5. Turn-of-Nut Tightening:

a. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension (Skidmore-Wilhelm Bolt Calibrator or equal). The test shall demonstrate that the method of estimating the snug tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than 5 percent greater than the tension required by Table 1.

b. Bolts shall be installed in all holes of the connection and brought to a snug tight condition. Snug tight is defined as the tightness that exists when the plies of the joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. Snug tightening shall progress systematically from the most rigid part of the connection to the free edges, and then the bolts of the connection shall be retightened in a similar systematic manner as necessary until all bolts are simultaneously snug tight and the connection is fully compacted.

c. Following this initial operation all bolts in the connection shall be tightened further by the applicable amount of rotation specified in Table 2. During the tightening operation there shall be no rotation of the part not turned by the wrench. Tightening shall progress systematically from the most rigid part of the joint to its free edges.

TABLE 2
Nut Rotation from Snug Tight Condition

Bolt length (Under side of head to end of bolt)	Disposition of Outer Face of Bolted Parts		
	Both faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1:20 (beveled washer not used)	Both faces sloped not more than 1:20 from normal to the bolt axis (beveled washer not used)
Up to and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters	2/3 turn	5/6 turn	1 turn

Nut rotation is relative to bolt regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance should be plus or minus 30 degrees; for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45 degrees.

6. ASTM Designation: A 490 bolts and galvanized ASTM Designation: A 325 bolts shall not be reused after having once been fully torqued. These same type bolts may be used for both fitting up and final bolting if tightened to no more than snug fit during fitting up. Other ASTM Designation: A 325 bolts may be reused after having been torqued only once if approved by the Engineer.

H. Lock-Pin and Collar Connections:

1. Connections shall be accurately fitted up before lock-pins are placed. A sufficient number of the holes at a connection point shall be filled with erection pins to "fair-up" all holes. Light drifting will be permitted, but drifting to match unfair holes will not be permitted. Such holes shall be reamed or drilled under the direction of the Engineer. Parts shall fit solidly together when assembled without interposition of gaskets or other compressible material.

2. When assembled, all joint surfaces, including those adjacent to the lock-pin heads and to the collars, shall be free of dirt, loose rust and scale, burrs and other defects that would prevent solid bearing of the parts. In addition, surface requirements shall be in accordance with Paragraphs 3.2.G.2.b, c, and d.

3. If the hole diameter is more than 1/16 inch greater than the nominal lock-pin diameter, hardened washers shall be placed under both the lock-pin head and collar, adjusting pin length if required for grip length. Where necessary, washers may be clipped on one side to a point not closer than seven-eighths of the nominal lock-pin diameter from the center of the washer. Surfaces of connected parts in contact with lock-pin head, collar or flat hardened washer shall not have a slope of more than 1:20 with respect to a plane normal to the lock-pin axis. When an outer face of the connected parts has a slope of more than 1:20, a smooth hardened beveled washer shall be used to compensate for the lack of parallelism.

4. Driving of lock-pin and collar fasteners shall be done by a special driving tool capable of producing the required tension in the shank of the fastener and capable of swaging the collar into the annular locking grooves, forming the collar to the proper size and shape as recommended by the manufacturer, before the pull-groove section is removed. The expendable pull-groove section shall be recovered from the driving tool as it breaks from the shank, and shall not be permitted to drop in such a manner as to create a hazard.

I. Welded Connections: Workmanship and technique, qualification of welders and welding operators, and inspection for field welded connections shown on the plans or authorized by the Engineer shall be in accordance with the ANSI/AASHTO/AWS D1.5 Bridge Welding Code.

J. Steel construction shall be cleaned and field painted in accordance with Section 04700, Protective Coatings for Steel Surfaces.

PART 4 MEASUREMENT AND PAYMENT

4.1 STEEL CONSTRUCTION

A. Measurement of Steel Construction: Steel Construction of the various classifications will be measured by the ton (2,000 pounds) of steel in the completed work. The weight of steel will be computed in accordance with Section 9 of the American Institute of Steel Construction "Code of Standard Practice."

B. Payment for Steel Construction:

1. Steel Construction shall be paid for at the contract unit price per ton (2,000 pounds) of steel of the various classifications measured in accordance with Paragraph 4.1.A. This price shall be full compensation for furnishing the material and protective coat application in accordance with Section 04700, Protective Coatings for Steel Surfaces, unless otherwise specified; and for all labor, tools, equipment, supplies, supervision, and incidentals necessary for unloading, hauling, and storing the materials; furnishing, placing, and removing erection falsework and special erecting devices when required; and erecting the steel and completing the work in accordance with the plans and these specifications.

2. The above provisions for payment shall not be interpreted to provide payment for steel piling, reinforcement, structure drain pipe, hardware and structural steel, including apron and deck plates, and bearing plates, incidental to other types of construction, or other items for which provision is otherwise made in the contract.

END OF SECTION

SECTION 04700

PROTECTIVE COATINGS FOR STEEL SURFACES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cleaning and Painting

B. Hot Dip Galvanizing

C. Petrolatum Application

1.2 DESCRIPTION

A. These specifications shall govern the surface preparation, surface pretreatment, and application of protective coatings to steel structures and the steel portions of other structures, all in accordance with the plans, specifications and special provisions.

B. Weathering Steel:

1. ASTM Designation: A 588 or A 709, Grade 50W and ASTM Designation: A 852 or A 709, Grade 70W weathering steel, in order to provide a sound uniform surface for the formation of the protective oxide, shall be blast cleaned in the fabricating shop in accordance with the requirements of the Steel Structures Painting Council Specification SSPC-SP6 "Commercial Blast Cleaning."

2. Contamination of blast cleaned surfaces shall be avoided through the completion of work and all contaminants such as oil, grease and dirt shall be promptly removed.

3. Unless otherwise shown on the plans or in the special provisions, weathering steel shall not be shop or field painted.

1.3 PROTECTION AGAINST DAMAGE

A. The Contractor shall provide protective devices such as tarps, screens or covers as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

B. Paint or paint stains that result in an unsightly appearance on surfaces not designated to be painted shall be removed or obliterated by the Contractor at the Contractor's expense and to the satisfaction of the Engineer.

C. All painted and galvanized surfaces that are marred or damaged as a result of operations of the Contractor shall be repaired by the Contractor, at the Contractor's expense, with materials and to a condition equal to that of the coating specified.

D. Upon completion of all painting operations and of any other work that would cause dust, grease, or other foreign materials to be deposited upon the painted surfaces, the painted surfaces shall be thoroughly cleaned.

1.4 HANDLING, STORAGE AND SHIPPING

A. All blocks, chains, slings, braces, clamps, etc., used in the handling, moving, storing and shipping of painted and galvanized members shall be padded in such a manner that the coating will not be damaged.

B. Articles shall be loaded and stored to prevent the formation of wet storage stains.

1. The material shall be loaded in such a manner that continuous drainage could occur.

2. In storage, the articles shall be raised from the ground and, if necessary, separated with strip spacers to provide free access of air to most parts of the surface. They shall also be inclined in a manner which will give continuous drainage. Under no circumstances shall the steel be allowed to rest on cinders nor shall it be stored on wet soil or decaying vegetation.

1.5 WEATHER CONDITIONS

A. Protective coatings shall be applied only on thoroughly dry surfaces and during periods of favorable weather.

B. Painting will not be permitted when the atmospheric temperature, paint, or the surface to be painted is at or below 40 degree or above 100 degree F, or when metal surfaces are less than 5 degree F above the dew point, or, unless approved in writing by the Engineer, when the humidity exceeds 80 percent at the site of the work.

C. Application of paint will not be permitted when freshly painted surfaces may become damaged by rain, snow, fog, or condensation, or when it can be anticipated that the atmospheric temperature or relative humidity will not remain within the specified application conditions during the drying period, except as provided in Paragraph 1.6.E. for enclosures.

D. Painting shall not be done when the steel is hot enough to cause the paint to blister or produce a porous paint film.

E. Subject to approval by the Engineer in writing, the Contractor may provide suitable enclosures to permit painting during inclement weather. Provisions shall be made to control atmospheric conditions artificially inside the enclosures within limits suitable for painting throughout the painting operation and drying period. Full compensation for providing and maintaining the enclosures shall be considered as included in the prices paid for the various contract items of work requiring paint and no additional

compensation will be allowed therefor.

F. If fresh paint is damaged by the elements, it shall be replaced or repaired by the Contractor at the Contractor's expense.

G. If, in the opinion of the Engineer, there is an objectionable amount of dust in the atmosphere, the contractor shall, at his own expense, take necessary precautions to prevent dust and dirt from coming in contact with freshly painted surfaces or with surfaces before the paint is applied.

1.6 SURFACES IN CONTACT WITH CONCRETE

A. Tops of beams and girders that are to have concrete cast in contact with them shall not be painted. Steel that is to be completely embedded in concrete shall not be painted.

B. Pile plate surfaces, including shear stud connectors, in contact with and embedded in concrete shall not be painted. The exposed portion of pile plates shall be field cleaned and painted as specified in Paragraph 3.7.

C. Care shall be taken when painting steel that is in contact with concrete to insure full paint coverage on the steel. Concrete surfaces shall be masked or covered as necessary to prevent surface contamination. Paint on concrete surfaces shall be removed, at the Contractor's expense, in a manner approved by the Engineer.

1.7 CONTACT AND INACCESSIBLE SURFACES

A. Surfaces in contact to be welded or bolted in the shop shall not be painted unless specified, but shall be cleaned of loose rust, scale and foreign material to meet the approval of the Engineer. Field contact surfaces shall not be painted. Surfaces not in contact, but which will be inaccessible after assembly or erection, shall be painted in the shop with the shop and field coats of the paint system required for the completed structure.

B. The bottom surfaces of masonry plates and surfaces of structural steel to be in contact with elastomeric bearing pads or preformed fabric pads shall be cleaned and painted with the full number of paint coats prior to erection.

1.8 MACHINE FINISHED SURFACES

A. Machine finished surfaces of pins, pin holes, rollers or other finished surfaces that will be subject to friction, shall be coated as soon as practicable after being approved, with lacquer or an anti-rust compound. When anti-rust compound is used, it shall be removed at the time of erection.

B. While still in the shop, machine finished surfaces and inaccessible surfaces of rocker or pin-type bearings shall receive the full paint system.

1.9 ERECTION MARKS

A. Erection marks and match marks shall be painted upon areas not visible to view after erection or upon areas that have received the shop paint.

1.10 SIGNS AND EMBLEMS

A. When designated, signs and/or company emblems as shown on the plans shall be painted on specified structures by qualified sign painters. This work shall not be started until the underlying finish coat is completely dry and the exact locations have been specified by the Engineer.

PART 2 MATERIALS

2.1 PAINT

A. Paint systems and materials shall be as specified on the plans or in the special provisions.

2.2 ZINC FOR GALVANIZING

A. Zinc for galvanizing shall conform to ASTM Designation: B 6 and the requirements stated in ASTM Designations: A 123 and A 153 as applicable.

B. Galvanized repair paint, Zinc Dust-Zinc Oxide Type I linseed oil paint, shall meet the Federal Specification, TT-P-641.

2.3 PETROLATUM

A. Petrolatum is a rust inhibiting grease coating applied over surfaces free of loose rust, scale, and paint and shall be subject to the approval of the Engineer.

PART 3 EXECUTION

3.1 CLEANING AND PREPARATION OF ALL SURFACES TO BE PAINTED

A. Unless otherwise prohibited by the special provisions, solvents shall be used to remove oil, grease, and other soluble contaminants in accordance with the requirements of the Steel Structures Painting Council Specification, SSPC-SP1, "Solvent Cleaning." Solvent cleaning shall be performed prior to blast cleaning. If contamination remains after blasting, the area shall be recleaned with solvent.

B. After solvent cleaning, if permitted, all surfaces to be painted shall be blast cleaned in accordance with the requirements of the Steel Structures Painting Council Specification, SSPC-SP6, "Commercial Blast Cleaning." Special attention shall be given to the cleaning of corners and re-entrant angles. All cleaned surfaces shall have an anchor profile of 1 to 2.5 mils.

C. Abrasives used for blast cleaning shall be either clean dry sand, mineral grit, steel shot, or steel grit, at the option of the Contractor, and shall have a suitable grading to produce satisfactory results. The use of other abrasives will not be permitted unless approved in writing by the Engineer. Unwashed beach sand containing salt or excessive amounts of silt will not be allowed.

D. Before painting, all blast products shall be removed from the surfaces, and the cleaning shall be approved by the Engineer. The blast cleaned surfaces shall be given a coat of paint within 24 hours after cleaning, unless otherwise authorized by the Engineer. The surface must be painted before rust forms.

E. In repainting existing steel structures the method of cleaning will be specified in the special provisions. Any damage to sound paint, on areas not designated for treatment, resulting from the Contractor's operations shall be repaired by the Contractor at the Contractor's expense to the satisfaction of the Engineer.

3.2 PAINT APPLICATION

A. Surfaces shall be painted as soon as practicable after they have been properly cleaned and approved for painting by the Company's inspector. Blast cleaning and painting operations shall be coordinated so that at all times the blast cleaning work will be carried on a sufficient distance from freshly painted surfaces to preclude any adhesion of grit in the fresh paint.

B. All painting shall be done in accordance with the requirements of the Steel Structures Painting Council Specification, SSPC-PA1, "Shop, Field and Maintenance Painting."

C. Unless otherwise specified three coats of paint shall be applied to all new structural steel (except "Weathering Steel"). The prime and intermediate coats shall be applied in the fabricating shop. The finish coat shall be applied in the field after erection. The dry film thickness of each coat shall be as specified on the plans or in the special provisions. Each

coat shall differ enough in color from its preceding coat to make it easy to see voids in the fresh paint. Colors shall be as stated on the plans or special provisions as the Engineer directs. The final coat on any surface exposed to view shall be made with paint from a common batch. The Contractor shall provide the Engineer with a written method for verifying and certifying that the final coat is, in fact, from a common batch.

3.3 SHOP PAINTING

A. Shop painting shall include the furnishing of all shop applied paint, the preparation and cleaning of surfaces, the application, drying and protection of the shop applied paint; and the supplying of all materials, tools and labor necessary to complete the work.

B. Refer to Paragraph 1.6 for surfaces in contact with concrete, Paragraph 1.7 for contact and inaccessible surfaces, and Paragraph 1.8 for machine finished surfaces.

C. The fabricated steel shall not be loaded for shipment until the shop paint is dry and has been inspected and approved by the Engineer. Structural steel shall not be loaded for shipment sooner than 24 hours after application of paint. No painting shall be done after the material has been loaded for shipment.

3.4 FIELD PAINTING

A. Field painting following shop painting and steel erection shall include the furnishing of all field applied paint, the cleaning of all surfaces as required, the application of the prime and intermediate coats on all surfaces not painted in the shop and on all shop painted surfaces damaged during handling and erection, the application, drying and protection of the finish paint coat and the supplying of all materials, tools and labor necessary to complete the work, including signs and emblems, and to protect surfaces not to be painted from contamination.

B. Field painting of steel not previously shop painted shall include the furnishing of all field applied paint, the cleaning of all surfaces, the application of the field applied paint coat, or coats as specified; and the supplying of all materials, tools and labor necessary to complete the work, including signs and emblems, and to protect surfaces not to be painted from contamination.

3.5 REMOVAL OF UNACCEPTABLE COATINGS

A. All coatings applied improperly or which fail to dry or adhere properly, or do not evidence a normal, workmanlike appearance shall be remedied or completely removed and replaced under the direction of the Engineer and at the expense of the Contractor.

B. When the final field coat does not have a uniform color and appearance throughout the structure, it shall be corrected by the use of whatever additional coats or other corrective measures found to be necessary. Freshly applied paint which has not yet set shall be removed with the use of suitable solvents. Removal of dried paint films shall be either by means of blast cleaning, scraping, or other methods meeting the approval of the Engineer.

3.6 INSPECTION

A. All material and workmanship shall be subject to inspection by the Company's inspector.

B. The Contractor shall provide all reasonable facilities, labor, materials, equipment, scaffolding and assistance for the safe and convenient conduct of all inspections.

C. All surfaces will be inspected and approved prior to completion or proceeding to the next order of work.

D. Such inspections shall not relieve the Contractor's responsibility for furnishing qualified labor, materials and workmanship in strict accordance with these specifications.

E. Any work performed or results achieved which are not in strict accordance with these specifications shall be redone to meet these specifications at the Contractor's expense.

3.7 GALVANIZED STEEL

A. When designated on the plans or in the special provisions, steel shall be galvanized as follows:

1. Steel members, fabrications, and assemblies shall be galvanized after fabrication by the hot dip process in accordance with ASTM Designation: A 123.

2. Bolts, nuts and washers and iron and steel hardware components shall be galvanized in accordance with ASTM Designation: A 153.

B. After galvanizing, all elements shall be free of fins, abrasions, rough or sharp edges, and other surface defects. The galvanized coating shall be continuous, adherent, as smooth and evenly distributed as possible and free from any defect that is detrimental to the coated article.

C. Damaged galvanized surfaces shall be thoroughly cleaned to remove all contaminants including weld slag, weld splatter, and rust and shall then be painted with two coats of galvanized repair paint meeting the requirements of Paragraph 2.2.B.

3.8 PETROLATUM APPLICATION

A. Petrolatum application shall include the furnishing of petrolatum as specified in Paragraph 2.3, the cleaning of surfaces to remove loose rust, scale and dirt; the application of an approximately 1/32 inch thick coating on surfaces designated on the plans, in the special provisions or by the Engineer; and the supplying of all materials, tools and labor necessary to complete the work.

PART 4 MEASUREMENT AND PAYMENT

4.1 PROTECTIVE COATINGS FOR STEEL SURFACES

A. Protective coatings for steel surfaces including surface cleaning and preparations, shop painting, field painting, hot dip galvanizing of steel items and petrolatum application shall be considered as incidental to other items of work and no measurement nor direct payment will be made therefor.

END OF SECTION

SECTION 04900

ELASTOMERIC BEARING PADS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Plain Elastomeric Bearing Pads

B. Laminated Elastomeric Bearing Pads

1.2 DESCRIPTION

A. Elastomeric bearing pads covered by this section includes plain pads consisting of elastomer only and laminated pads consisting of alternate laminations of elastomer and steel sheets bonded together.

1.3 CERTIFICATION

A. The bearing pad supplier shall certify that the elastomer, and steel sheets if used, in the bearing pads that are furnished for each order conform to all of the requirements of Paragraphs 2.1 and 2.2. The certification shall be supported by a certified copy of the results of tests performed by the manufacturer upon samples of the elastomer and steel sheets that were used in the bearing pads.

PART 2 MATERIALS

2.1 ELASTOMER

A. The elastomer for bearing pads shall be formulated from previously unvulcanized 100 percent virgin polychloroprene (neoprene) and shall, as determined from test specimens prepared in accordance with ASTM Designation: D 3190, conform to the following:

ASTM Designation	Test	Requirement
D 2240	Hardness, Type A Durometer	60 +/- 5
D 412	Minimum Tensile Strength in MPa	17
	Minimum Elongation at break, %	350
D 573	Heat Resistance, Oven Aged 70 hrs at 100 deg. C.	
	Change in durometer hardness, max. points	0 to +15
	Change in tensile strength, max. %	-15
	Change in ultimate elongation, max. %	-40
D 395	Compression Set, 22 hrs. at 70 deg. C., Method B, max. %	25

D 1149	Ozone Resistance, 1 ppm in Air by volume, 20% strain, 40 +/- 1 deg. C., mounting procedure D 518 Procedure A	No cracks after 100 hrs. exposure
D 2137	Low Temperature Brittleness, at -40 deg. C.	Pass
D 624	Tear Resistance, Die "C", min. N/m	43,775

2.2 STEEL SHEETS

A. Steel sheets for use in laminated bearing pads shall meet the requirements of ASTM Designation: A 570, Grade 36.

2.3 METHYL ETHYL KETONE

A. Methyl ethyl ketone for use in cleaning of elastomeric bearing pads shall meet the requirements of ASTM Designation: D 740, Type 1 or Type 2.

2.4 GEL TYPE EPOXY

A. The gel type epoxy shall be a two component, epoxy-resin bonding system conforming to the requirements of ASTM Designation: C 881, Type IV, Grade 2, Class B or C. The class supplied shall be governed by the range of temperatures for which the material is to be used.

PART 3 EXECUTION

3.1 PLAIN BEARING PADS

A. Plain bearing pads shall be cast in molds under pressure and heat and may be molded individually, cut from previously molded strips or slabs molded to the full thickness of the finished bearings, or extruded and cut to length. Plain bearing pads shall be fully vulcanized, uniform and integral units of such construction that the bearing pad cannot be separated by any mechanical means into separate, definite and well-defined elastomeric layers. Evidence of layered construction shall be cause for rejection.

B. Cutting of plain bearing pads from previously molded strips or slabs shall be performed in such a manner as to avoid heating of the material and to produce an edge, with no tears or other jagged areas, having a surface roughness that does not exceed ANSI/ASME B46.1, 250.

3.2 LAMINATED BEARING PADS

A. Laminated bearing pads shall have alternate layers of elastomer and steel sheets as shown on the design drawings, and shall be cast in individual molds under heat and pressure to form an integral unit of such construction that the bearing pad cannot be separated by any mechanical means into separate, definite and well-defined elastomeric layers. Evidence of layered construction shall be cause for rejection.

B. The top and bottom steel sheets and the edges of all steel sheets shall be uniformly covered with not less than 1/8 inch of elastomer. The maximum cover of elastomer over the edges of steel sheets shall be 1/4 inch. Steel sheets shall be abrasive blast cleaned to remove all rust, mill scale, and other contaminates, and shall be free of sharp edges and burrs.

3.3 TOLERANCES

A. For both plain and laminated bearing pads the permissible variation from the dimensions and configuration required by the plans and these specifications shall be as follows:

1. Overall vertical dimensions
   - Average total thickness 1-1/2" or less: -0, +1/8"
   - Average total thickness over 1-1/2": -0, +1/4"

2. Overall horizontal dimensions -0, +1/4"

3. Thickness of individual layers of elastomer (laminated bearing pads only): +/-1/8"

4. Variation from a plane parallel to the theoretical surface
   - Top: 1/8"
   - Sides: 1/4"
   - Individual Steel Sheets: 1/8"

5. Size of holes or slots: -0, +1/8"

6. Position of holes or slots: +/-1/8"

3.4 INSTALLATION

A. Elastomeric bearing pads shall be installed in accordance with the plans. Substructure bearing surfaces to receive the bearing shall be level, smooth, and finished to the correct elevation. The entire bearing surface shall be fully loaded under all conditions.

B. Top and bottom elastomer surfaces shall be level under dead load only. Tapered load plates bonded to the bearing, tapered sole plates on the bridge span, or epoxy mortar between the bearing and the bridge span, as specified on the plans, shall compensate for span grade, rotation, or camber.

C. Welding of bridge span members to the bearing load plate is not permitted unless there is more than 1-1/2 inches of steel between the weld and the elastomer. The temperature of the steel plate in contact with the elastomer shall not exceed 400 degrees F during the welding process.

D. Bearing areas on bridge seats and precast concrete beams, which are to receive epoxy materials, shall be abrasive blast cleaned to remove all form oil and curing agents and

shall be in a dust free condition. Bearing areas on steel bearing plates, which are to receive epoxy materials, shall be cleaned of all dirt, grease, and other contaminants before epoxy materials are applied.

E. Clean top and bottom surfaces of bearing pads with methyl ethyl ketone to remove all traces of mold release agents. When mating surfaces are clean and dry, gel type epoxy as specified in Paragraph 2.4.A shall be applied to a 5 mil thickness on the areas of the bridge seat where elastomeric bearing pads are to be placed, and on the bottom side of the elastomeric bearing pads and then the pads shall be set and held in the proper location on the bridge seat until the epoxy takes its initial set. Pads must be held down with sufficient weight to ensure total pad contact on the bridge seat.

F. When epoxy mortar is specified to compensate for span, grade, rotation, or camber, mortar consisting of equal parts by volume of gel type epoxy as specified in Paragraph 2.4.A and dry silica sand, mixed in accordance with manufacturer's directions, shall be spread on top of bearing pads to a thickness of approximately 1/8 inch just before setting beams in order to obtain uniform bearing. The beams shall be set in the proper location on the bearing pads before the epoxy mortar takes its initial set. Scrape excess mortar from around bearing pads after beams are set.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Elastomeric bearing pads will be measured by each elastomeric bearing pad.

4.2 PAYMENT

A. Elastomeric bearing pads will be paid for at the contract unit price per each elastomeric bearing pad in place. This price shall include full compensation for furnishing all materials, and for all labor, tools, equipment, and incidentals necessary to complete the work.

END OF SECTION

APPENDIX A
GEOTECHNICAL INFORMATION

HWA GEOSCIENCES INC.
Geotechnical & Pavement Engineering · Hydrogeology · Geoenvironmental · Inspection & Testing

February 26, 2010
HWA Project No. 2007-142-21

AECOM Transportation
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004

Attention: Kiva Lints, P.E., S.E.

Subject: **Geotechnical Evaluation Report**
Willow Creek Culvert Replacement under BNSF Mainline
Edmonds, Washington

Dear Mr. Lints:

As requested, HWA GeoSciences Inc. (HWA) completed a geotechnical evaluation in support of the design and construction of the proposed replacement culvert located under the BNSF Mainline. The purpose of our work was to evaluate subsurface conditions at this location and to provide geotechnical recommendations for this project. This final report incorporates your comments on an initial draft report, and presents our findings, assumptions and recommendations.

PROJECT DESCRIPTION

As part of the Seattle to Everett Commuter Rail project for Sound Transit, BNSF is constructing a second mainline track. In this area, the work is referred to as the Edmonds Double Track Project. The second track will be located on the east (upland) side of the existing mainline. Willow Creek currently extends below the single mainline tracks in a culvert. The subject project involves construction of single-span bridge at a future creek under-crossing. Figure 1 is a Vicinity Map showing the project location.

As part of the future Washington State Ferry's Edmonds Multi-Modal project, Willow Creek will be re-routed south along the east (upland side) of the existing mainline approximately 700 feet. The creek will then be routed to the west and will cross beneath the mainline tracks, where it will traverse the City of Edmonds Off Leash Dog Park, and enter Puget Sound. After evaluation of costs and constructability issues associated with various culvert options, Sound Transit selected a single-span railroad bridge to be constructed for this under-crossing.

In order to keep the existing mainline track open for freight during this construction, the bridge structure will be constructed in stages. **Stage 1** will shift the existing mainline tracks slightly to the east approximately

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4 feet to the proposed AO-MT2 location; construct temporary shoring; and construct the western portion of the new bridge. **Stage 2** will include constructing the tracks at the proposed AO-MT1 location on the western portion of the bridge, shifting the active railroad traffic to the AO-MT1; removing the temporary shoring between the new bridge abutments; and constructing the remaining portion of the bridge. In the **Final Stage**, the proposed tracks at AO-MT2 will be constructed and both sets of tracks will be open.

This geotechnical engineering report provides recommendations for design and construction of the railroad bridge structure.

SUBSURFACE CONDITIONS

General Geologic Conditions

Geologic information was obtained from *Preliminary Surficial Geologic Map of the Edmonds East and Edmonds West Quadrangles, Snohomish and King Counties, Washington* (Mackey Smith, 1975). This map indicates the surficial geology in the project vicinity consists of deposits from the Whidbey Formation. The Whidbey Formation can be expected to consist of sand, silt, and clay, bedded 2 to 4 feet thick, with particle sizes ranging from clay to coarse sand. This map also indicates that much of the area consists of Modified Land, which is land disturbed by removal, grading and artificial fill of unknown quality.

Exploration

We conducted a site subsurface exploration program on July 16 and July 17, 2008. The subsurface investigation consisted of two borings; each drilled two depths of 41.5 feet below the ground surface (bgs). Our boring BH-1 was located east of the BNSF Mainline and BH-2 was located to the west of the BNSF Mainline. Figure 2 is a Site and Exploration Plan illustrating the approximate locations of our borings. The borings were drilled by Holocene Drilling, under subcontract to HWA, using a CME-850 track mounted drill rig with a hollow stem auger. Soil samples were taken every two and a half (2½) feet to a depth of 20 feet and taken every five (5) feet thereafter. Sampling was accomplished in general accordance with the Standard Penetration Test (SPT), which consists of driving a 2-inch outside diameter (OD) and 1.375-inch inside diameter split-spoon sampler 18 inches into the soil. The sampler is advanced using a 140-pound hammer freely-falling a distance of 30 inches onto the sampling rods. The number of blows required to advance the sampler each of three 6-inch intervals is recorded. The SPT N-value is the total number of blows required to advance the sampler the final 12 inches. The N-value provides and indication of the relative density of the granular materials encountered in our borings. Boreholes were backfilled using bentonite chips. A slotted standpipe monitoring well (piezometer) was installed in BH-2 to monitor groundwater conditions.

Figure 3 is a legend of terms and symbols used on HWA borings. Our logs of borings BH-1 and BH-2 are presented in Figures 4 and 5, respectively.

Sampling and Testing

SPT soil samples were taken at 2½- to 5-foot intervals. An HWA geologist inspected and logged each sample, recording pertinent information including soil sample depths, stratigraphy, ground water occurrence, and any visual or olfactory observations regarding the presence of contamination.

Soil samples were logged with respect to lithology and field screened for organic vapors by headspace analysis using a photoionization detector (PID). HWA conducted field screening of soil from the borings for the presence of volatile organic vapors using a Mini-Rae PGM 75 photoionization detector (PID). Any visual indications of contamination and odor were also noted. Although the PID is not capable of quantifying or identifying specific organic compounds, this instrument is capable of measuring relative concentrations of a variety of organic vapors with ionization potentials less than the energy of the ultraviolet source (in this case, 10.6 eV). The PID is useful for providing qualitative information with respect to the presence and relative concentration of organic vapors.

The PID was calibrated with 100 parts per million isobutylene standard at the beginning of the day. Fifty to 100 milliliters of soil from a discrete depth were placed in a plastic bag, sealed, and permitted to sit at least 10 minutes prior to analyzing the vapor in the sample bag. The bag was then perforated by the PID sample tip to obtain the reading.

No samples were detected with elevated levels of organic vapors or discernible visual/olfactory contamination. Due to the absence of field screening indications, a composite sample of above ground water material was submitted for analysis.

We submitted the composite soil sample to Onsite Environmental Laboratory for analysis. HWA delivered samples to the laboratory within 24 hours of sampling and employed full chain-of-custody procedures to allow tracking and handling of the samples. Analytical results, shown in Table 1, show no elevated hydrocarbon levels in the composite sample.

Of the remaining collected soil samples, select samples were chosen to further characterize relevant engineering and index properties of the site soils. These tests were performed at HWA's laboratory in Lynnwood, Washington and included tests for natural moisture content and grain size distribution, Figures 4-7 respectively. HWA personnel performed laboratory tests in general accordance with appropriate ASTM standards.

Table 1: Analytical Soil Data (reported in milligrams per kilogram, mg/kg)

			Petroleum Hydrocarbons			Aromatic Hydrocarbons			
Sample ID	**Sample Description**	**PID Reading (ppm)**	**Diesel**	**Lube Oil**	**Gasoline**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes**
BH-2-Comp	*Sand*	*0*	*<28*	*<55*	*<5.3*	*<0.02*	*<0.053*	*<0.053*	*<0.053*
MTCA Method A Cleanup Level			2000	2000	30/100*	0.03	7	6	9

Notes:
MTCA A – Ecology MTCA Method A soil cleanup levels, Chapter 173-340 WAC, shown for reference only. These cleanup levels may not apply at this site, and are provided as a screening level indication of the environmental quality of the site only. All values are in milligrams per kilogram (mg/kg)
* - The Method A Soil cleanup levels for gasoline mixtures without benzene and the total of ethylbenzene, toluene, and xylenes are less than 1% of the gasoline mixture are 100 mg/kg/all other mixtures are 30 mg/kg.
All diesel range hydrocarbon sample extracts treated with an acid/silica gel cleanup procedure.

Site Soil Conditions

The first borehole, BH-1, was completed on July 16, 2008. Groundwater was encountered at about 7 feet below grade surface (bgs). The upper 20 feet primarily consisted of silty, fine to medium grained sand. SPT blow counts indicate that this material is loose to medium dense. At approximately 17.5 feet a one-foot thick layer of slightly gravelly organic silt was discovered. Below 17.5 feet, dense, slightly gravelly, fine to medium sand was encountered to the bottom of the boring at 41.5 feet bgs.

The second borehole, BH-2, was completed on July 17, 2008. Groundwater was encountered at approximately 9.5 feet bgs during drilling. The upper 15 feet consisted of loose to medium dense fine to coarse sand. Below 15 feet, the material then became dense to very dense, gravelly, silty sand to the bottom of the boring at 41.5 feet bgs.

We interpreted the native sand encountered in BH-1 and BH-2 to be part of the Whidbey Formation. Our interpretation of the site soil conditions apply only to the locations at which we drilled.

It is also important to note that ground water conditions are reported for the specific date and locations indicated and, therefore, may not necessarily be indicative of other times and/or locations. It is anticipated that ground water conditions will vary depending on the season, local subsurface conditions, tides, and other factors. Ground water measurements were recorded using a pore pressure transducer during the months of January and February for approximately 10 days. As is evident from Figure 9, the ground water table fluctuates about 1 foot with tidal fluctuations. The average ground water table is approximately Elevation + 6.5.

CONCLUSIONS AND RECOMMENDATIONS

Pile Foundations for Permanent Bridge

The permanent single-span bridge will be constructed in accordance with BNSF Standard Bridge Plans, which call for steel H-piles for foundation support. The proposed H-piles are HP 14x89. The project Plans call for these piles to be driven to achieve ultimate capacities of 250 tons.

Dense sand was encountered in our borings below approximate Elevation minus 15 feet, and pile driving resistance will increase below this tip elevation. However, given the low-displacement nature of H-piles, there is a possibility that the piles will achieve significantly greater penetration depths before required ultimate axial capacities are achieved. Actual required penetration depth is difficult to predict accurately. The contractor should be prepared to field-splice additional pile length as necessary. For planning purposes, minimum pile tip elevation of minus 25 feet (-25 ft) should be assumed. Steel H-piles should be measured and paid for on a unit-price basis.

Pile capacities and final pile tip elevation, should be verified in the field at the time of driving. A vibratory pile driving hammer could be utilized for initial pile placement and driving. However, final driving must be done with an impact hammer, so that pile capacities can be verified. BNSF Standard Bridge Plans call for pile capacity to be determined using the Modified ENR formula. However, in our opinion, the Modified ENR formula is outdated and in some cases un-conservative. We recommend that pile capacity be determined using the wave equation analysis of pile driving (WEAP). HWA is available to provide during-construction assistance and evaluation of pile capacity if requested.

Temporary Shoring

As indicated on the construction sequence and bridge layout drawings provided by AECOM Transportation, temporary shoring will be required to facilitate the staged construction. Drawings indicate the maximum exposed height of the temporary shoring will be about 12 feet. The temporary shoring will be in close proximity to the active main line, and thus, it will need to support the lateral influence of train live loading.

From a shoring installation perspective, the soils encountered in our borings are suitable for shoring installation with using vibratory pile driving equipment. Either interlocking steel sheet piles or steel soldier piles with timber lagging could be considered for shoring. However, the average ground water level is at approximate Elevation +6.5; and temporary excavations will extend down to approximate Elevation +4 feet. Thus, the excavations will extend 2.5 feet or greater below the ground water level. . For this reason, we consider interlocking steel sheet piling would be more effective temporary shoring than soldier piles and timber lagging. The interlocking steel sheets will tend to cut off and reduce the amount of water flowing past the

shoring and into the excavated creek channel. Ultimately the Contractor should be responsible to design and install the temporary shoring.

Figure 8 presents recommended earth and ground water design pressures for the temporary shoring. Due to its proximity to the active main line, the temporary shoring design must also be designed to accommodate live load effects from a Cooper E80 train. BNSF live loading requirements are presented in the BNSF and Union Pacific *Guidelines for Temporary Shoring*. The Cooper E80 lateral surcharge pressures - determined in accordance with the *Guidelines for Temporary Shoring* - should be added to the soil and ground water pressures presented in Figure 8. The Contractor should be required to submit the temporary shoring design to AECOM Transportation and HWA for review and approval.

Temporary Excavations and Dewatering

Temporary excavations should be performed in accordance with the current requirements of federal, state and/or local agencies. Exposure of personnel beneath temporary cut slopes should be kept to a minimum. Construction should proceed as rapidly as feasible, to limit the time temporary excavations are open. During wet weather, runoff water should be prevented from entering excavations, and should be collected and disposed of outside the construction limits. Heavy construction equipment, building materials, and surcharge loads such as excavated soil should not be allowed within 1/3 the slope height from the top of any excavation.

Per the Washington Administrative Code 296-155, site soils classify as Type C soils and may be constructed no steeper than 1.5H:1V (horizontal:vertical). Specific design for temporary slopes is not included herein, since the contractor has control over factors during construction that are critical to the stability of the slope. Such factors include the amount of slope opened at one time, the length of time the slope is left open, and to some extent when the slope is left open in terms of weather conditions. Thus, maintaining safe and stable temporary excavations is the responsibility of the contractor.

With time and the presence of seepage and/or precipitation, the stability of temporary unsupported cut slopes can be significantly reduced. Therefore, all temporary slopes should be protected from erosion by installing a surface water diversion ditch or berm at the top of the slope and by covering the cut face with well-anchored plastic sheets. In addition, the contractor should monitor the stability of the temporary cut slopes and adjust the construction schedule and slope inclination accordingly.

Excavations to the proposed stream channel elevation will be about 2.5 feet below the average ground water level. The contractor should be prepared to deal with groundwater during construction. Design and implementation of any dewatering system is the responsibility of the contractor.

Wet Weather Earthwork

Existing site soils are moisture sensitive to varying degrees, and may be difficult to handle or traverse with construction equipment during periods of wet weather. Therefore, general recommendations relative to earthwork performed in wet weather or in wet conditions are presented below. These recommendations should be incorporated into the contract specification and should be required when earthwork is performed in wet conditions:

1) Site stripping and fill placement should be accomplished in small sections to minimize exposure to wet weather. Excavation or removal of unsuitable soil should be followed promptly by placement and compaction of a suitable thickness of clean structural fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance.

2) Material used as structural fill should consist of clean granular soil, of which not more than 5% passes the U.S. Standard No. 200 sieve, based on wet sieving the fraction passing the ¾-inch sieve. The fine-grained portion of structural fill soils should be non-plastic.

3) No soil should be left uncompacted so it can absorb water. Stockpiles of excavated soil should either be shaped and the surface compacted, or covered with plastic sheets. Soils that become too wet should be removed and replaced with clean granular materials.

4) Excavation and placement of fill should be monitored by someone experienced in wet weather earthwork to determine that the work is being accomplished in accordance with the project specifications and the recommendations contained herein.

Qualifications and Limitations

We prepared this letter report for use by Sound Transit and AECOM Transportation, for use in the design of a portion of this project. This report should be provided in its entirety to prospective contractors for their bidding or estimating purposes, but our conclusions and interpretations should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and ground water conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations and may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HWA should be notified for review of the recommendations of this letter report, and revision of such if necessary.

This report is issued with the understanding that it is the responsibility of the owner to ensure that the information and recommendations contained herein are brought to the attention of the

appropriate design team personnel and incorporated into the project plans and specifications. It is also the owner's responsibility to see that the necessary steps are taken to verify that the contractor and subcontractors carry out these recommendations in the field.

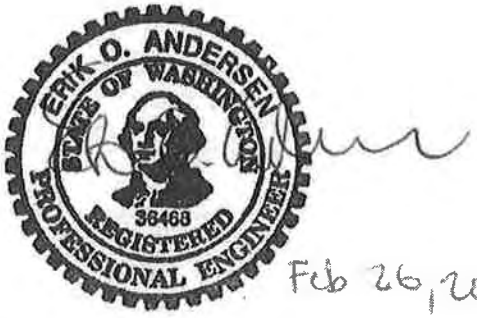
Our work included environmental testing of soil samples retrieved from our borings. These samples and tests did not reveal elevated hydrocarbon levels. However, there is always a possibility that contaminated or hazardous substances may be encountered at other locations during construction.

HWA does not practice or consult in the field of safety engineering. We do not direct the contractor's operations and we cannot be responsible for the safety of personnel other than our own on the site. The safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered unsafe.

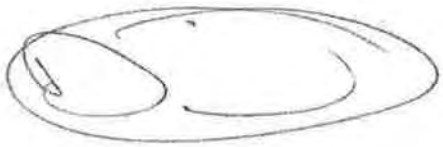
We appreciate this opportunity to provide geotechnical engineering services on this project. If you have any questions or if we may be of further assistance, please contact the undersigned at (425) 774-0106.

Sincerely,

HWA GEOSCIENCES INC.



Feb 26, 2010



Erik O. Andersen, P.E.
Senior Geotechnical Engineer

David S. Maloney
Geotechnical Engineer

February 26, 2010
HWA Project No. 2007-142-21

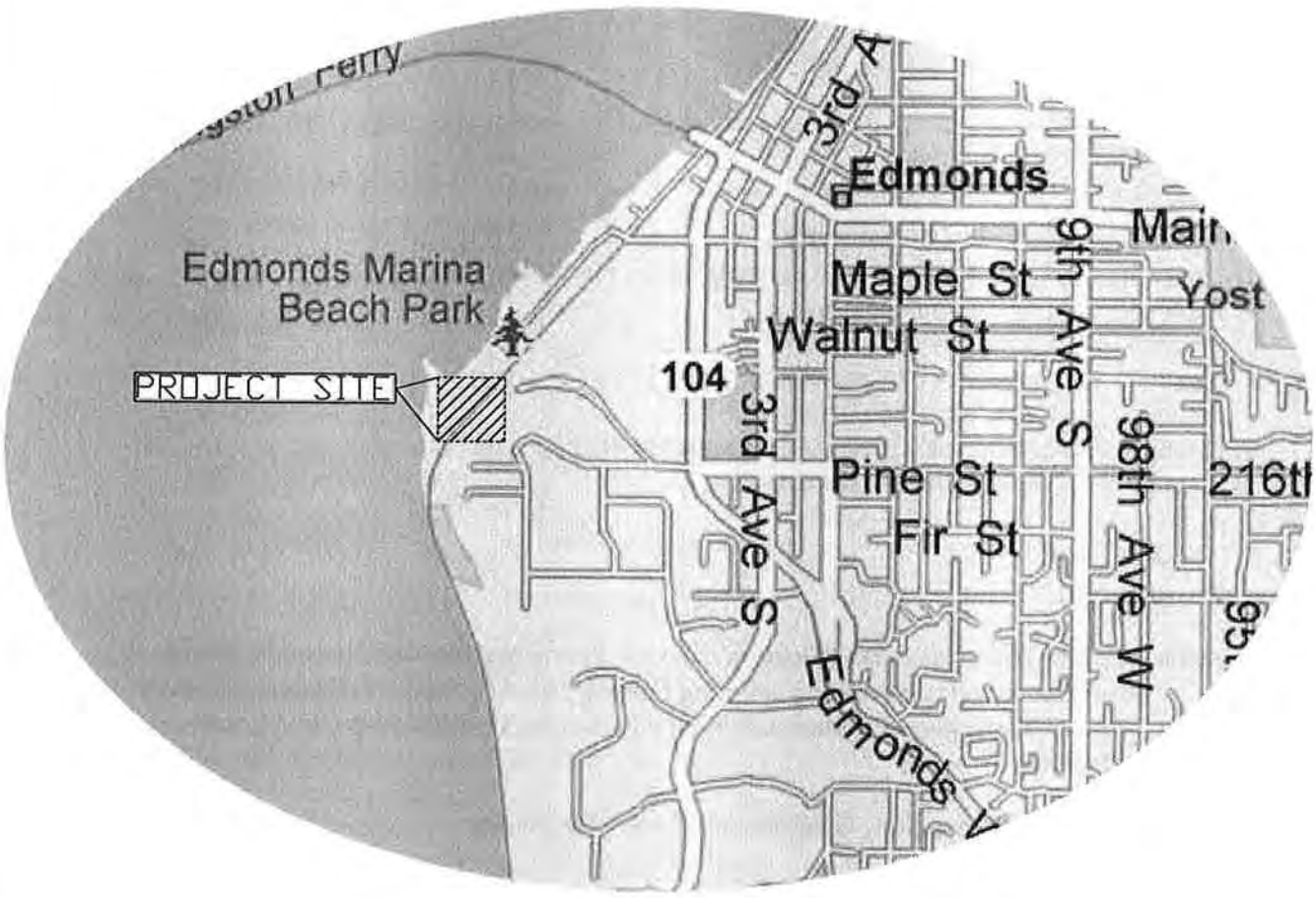
ATTACHMENTS:

Figure 1. Vicinity Map
Figure 2. Site and Exploration Plan
Figure 3. Legend of Terms and Symbols Used on Explorations
Figure 4. Log of Borehole BH-1
Figure 5. Log of Borehole BH-2
Figure 6. Grain Size Distributions, BH-1
Figure 7. Grain Size Distributions, BH-2
Figure 8. Lateral Earth Pressure for Temporary Shoring
Figure 9. Groundwater Measurements

REFERENCES:

Smith, Mackey, 1975, *Preliminary Surficial Geologic Map of the Edmonds East and Edmonds West Quadrangles, Snohomish and King Counties, Washington.* U. S. Geological Survey. State of Washington Department of Natural Resources, Geologic Map GM-14, scale 1:24,000.

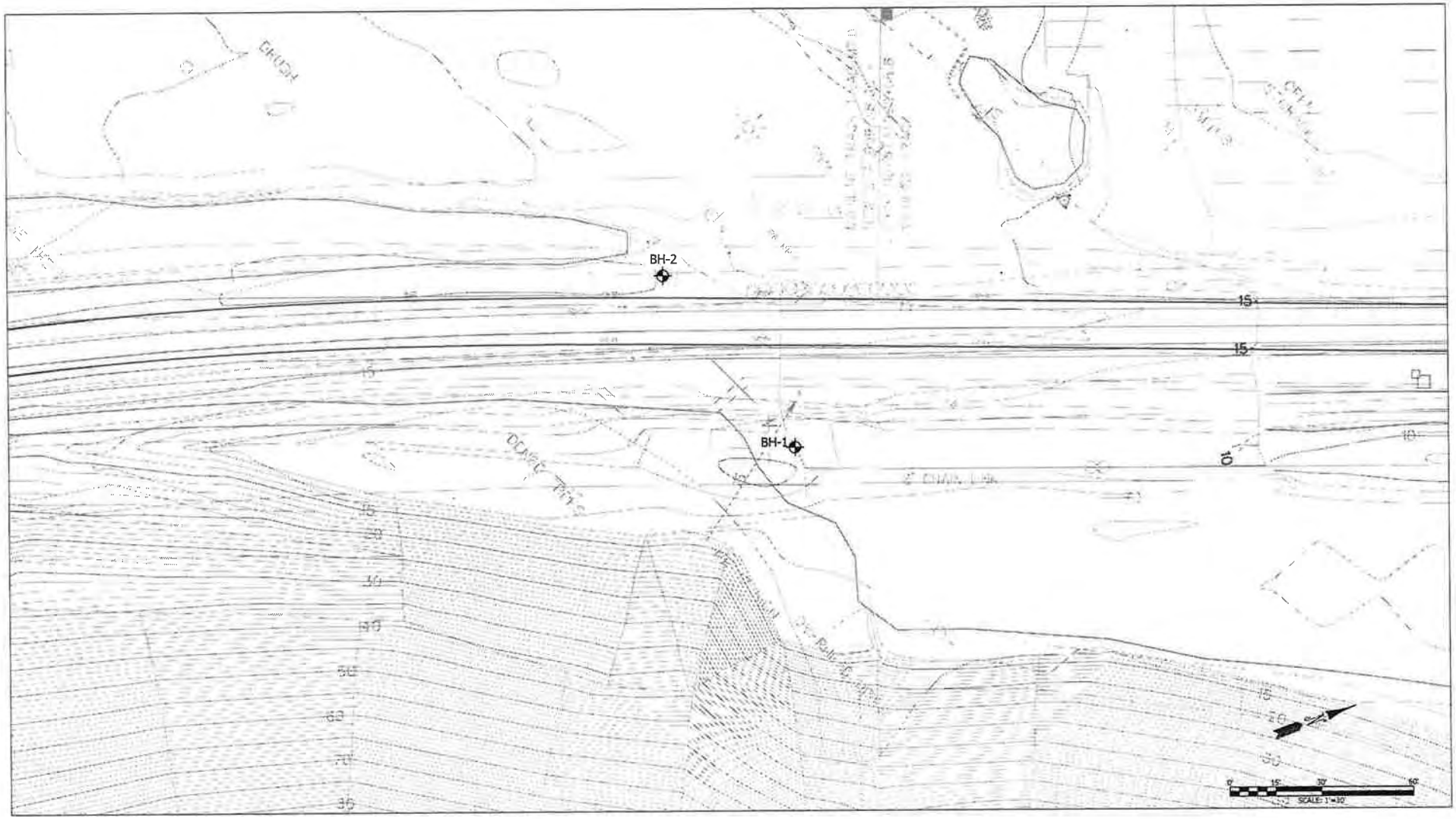
BNSF and Union Pacific, 2004, *Guidelines for Temporary Shoring*



CITY OF EDMONDS

NOT TO SCALE

HWA GeoSciences Inc.	VICINITY MAP	DRAWN BY EFK	FIGURE NO. 1
	WILLOW CREEK CULVERT REPLACEMENT UNDER BNSF MAINLINE EDMONDS, WASHINGTON	CHECK BY DM	PROJECT NO. 2007-147-21
		DATE 12.18.08	



LEGEND

BH-1 ⌖ BOREHOLE DESIGNATION AND APPROXIMATE LOCATION

BASE MAP IS FROM A PDF PROVIDED BY CLIENT

S:\2007 PROJECTS\2007-142-21 WILLOW CREEK CULVERT REPLACEMENT UNDER BNSF MAINLINE\CAD\HWA 2007-142.DWG

HWA GEOSCIENCES INC.

WILLOW CREEK CULVERT REPLACEMENT UNDER BNSF MAINLINE
EDMONDS, WASHINGTON

SITE AND EXPLORATION PLAN

DRAWN BY EPK
CHECK BY DM
DATE 12.18.08

FIGURE NO. 2

PROJECT NO. 2007-142-21

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
	More than 50% of Coarse Fraction Retained on No. 4 Sieve		GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils	Clean Sand (little or no fines)	SW	Well-graded SAND
More than 50% Retained on No. 200 Sieve Size			SP	Poorly-graded SAND
	50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit, LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

- 2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
- Shelby Tube
- 3-1/4" OD Split Spoon with Brass Rings
- Small Bag Sample
- Large Bag (Bulk) Sample
- Core Run
- Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

- Groundwater Level (measured at time of drilling)
- Groundwater Level (measured in well or open hole after water level stabllized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

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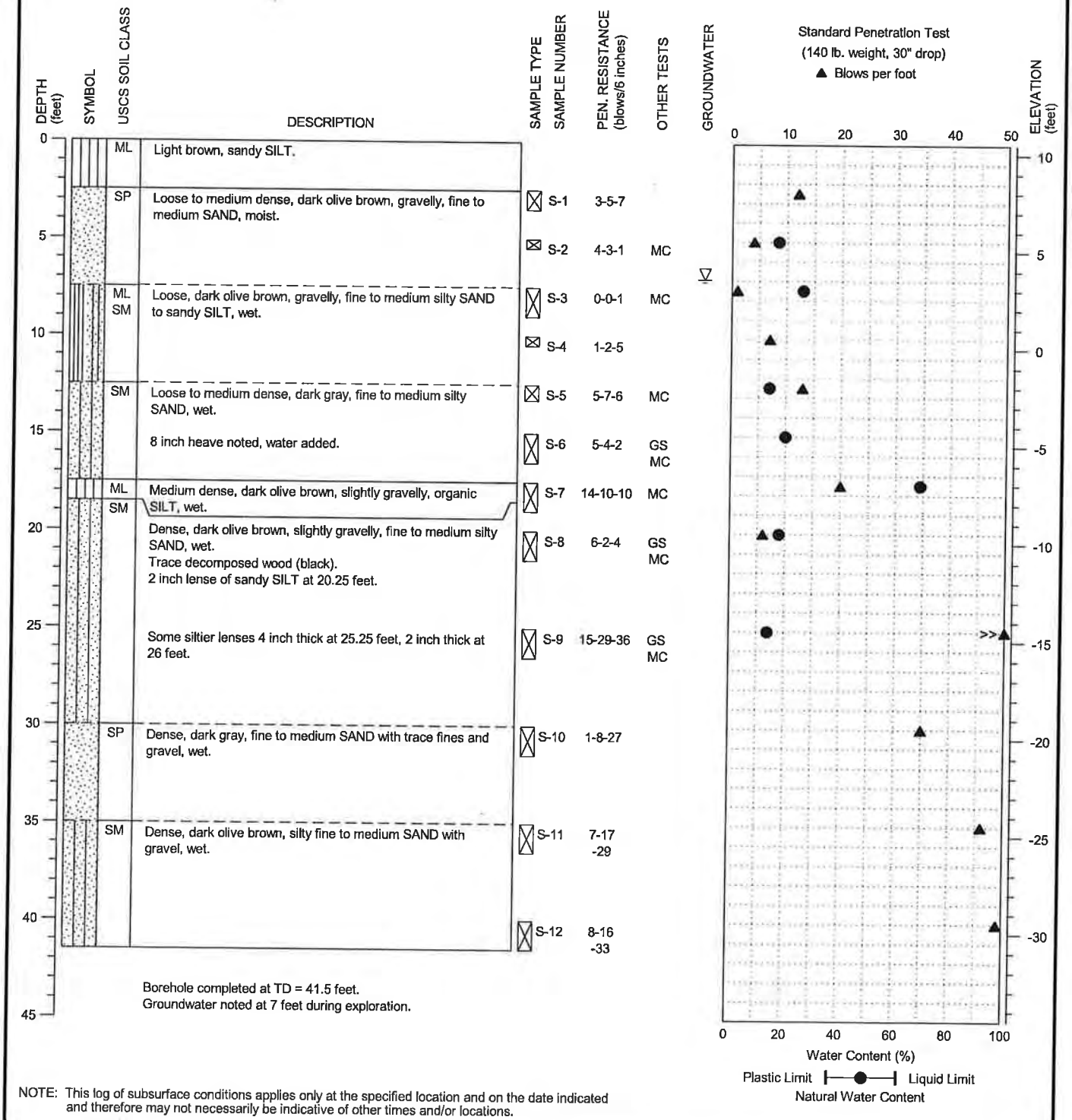
WILLOW CREEK CULVERT REPLACEMENT UNDER BNSF MAINLINE

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 2007-147-21 FIGURE: 3

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger, CME-850 track mounted rig
SAMPLING METHOD: SPT with autohammer
LOCATION: See Figure 2: Site and Exploration Plan

DATE STARTED: 07/16/2008
DATE COMPLETED: 07/16/2008
LOGGED BY: J. Speck
SURFACE ELEVATION: 10.5 ± feet



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WILLOW CREEK CULVERT REPLACEMENT
UNDER BNSF MAINLINE

BORING:
BH-1

PAGE: 1 of 1

PROJECT NO.: 2007-147-21 FIGURE: 4

BORING-DSM 2007142.GPJ 2/26/10

DRILLING COMPANY: Holocene Drilling
DRILLING METHOD: Hollow Stem Auger, CME-850 track mounted rig
SAMPLING METHOD: SPT with autohammer
LOCATION: See Figure 2: Site and Exploration Plan

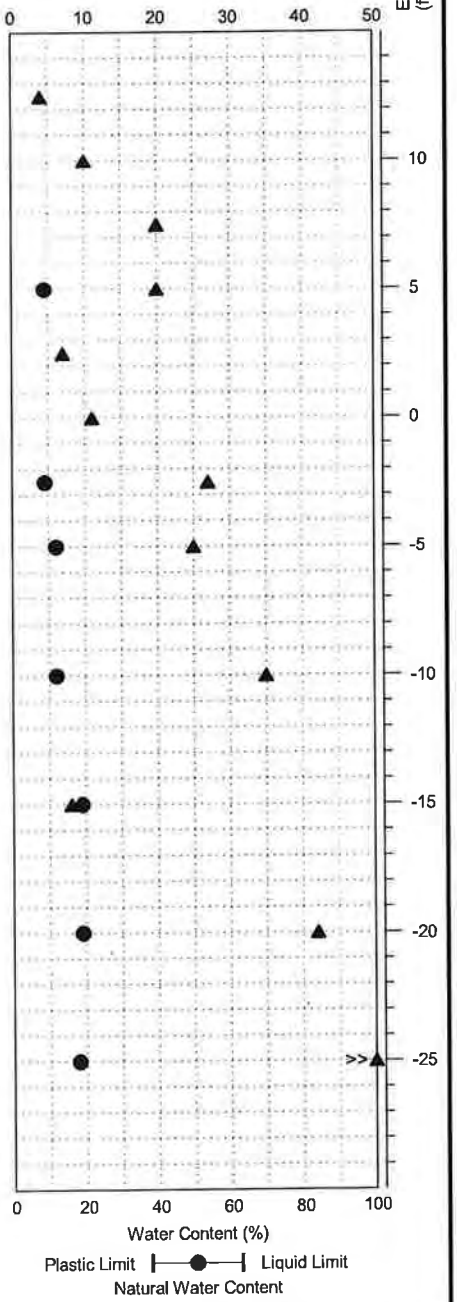
DATE STARTED: 07/17/2008
DATE COMPLETED: 07/17/2008
LOGGED BY: J. Speck/B. Blanchette
SURFACE ELEVATION: 15.0 ± feet

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS
0		SM	Cuttings, brown, sandy SILT to fine to medium silty SAND with gravel, moist.				
			No recovery		S-1	4-2-2	
5		SP	Medium dense, olive brown, gravelly, fine to coarse SAND, moist.		S-2	3-4-6	
					S-3	4-8-12	
10			Very gravelly, gravel is fine to coarse. Wet.		S-4	6-9-11	GS MC
					S-5	4-3-4	
15					S-6	2-6-5	
					S-7	8-13-14	MC
20		SP SM	Medium dense, olive brown, gravelly, fine to coarse slightly silty SAND, wet. Gravel is fine. Noticeably more fine sand than above sample.		S-8	11-10-15	GS MC
25		SM	Dense, dark gray, gravelly, fine to medium silty SAND, wet.		S-9	9-15-20	MC
30			Material becomes loose with a 3 inch thick silty sand lense at 31 feet. Color changes to dark gray at 31 feet. Wood fragments noted at 30.5 feet.		S-10	8-3-5	GS MC
35					S-11	13-21 -21	MC
40					S-12	31 -50/3	MC
45			Borehole completed at TD = 41.5 feet. Groundwater was first noted at 9.5 feet during exploration.				

GROUNDWATER

Standard Penetration Test
(140 lb. weight, 30" drop)
▲ Blows per foot

ELEVATION (feet)



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

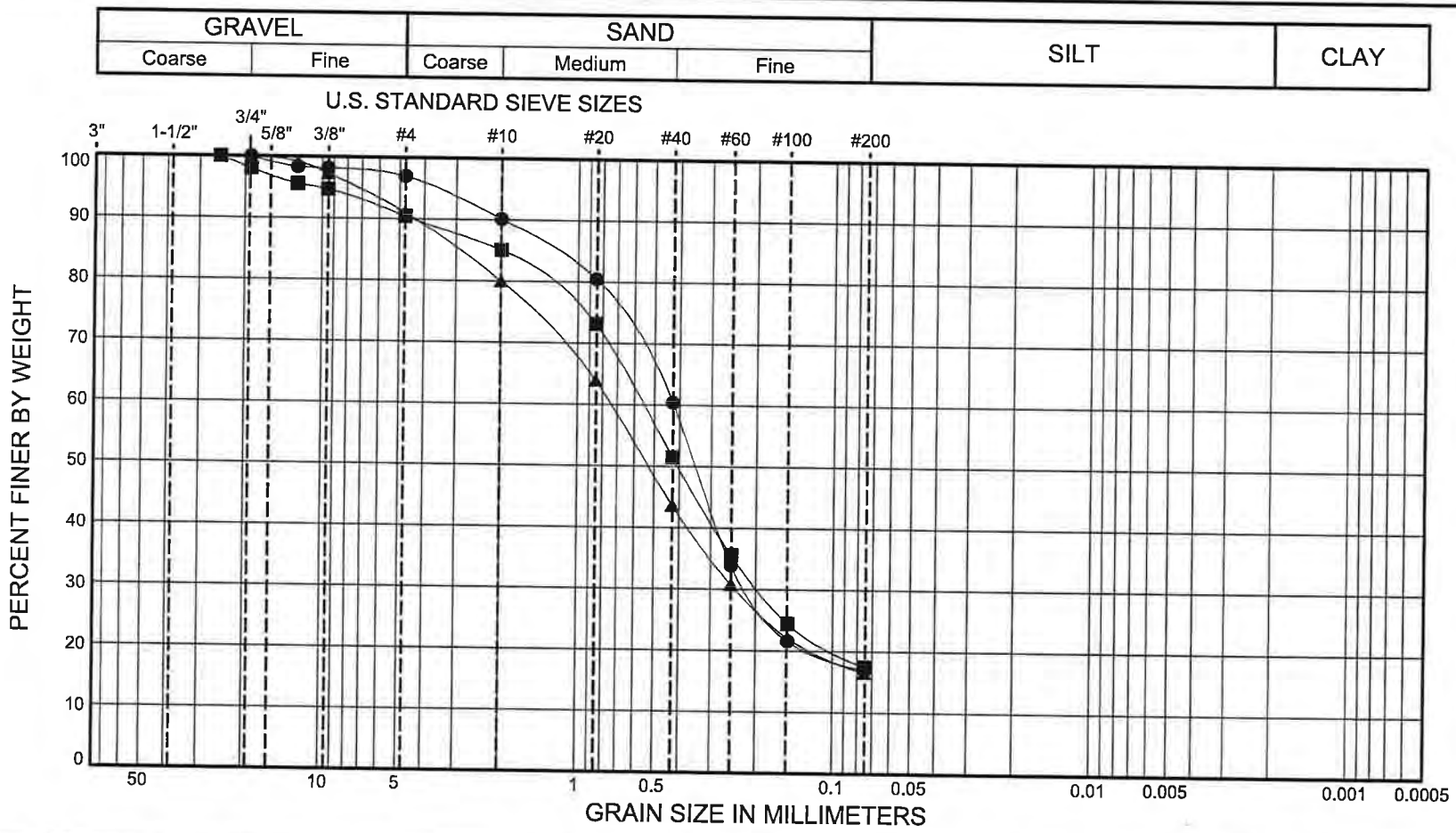
WILLOW CREEK CULVERT REPLACEMENT
UNDER BNSF MAINLINE

BORING:
BH-2

PAGE: 1 of 1

PROJECT NO.: 2007-147-21 FIGURE: 5

BORING-DSM 2007142.GPJ 2/26/10

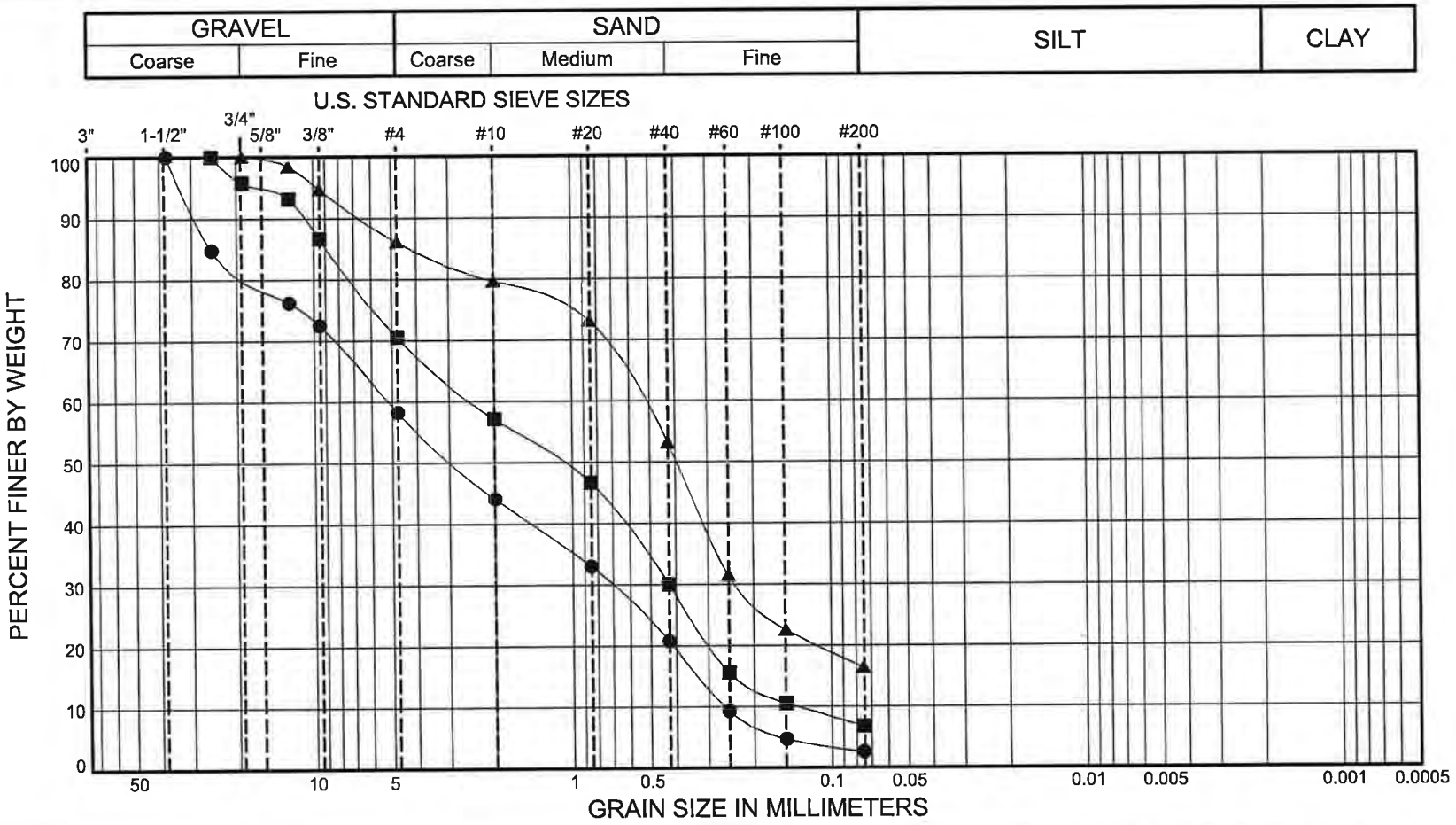


SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-1	S-6	15.0 - 16.5	(SM) Dark gray, silty SAND	20				3.1	80.0	16.9
■	BH-1	S-8	20.0 - 21.5	(SM) Dark olive gray, silty SAND	18				9.6	73.0	17.5
▲	BH-1	S-9	25.0 - 26.5	(SM) Dark olive gray, silty SAND	14				9.0	74.5	16.5

HWA GEOSCIENCES INC.

WILLOW CREEK CULVERT REPLACEMENT
UNDER BNSF MAINLINE

PARTICLE-SIZE ANALYSIS
OF SOILS
METHOD ASTM D422



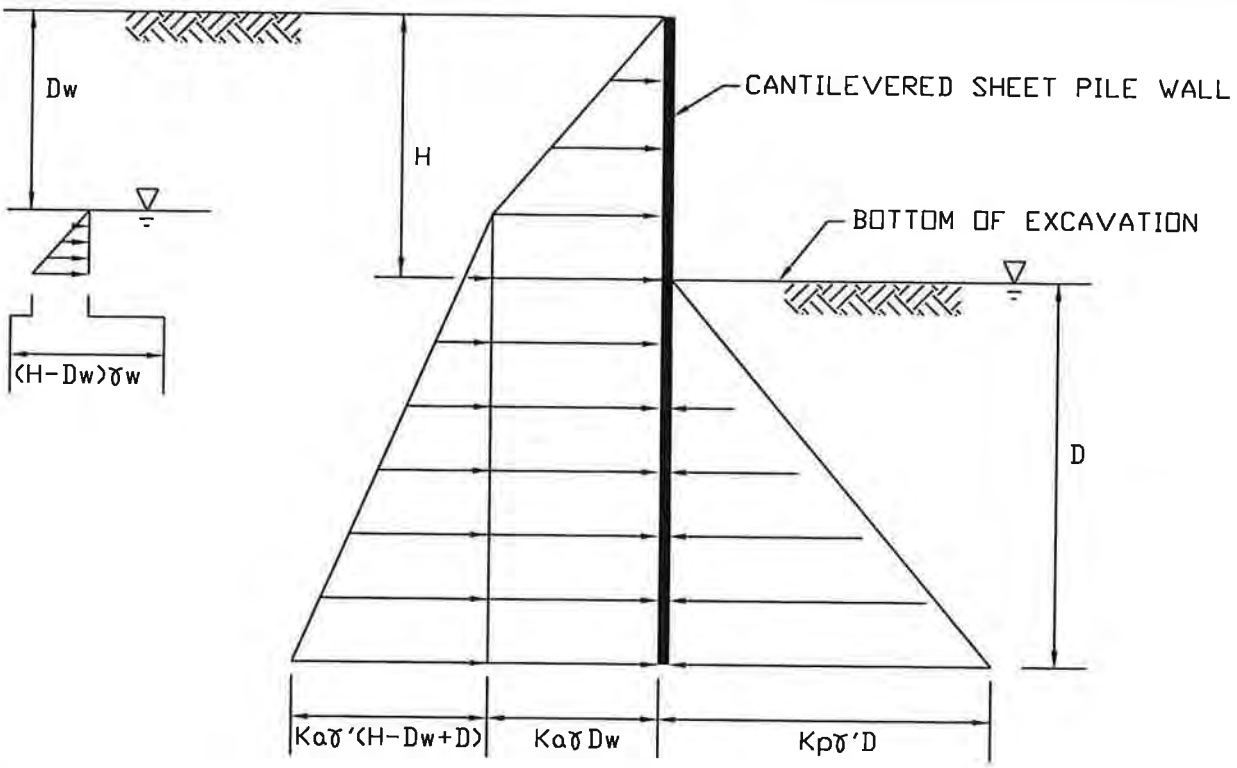
SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION OF SOIL- ASTM D2487 Group Symbol and Name	% MC	LL	PL	PI	Gravel %	Sand %	Fines %
●	BH-2	S-4	10.0 - 10.7	(SP) Grayish brown, poorly graded SAND with gravel	9				41.8	55.6	2.6
■	BH-2	S-8	20.0 - 20.7	(SP-SM) Dark olive gray, poorly graded SAND with silt and gravel	12				29.5	63.7	6.8
▲	BH-2	S-10	30.0 - 31.5	(SM) Dark gray, silty SAND	19				13.9	69.6	16.4

HWA GeoSciences Inc.

WILLOW CREEK CULVERT REPLACEMENT
UNDER BNSF MAINLINE

PARTICLE-SIZE ANALYSIS
OF SOILS
METHOD ASTM D422

PROJECT NO.: 2007-147-21 FIGURE: 7



Ka = 0.31 (ø = 32°) with level backfill

Kp = 3.25

γ = 115 pcf

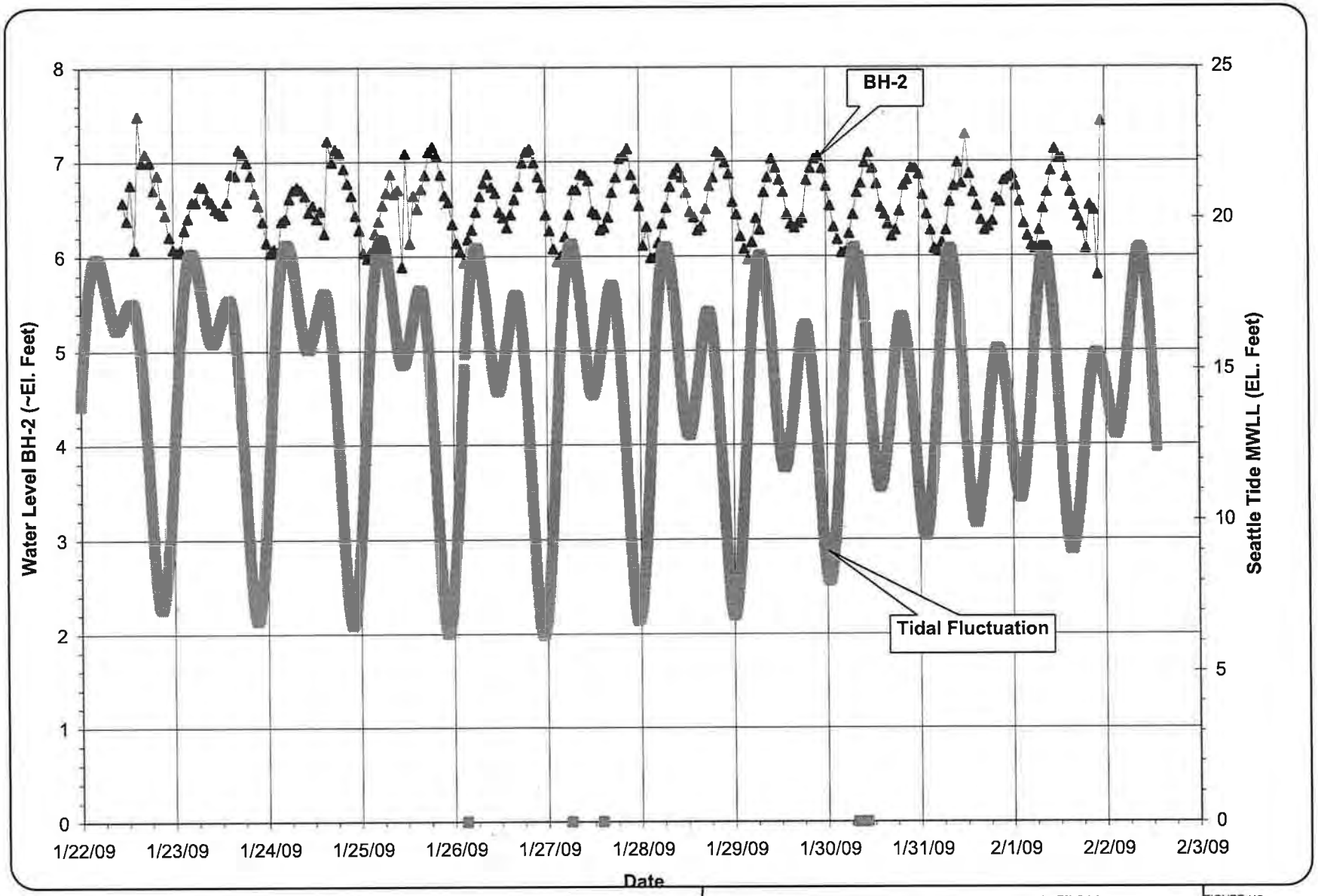
γ' = 53 pcf

γw = 62.4 pcf

NOTES:

1. Assume interlocking steel sheets.
2. Ground water at elevation +7 feet.
3. Recommended lateral earth pressure values assume subsurface soils consist of medium dense soil.
4. The coeffients of active and passive pressure do not include the effects of wall friction.
5. Surcharge loads should be added to the active pressure where appropriate in accordance with BNSF Guideline for Temporary Shoring.

HWA GEOSCIENCES INC.	DESIGN EARTH PRESSURES FOR TEMPORARY CANTILEVER SHORING	DRAWN BY EFK CHECKED BY DM	FIGURE NO. 8
	WILLOW CREEK CULVERT REPLACEMENT UNDER BNSF MAINLINE EDMONDS, WASHINGTON	DATE 02.26.10	PROJECT NO. 2007-142.21



HWA GEOSCIENCES INC.

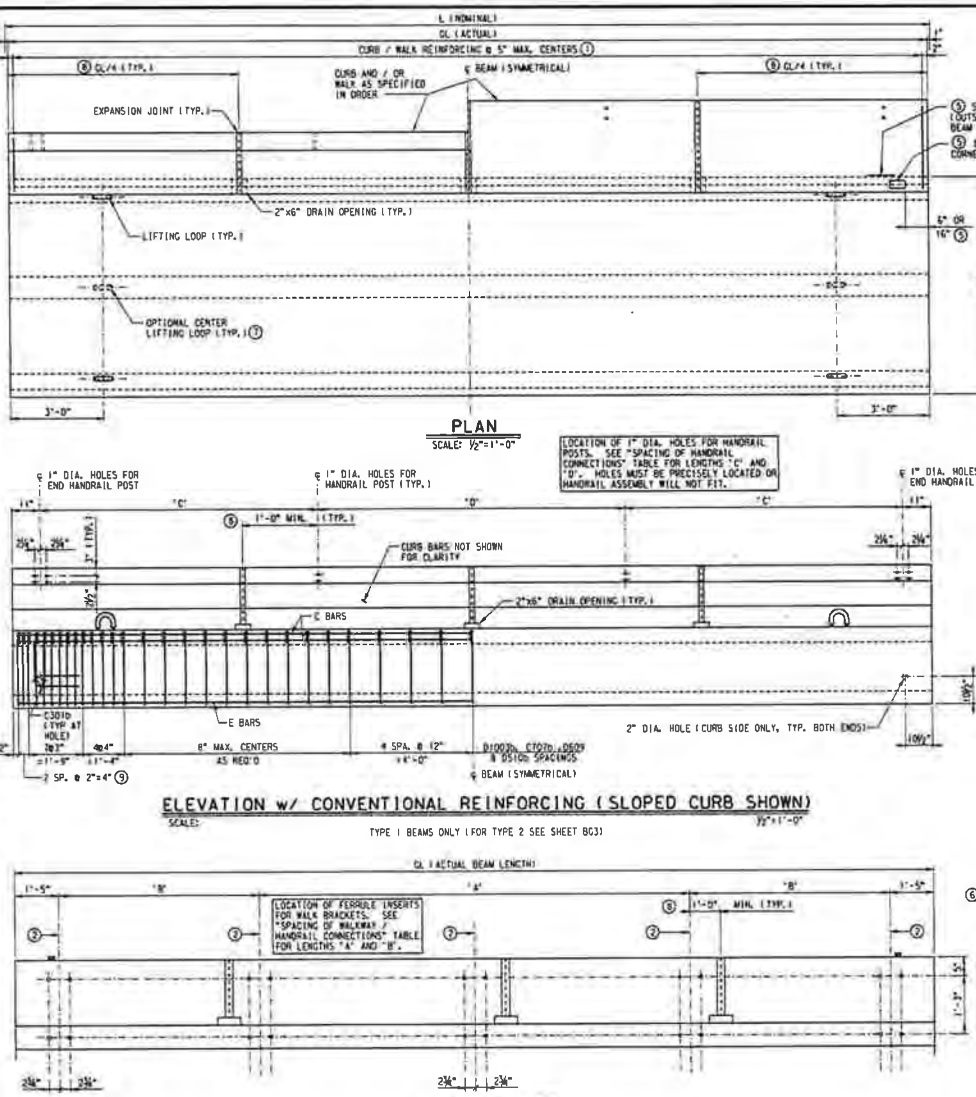
BH-2 WATER LEVEL FLUCTUATION

WILLOW CREEK CULVERT REPLACEMENT UNDER
BNSF MAINLINE
EDMONDS, WASHINGTON

FIGURE NO.
9

PROJECT NO.
2007-142-21

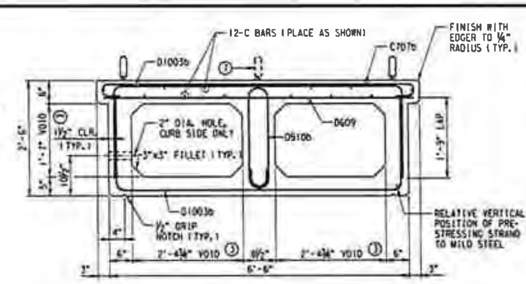
APPENDIX B
BNSF STANDARD EXHIBITS



PLAN
SCALE: 1/2" = 1'-0"

ELEVATION w/ CONVENTIONAL REINFORCING (SLOPED CURB SHOWN)
SCALE: 1/2" = 1'-0"
TYPE 1 BEAMS ONLY (FOR TYPE 2 SEE SHEET BG3)

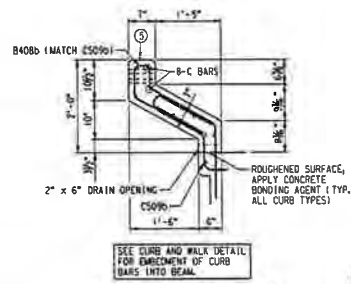
VIEW (A)
SCALE: 3/4" = 1'-0"



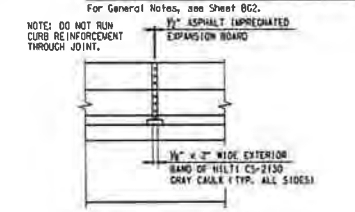
SECTION w/ CONVENTIONAL REINFORCING (w/o CURB)
SCALE: 3/4" = 1'-0"
(STRANDS NOT SHOWN)

SPACING OF WALKWAY / HANDRAIL CONNECTIONS				
ACTUAL BEAM LENGTH	FERRULE INSERTS		1" DIA. HOLES	
	"A"	"B"	"C"	"D"
19'-10"	84"	60"	9'-0"	N/A
20'-10"	84"	66"	9'-6"	N/A
21'-10"	84"	72"	10'-0"	N/A
22'-10"	84"	78"	5'-6"	10'-0"
23'-10"	84"	84"	6'-0"	10'-0"
24'-10"	2@84"	48"	6'-6"	10'-0"
25'-10"	2@84"	54"	7'-0"	10'-0"
26'-10"	2@84"	60"	7'-6"	10'-0"
27'-10"	2@84"	66"	8'-0"	10'-0"
28'-10"	2@84"	72"	8'-6"	10'-0"
29'-10"	2@84"	78"	9'-0"	10'-0"
30'-10"	2@84"	84"	9'-6"	10'-0"
31'-10"	3@84"	48"	10'-0"	10'-0"
32'-10"	3@84"	54"	5'-6"	2@10'-0"
33'-10"	3@84"	60"	6'-0"	2@10'-0"
34'-10"	3@84"	66"	6'-6"	2@10'-0"
35'-10"	3@84"	72"	7'-0"	2@10'-0"

For General Notes, see Sheet BG2.

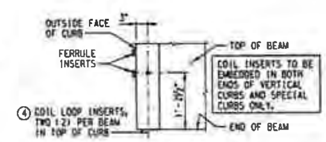


SLOPED CURB DETAIL
SCALE: 3/4" = 1'-0"

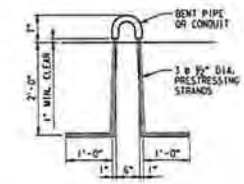


NOTE: DO NOT RUN CURB REINFORCEMENT THROUGH JOINT.

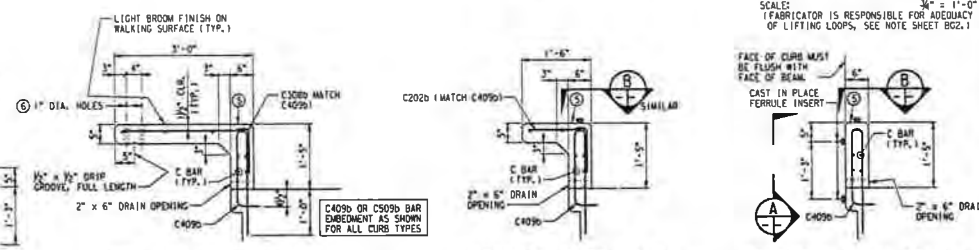
ELEVATION - CURB EXPANSION JOINT
SCALE: 1/2" = 1'-0"



VIEW (B)
SCALE: 3/4" = 1'-0"



LIFTING LOOP DETAIL
SCALE: 3/4" = 1'-0"
(FABRICATOR IS RESPONSIBLE FOR ADEQUACY OF LIFTING LOOPS, SEE NOTE SHEET BG2.)



CURB AND WALK DETAIL
SCALE: 3/4" = 1'-0"

SPECIAL CURB DETAIL
SCALE: 3/4" = 1'-0"

VERTICAL CURB DETAIL
SCALE: 3/4" = 1'-0"

(1) Adjust as required to miss other reinforcement, ferrule inserts, handrail post holes, and curb expansion joints.

(2) Cast-in-place ferrule inserts, F-65, 5/8" dia. type LF as manufactured by Dayton/Richmond or equal. Minimum shear = 3,000 lb, minimum tension = 3,320 lb with a factor of safety of 3 to 1. 4 inserts per walk bracket location. Furnish with 5/8" dia. bolts and washers. All items shall be galvanized.

(3) Void dimensions shown are maximum and must not be exceeded at any point including splices of void form.

(4) Coil loop inserts are to be single flared type B-18, 1" dia. x 12" as manufactured by Dayton Superior, and have a safe working load of 4,750 lb. with a factor of safety of 4 to 1. The inserts are to be completely recessed with spiral bolts furnished in the insert.

(5) 3" x 6" I.D. Plate is to be embedded flush in top of curb and centered. Locate 6" from end of curb for curb and walk, special curb, or vertical curb; 16" from end for curb for sloped curb. Plate shall contain the following information in 1/2" lettering: item name, length, number and diameter of prestressing strands, date manufactured, and name of manufacturer.

The same information, plus actual lifting weight, shall be clearly stenciled on the side of the beam.

(6) Two 1" dia. holes shall be located 17", 17"+A, 17"+2A, and 17"+3A from one end of beam. Holes must be in proper location or handrail will not fit. A = (GL - 34")/3.

(7) Optional center lifting loops (shown dashed) to be provided only if specified by purchasing railroad.

(8) Curb to be divided into four (4) equal segments as shown. If curb joints cannot be equally spaced due to conflicts with handrail connections, then fabricator shall adjust curb segment lengths so that each curb joint is a minimum of 12" from centerline of any walkway / handrail conection.

(9) Increase end stirrup group to 6 spaces at 2" = 1'-0" for L > 34'. All other spacings remain as shown.

BLOCKING NOTE:
BEAM SHALL BE SUPPORTED BY BLOCKING WITHIN 1'-6" OF ENDS DURING STORAGE AND TRANSPORT. STORE AND TRANSPORT BEAMS IN LEVEL POSITIONS.

FIELD NOTE

For beams located over roadways, the drain openings shall be covered with wire screen to prevent ballast from falling off beams. Screen shall be industrial wire screen meeting the requirements specified in ASTM E437-85, Heavy Grade, 1/4" opening, plain weave, galvanized sheet. Screen shall fully cover opening and be anchored into the concrete. Screen installation to be in field by Railroad forces or contractor.

REVISIONS		
DATE	LTR.	DESCRIPTION
8/03	A	CHANGE SIZE & SPACING OF CURB BAR
10/03	B	1" DIA. HOLES IN WALK (NOTE 6)
2/04	C	LIFTING LOOPS, STIRRUPS, I.D. PLATE
1/06	D	CURB REBARS
10/06	E	CURB REBARS & JOINT, OPTIONAL LOOP
12/07	F	STRAND PATTERNS, WEIGHTS, MISC.

DESIGN BY: MLM | DRAWN BY: DTP | CHECKED BY: MLM

APPROVED:
K.H. Jennison
BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN
George J. Meyer
UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN

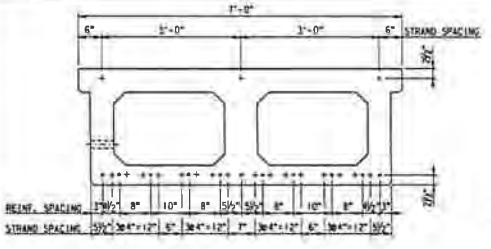
BNSF RAILWAY | UNION PACIFIC

BRIDGE STANDARDS

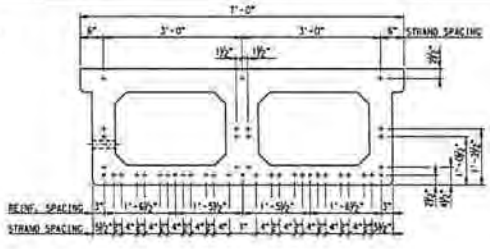
CONCRETE BEAM BRIDGES

30"x7'-0" DOUBLE BOX BEAM VARIOUS LENGTHS FRAMING AND REINFORCING

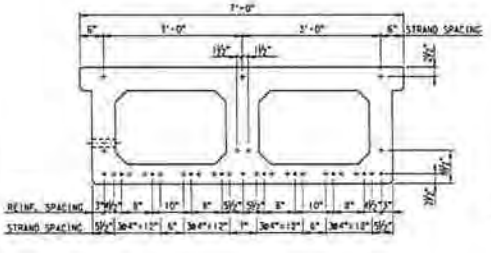
FILE OWNER: UPPR | DATE: MAY 2003
PLAN NO.: 500000 | SHEET: BD1



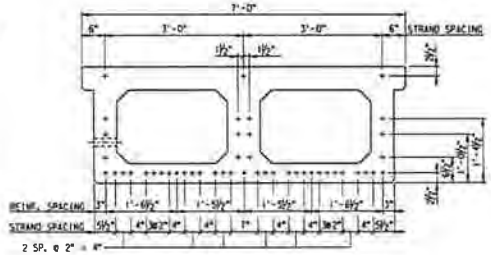
L = 20'-0" TO L = 22'-0"
+(19 - 0.6" 270 KSI STRANDS)
+(11 - #6 REINFORCING BAR)



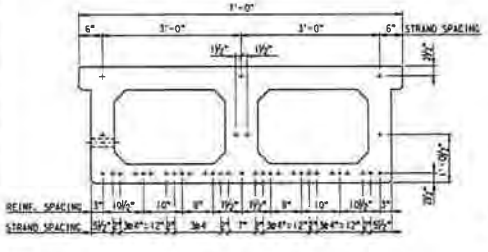
L > 28'-0" TO L = 30'-0"
+(37 - 0.6" 270 KSI STRANDS)
+(5 - #6 REINFORCING BAR)



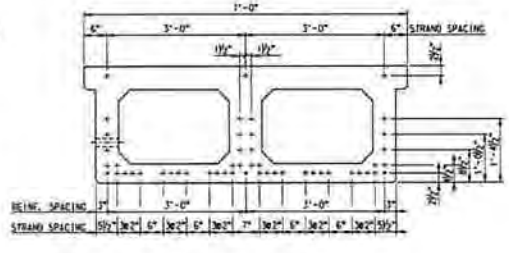
L > 22'-0" TO L = 24'-0"
+(23 - 0.6" 270 KSI STRANDS)
+(11 - #6 REINFORCING BAR)



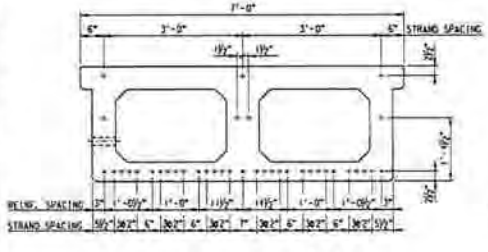
L > 30'-0" TO L = 32'-0"
+(41 - 0.6" 270 KSI STRANDS)
+(5 - #6 REINFORCING BAR)



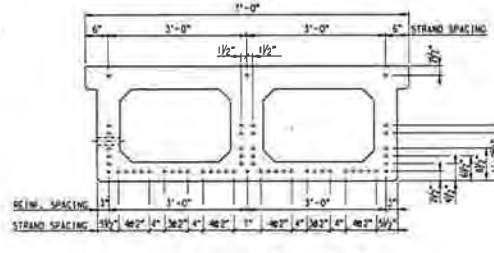
L > 24'-0" TO L = 26'-0"
+(27 - 0.6" 270 KSI STRANDS)
+(9 - #6 REINFORCING BAR)



L > 32'-0" TO L = 34'-0"
+(47 - 0.6" 270 KSI STRANDS)
+(3 - #6 REINFORCING BAR)



L > 26'-0" TO L = 28'-0"
+(31 - 0.6" 270 KSI STRANDS)
+(7 - #6 REINFORCING BAR)



L > 34'-0" TO L = 36'-0"
+(51 - 0.6" 270 KSI STRANDS)
+(3 - #6 REINFORCING BAR)

TYPE 1 30" BOX BEAMS

SCALE: 3/4" = 1'-0"
(MAXIMUM LENGTHS ARE NOMINAL (L))

GENERAL NOTES

CONCRETE:

Concrete material, placing and curing shall be in accordance with the requirements specified in BNSF / UP Joint Specifications for Precast / Prestressed Concrete Products and the current edition of Chapter 8 of the AREMA Manual for Railway Engineering.

The compressive strength of the beam concrete shall be as specified in table below. The compressive strength of the curb concrete shall exceed 4000 psi at 28 days.

REQUIRED MINIMUM BEAM CONCRETE COMPRESSIVE STRENGTHS (PSI)

TYPE	LENGTH	AT TRANSFER	AT 28 DAYS
1	L ≤ 30	4,500	6,000
1	30 < L ≤ 34	5,000	7,000
1	L > 34	5,500	7,000
2	L ≤ 24	5,500	7,000
2	L > 24	6,000	8,500

Air entraining agents shall be in accordance with the requirements specified in the current edition of ASTM C260. The total entrained air content shall be 6% ± 1% by volume of the plastic concrete.

Concrete aggregate shall be in accordance with the requirements specified in the current edition of ASTM C33. Coarse aggregate shall be Size No. 67.

PRESTRESSING STRAND:

Prestressing strand shall be 0.6 inch diameter, seven wire, uncoated, low relaxation strand which is in accordance with the requirements specified in ASTM A416. The strand shall have an ultimate tensile strength of 270 ksi. The initial prestress shall be 43,400 lbs. per strand unless noted otherwise.

Strand shall be tested in accordance with PCI recommendations (Moustafa Method) and certified by the fabricator as having adequate bond characteristics to satisfy the prediction equations for transfer and development length given in the AREMA Manual for Railway Engineering.

An alternate strand pattern which has the same eccentricity as the pattern shown on this plan and is better suited to the manufacturer's facilities will be considered. Manufacturer must submit plans and computations for Railroad approval prior to casting.

REINFORCING STEEL:

Reinforcing steel shall be deformed, per current ASTM A615 Specification and meet grade 60 requirements, except bars crossing curb joint to be per current ASTM A1035 specification. Bars required to meet ASTM A1035 are noted in the Bending Diagrams.

Fabrication of reinforcing steel shall be per Chapter 7 of the CRSI Manual of Standard Practice. Dimensions of bending details are out to out of bar.

Reinforcing steel is to be blocked to proper location and securely wired against displacement. Use plastic protected reinforcing supports, meeting CRSI specifications Chapter 3, Class 1. Tack welding of reinforcing is prohibited. Minimum concrete cover on reinforcement shall meet current AREMA requirements.

DESIGN LOADS:

Dead Load (assumed - lb. per lin. ft. of track):

Track, fasteners, etc.	200
Ballast	4,065
Curb, Walk, & Handrail	560
Beams	2,825
Total	7,650

Live Load: Cooper E80 centrifugal force and effects of eccentricity and superelevation applied per provisions of AREMA Chapter 8. Design superelevation is 5" with 2" unbalance.

Impact: $\frac{225}{\sqrt{L}}$ % (where L = L - 14')

Type 1 beams have been designed to accommodate a maximum offset between the centerline of track and the center of the longitudinal joint between beams of 6 inches. Type 1 beams shall be supplied with curb.

Type 2 beams have been designed to accommodate the placement of the track anywhere on the beam. Type 2 beams may be supplied with or without a curb.

MANUFACTURE:

Production procedures and dimensional tolerances for the manufacture of precast, prestressed beams shall be in accordance with the AREMA Manual for Railway Engineering and the Prestressed Concrete Institute's current Manual MNL 116 for Quality Control.

Tolerance for location of lifting loops shall be ±½".

The ends of the strands shall be burned off and recessed to a depth of 1 inch. Such recesses and minor spalls must be filled and finished to the plan dimensions using an epoxy bonding compound and grout.

Curb shall be cast after beam is removed from form.

Concrete bonding agent: refer to specifications.

Surfaces shall be formed in a manner which will produce a smooth and uniform appearance without rubbing or plastering. Unless otherwise noted, exposed edges of 90-degrees or less are to be chamfered ¾"x ¾". Unformed surfaces shall have a smooth finish free of all float and trowel marks.

The fabricator shall stencil the fabricator's name, date of fabrication, piece mark, and actual lifting weight at location shown.

The area around lifting loops shall not be recessed. Lifting loops to be removed in field flush with concrete surface.

Inspection, loading, and securing for shipment: refer to specifications.

If lifted with slings instead of lifting loops, slings must not be placed more than 3'-0" from ends of beams.

For intermediate beam lengths (not shown in "Spacing of Handrail Connections" table):

Vertical Curb - Length 'A' shall be held constant and length 'B' shall be adjusted.

Sloped Curb -Length 'D' shall be held constant and length 'C' shall be adjusted.

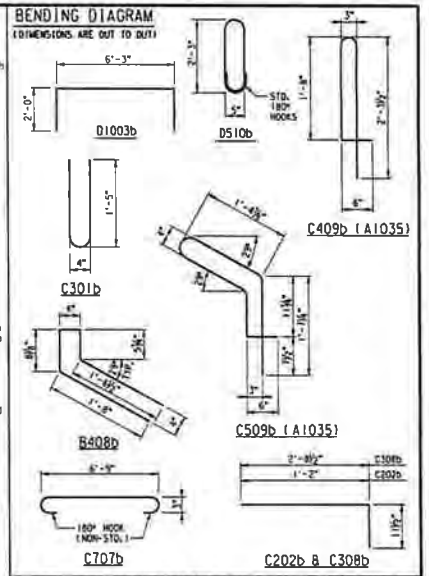
LIFTING LOOPS:

Fabricator is responsible for developing lifting loop anchorage detail to provide safety factor of 4 on working load. Detail shall be proof-tested with test results kept on file by fabricator and available for inspection by the railroad.

NOTE:
STRAND PATTERNS ARE TO BE USED ONLY FOR THE LENGTHS SHOWN. IF THE FABRICATOR, FOR CONVENIENCE, DESIRES TO USE A PATTERN SHOWN FOR A GREATER LENGTH, APPROVAL MUST BE OBTAINED FROM THE ENGINEER OF THE PURCHASING RAILROAD.

BENDING DIAGRAM

(DIMENSIONS ARE OUT TO OUT)



BAR DESIGNATIONS CONSIST OF BAR SIZE AND LENGTH FOLLOWED BY THE LETTER "b" IF BENT. BAR SIZES ARE REPRESENTED BY THE LETTERS A THROUGH L CORRESPONDING TO BAR NUMBERS 2 THROUGH 18. BAR LENGTHS ARE GIVEN IN FEET AND INCHES WITH THE FIRST DIGIT(S) INDICATING FEET AND THE LAST TWO DIGITS INDICATING INCHES.

LETTER	SIZE #
A	2
B	3
C	4
D	5
E	6

NOMINAL WEIGHT * (ONE BEAM)

NOMINAL BEAM LENGTH (L)	WEIGHT (WITH CURB AND WALK)		WEIGHT (WITH SLOPED CURB)		WEIGHT (WITH SPECIAL CURB)		WEIGHT (WITH VERT. CURB)		WEIGHT (NO CURB)	
	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS
PER FT	1,685	0.85	1,665	0.84	1,595	0.80	1,525	0.77	1,495	0.75
16'	26,800	13.4	26,400	13.2	25,300	12.7	24,300	12.2	23,200	11.6
17'	28,500	14.3	28,100	14.1	26,900	13.5	25,800	12.9	24,600	12.3
18'	30,100	15.1	29,700	14.9	28,400	14.2	27,200	13.6	25,900	13.0
19'	31,800	15.9	31,400	15.7	30,000	15.0	28,800	14.4	27,300	13.7
20'	33,400	16.7	33,000	16.5	31,600	15.8	30,300	15.2	28,700	14.4
21'	35,100	17.6	34,700	17.4	33,200	16.6	31,800	15.9	30,100	15.1
22'	36,900	18.4	36,300	18.2	34,700	17.4	33,300	16.7	31,500	15.8
23'	38,500	19.3	38,000	19.0	36,400	18.2	34,800	17.4	32,900	16.5
24'	40,200	20.1	39,600	19.8	38,000	19.0	36,300	18.2	34,400	17.2
25'	41,800	20.9	41,300	20.7	39,500	19.8	37,900	19.0	35,800	17.9
26'	43,500	21.8	42,900	21.5	41,100	20.6	39,300	19.7	37,100	18.6
27'	45,100	22.6	44,600	22.3	42,700	21.4	40,900	20.5	38,600	19.3
28'	46,800	23.4	46,200	23.1	44,300	22.2	42,400	21.2	40,000	20.0
29'	48,500	24.3	47,900	24.0	45,900	23.0	43,900	22.0	41,400	20.7
30'	50,200	25.1	49,500	24.8	47,400	23.7	45,400	22.7	42,700	21.4
31'	51,900	26.0	51,200	25.6	49,100	24.6	47,000	23.5	N/A	N/A
32'	53,600	26.8	52,900	26.5	50,700	25.4	48,500	24.3	N/A	N/A
33'	55,300	27.7	54,600	27.3	52,300	26.2	50,100	25.1	N/A	N/A
34'	56,900	28.5	56,200	28.1	53,800	26.9	51,500	25.8	N/A	N/A
35'	58,500	29.3	58,100	29.1	55,700	27.9	53,100	26.7	N/A	N/A
36'	60,600	30.3	59,800	29.9	57,300	28.7	54,800	27.4	N/A	N/A

* Computed weights using nominal dimensions. For planning purposes only. Fabricator to determine actual lifting weight (see Note 5 on Sheet BG1). If scale weight not available, use maximum weights on Sheet BG3.

REVISIONS		
DATE	LTR.	DESCRIPTION
6/03	A	CHANGE SIZE OF CURB BARS
10/03	B	ADD WT. SPECIAL & VERTICAL CURBS
2/04	C	CHANGE MIN. SPAN LENGTH TO 25'
10/05	D	CURB REBARS
10/05	E	MIN. SPAN = 16', CURB REBARS
12/07	F	STRAND PATTERNS, WEIGHTS, MISC.

DESIGN BY: MLM | DRAWN BY: DTP | CHECKED BY: MLM

APPROVED:

K.H. Jennison
BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN

Hugo J. Mesa
UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN

BNSF RAILWAY | UNION PACIFIC

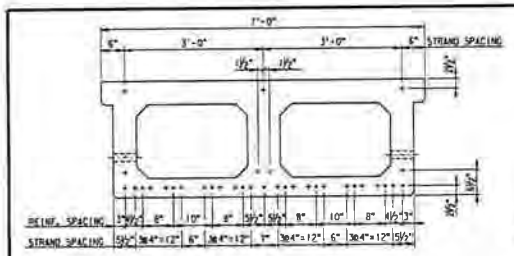
BRIDGE STANDARDS

CONCRETE BEAM BRIDGES

30"x7'-0" DOUBLE BOX BEAM NOTES, REBAR DETAILS, TYPE 1 STRAND PATTERNS

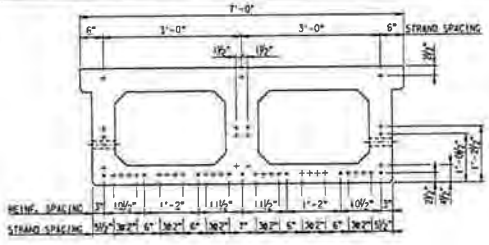
FILE OWNER: UPPR | DATE: MAY 2003

PLAN NO.: 500000 | SHEET: BG2



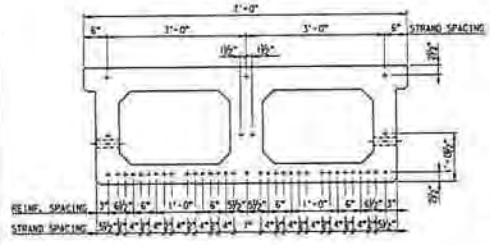
L = 20'-0" TO 22'-0"

+(23 - 0.6" 270 KSI STRANDS)
+(11 - #6 REINFORCING BAR)



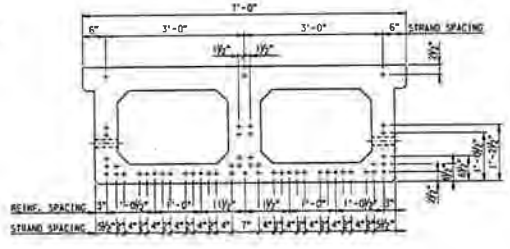
L > 26 '-0" TO 28'-0"

+(39 - 0.6" 270 KSI STRANDS)
+(7 - #6 REINFORCING BAR)



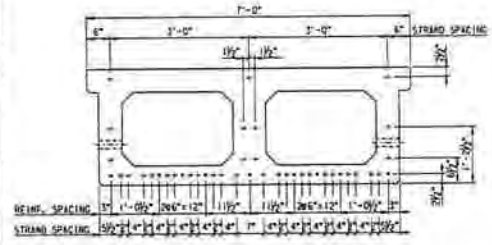
L > 22'-0" TO 24'-0"

+(29 - 0.6" 270 KSI STRANDS)
+(11 - #6 REINFORCING BAR)



L > 28 '-0" TO 30'-0"

+(45 - 0.6" 270 KSI STRANDS)
+(7 - #6 REINFORCING BAR)



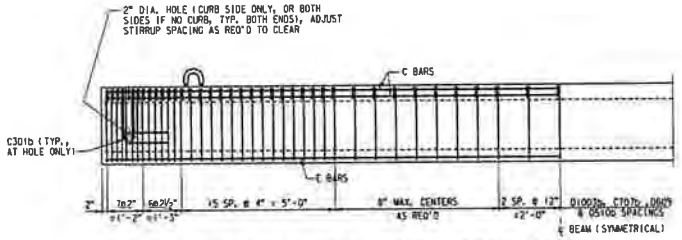
L > 24 '-0" TO 26'-0"

+(33 - 0.6" 270 KSI STRANDS)
+(9 - #6 REINFORCING BAR)

TYPE 2 30" BOX BEAMS

SCALE: 3/8" = 1'-0"

(MAXIMUM LENGTHS ARE NOMINAL (L))



ELEVATION w/ CONVENTIONAL REINFORCING

SCALE: ½"=1'-0"

TYPE 2 BEAMS ONLY (FOR TYPE 1 SEE SHEET BG1)

NOTE:
STRAND PATTERNS ARE TO BE USED ONLY FOR THE LENGTHS SHOWN. IF THE FABRICATOR, FOR CONVENIENCE, DESIRES TO USE A PATTERN SHOWN FOR A GREATER LENGTH, APPROVAL MUST BE OBTAINED FROM THE ENGINEER OF THE PURCHASING RAILROAD.

MAXIMUM LIFTING WEIGHT * (ONE BEAM)

NOMINAL BEAM LENGTH (L)	WEIGHT (WITH CURB AND WALK)		WEIGHT (WITH SLOPED CURB)		WEIGHT (WITH SPECIAL CURB)		WEIGHT (WITH VERT. CURB)		WEIGHT (NO CURB)	
	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS	LB.	TONS
PER FT	1,780	0.89	1,755	0.88	1,685	0.85	1,610	0.81	1,580	0.79
16'	28,300	14.2	27,900	14.0	26,800	13.4	25,700	12.9	24,500	12.3
17'	30,100	15.1	29,700	14.9	28,500	14.3	27,300	13.7	26,000	13.0
18'	31,800	15.9	31,400	15.7	30,100	15.1	28,800	14.4	27,400	13.7
19'	33,600	16.8	33,100	16.6	31,800	15.9	30,400	15.2	28,900	14.5
20'	35,300	17.7	34,900	17.5	33,400	16.7	32,000	16.0	30,300	15.2
21'	37,100	18.6	36,600	18.3	35,100	17.6	33,600	16.8	31,800	15.9
22'	38,800	19.4	38,300	19.2	36,700	18.4	35,200	17.6	33,300	16.7
23'	40,700	20.4	40,100	20.1	38,400	19.2	36,800	18.4	34,800	17.4
24'	42,400	21.2	41,900	21.0	40,100	20.1	38,400	19.2	36,300	18.2
25'	44,200	22.1	43,600	21.8	41,800	20.9	40,000	20.0	37,800	18.9
26'	45,900	23.0	45,300	22.7	43,400	21.7	41,600	20.8	39,200	19.6
27'	47,700	23.9	47,100	23.6	45,100	22.6	43,200	21.6	40,800	20.4
28'	49,500	24.8	48,800	24.4	46,800	23.4	44,800	22.4	42,300	21.2
29'	51,300	25.7	50,600	25.3	48,500	24.3	46,400	23.2	43,700	21.9
30'	53,000	26.5	52,300	26.2	50,100	25.1	48,000	24.0	45,200	22.6
31'	54,800	27.4	54,100	27.1	51,900	26.0	49,700	24.9	N/A	N/A
32'	56,600	28.3	55,900	28.0	53,500	26.8	51,300	25.7	N/A	N/A
33'	58,400	29.2	57,700	28.9	55,300	27.7	52,900	26.5	N/A	N/A
34'	60,200	30.1	59,400	29.7	56,900	28.5	54,500	27.3	N/A	N/A
35'	62,200	31.1	61,400	30.7	58,800	29.4	56,300	28.2	N/A	N/A
36'	64,000	32.0	63,100	31.6	60,500	30.3	57,900	29.0	N/A	N/A

* Computed weights using maximum dimensions per allowable tolerances. Use for lifting weight if scale weight is not available.

REVISIONS		
DATE	LTR.	DESCRIPTION
2/04	A	CHANGE MIN. SPAN LENGTH TO 22'
10/08	B	CHANGE MIN. SPAN LENGTH TO 16'
5/07	C	ELIMINATE MIN. SPAN LENGTH
12/07	P	STRAND PATTERNS, AREMA 2006 IMPACT
/		
/		

DESIGN BY: MLM | DRAWN BY: DTP | CHECKED BY: MLM

APPROVED:

K. H. Jennison
BNSF - ASSISTANT DIRECTOR STRUCTURES DESIGN

George J. Mavis
UPRR - MGR SPECIAL PROJECTS STRUCTURES DESIGN

BNSF RAILWAY | UNION PACIFIC

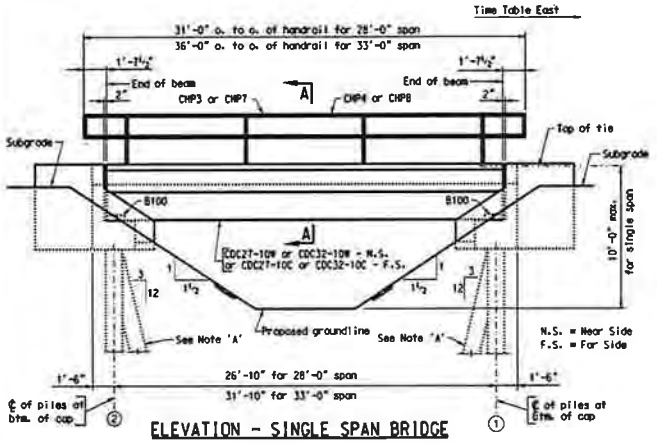
BRIDGE STANDARDS

CONCRETE BEAM BRIDGES

30"x7'-0" DOUBLE BOX BEAM TYPE 2 REINFORCING AND STRAND PATTERNS

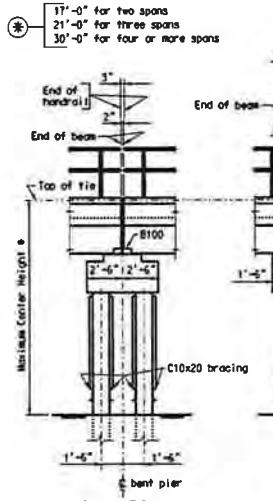
FILE OWNER: UPPR | DATE: MAY 2003

PLAN NO.: 500000 | SHEET: BG3



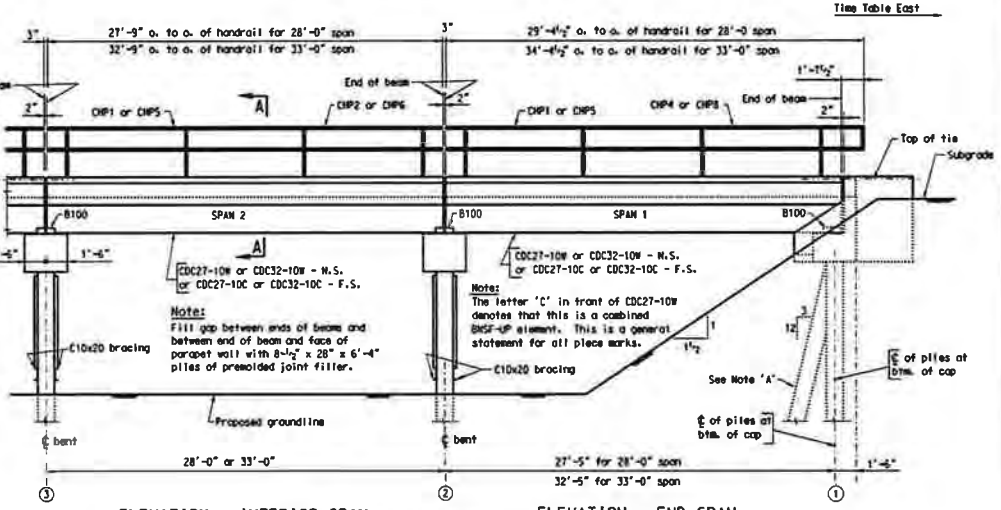
ELEVATION - SINGLE SPAN BRIDGE

Where walk and handrail are not required, substitute CDC27-10C for CDC27-10W and CDC32-10C for CDC32-10W. See Section "A-A" on Sheet 2 of 24.



ELEVATION DOUBLE BENT PIER

Double Bent Pier Requirements	
Lineal feet of Bridge	Min. No of Dbl. Bents Req'd.
up to 198'-0"	None
199'-0" to 396'-0"	One
397'-0" to 594'-0"	Two
595'-0" to 792'-0"	Three



Note:
Fill gap between ends of beams and between end of beam and face of parapet wall with 8-½" x 28" x 6'-4" piles of premolded joint filler.

Note:
The letter 'C' in front of CDC27-10W denotes that this is a combined BNSF-UP element. This is a general statement for all piece marks.

ELEVATION - INTERIOR SPAN

ELEVATION - END SPAN

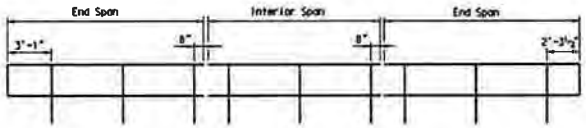
Where walk and handrail are not required, substitute CDC27-10C for CDC27-10W and CDC32-10C for CDC32-10W. See Section "A-A" on Sheet 2 of 24.

Note 'A':
When necessary to clear an existing pile, piles battered in the direction of the track may also be battered slightly in the direction normal to the track.

MAXIMUM LIFTING WEIGHTS

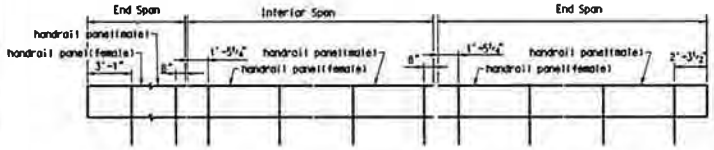
CDC27-10C	= 44,800 LBS.
CDC27-10EC	= 46,800 LBS.
CDC27-10SL	= 48,900 LBS.
CDC27-10W	= 49,500 LBS.
CDC32-10C	= 52,900 LBS.
CDC32-10EC	= 55,100 LBS.
CDC32-10SL	= 57,700 LBS
CDC32-10W	= 58,400 LBS.

See BNSF-UP Plan Number 500000, Sheet Numbers BG1, BG2 and BG3 for details of 30 inch deep prestressed concrete double box beams.



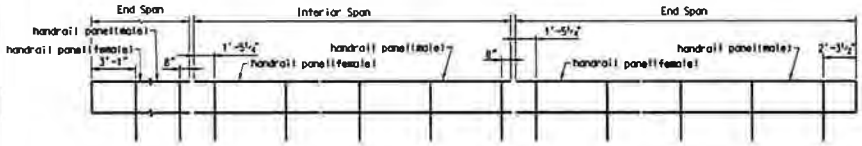
HANDRAIL PANEL LAYOUT DETAIL FOR SLOPED CURBS ONLY

Use where maximum span length = 21'-10".
See Sheet 22 of 24 for handrail details.
View taken standing outside of beam looking at handrail.



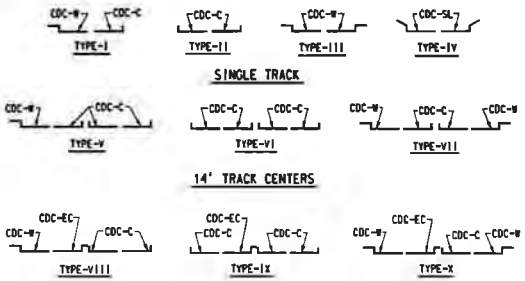
HANDRAIL PANEL LAYOUT DETAIL FOR SLOPED CURBS ONLY

Use for spans between lengths 21'-11" and 31'-10".
See Sheets 22 and 23 of 24 for handrail details.
View taken standing outside of beam looking at handrail.



HANDRAIL PANEL LAYOUT DETAIL FOR SLOPED CURBS ONLY

Use for spans between lengths 31'-11" and 34'-0".
See Sheet 23 of 24 for handrail details.
View taken standing outside of beam looking at handrail.



BEAM ARRANGEMENT DIAGRAMS

CDC-C denotes combined BNSF-UP beam with curb.
CDC-EC denotes combined BNSF-UP beam with extended curb.
* CDC-SL denotes combined BNSF-UP beam with sloped curb.
CDC-W denotes combined BNSF-UP beam with curb and walk.

* Sloped curbs will be utilized solely with single track construction

LIST OF DRAWINGS

Work Sheets 1, 2 and 3 of 24 together.

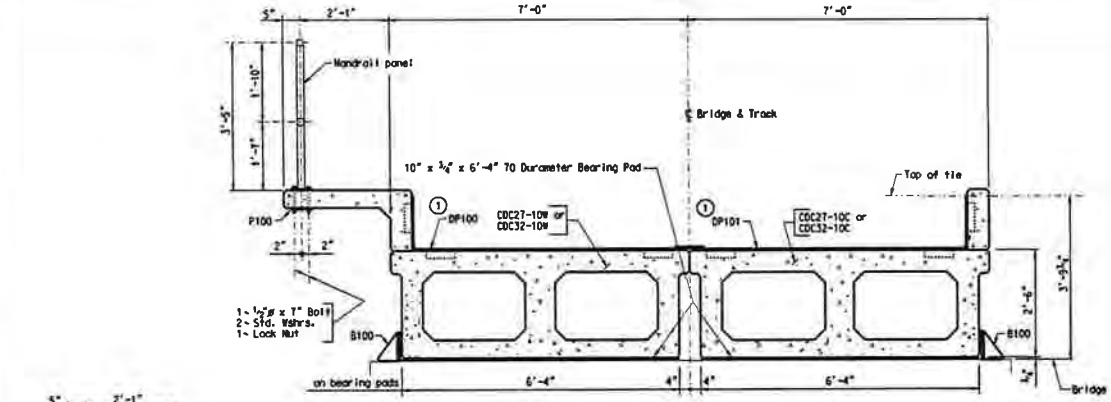
REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING - KANSAS CITY, KS
APPROVED: R G Beery
ASST. DIRECTOR STRUCTURES DESIGN

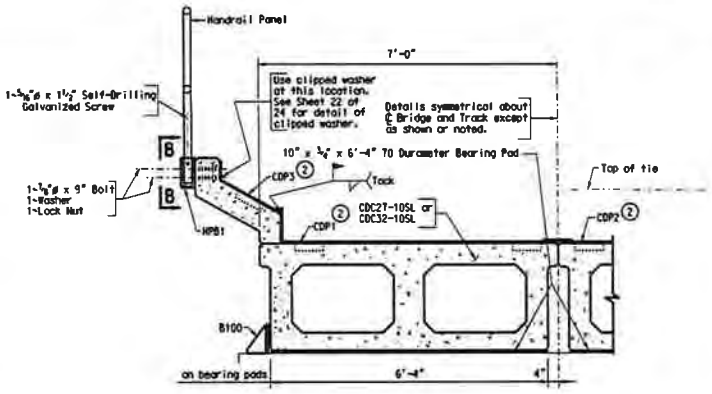
28' & 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM

GENERAL PLAN

PLAN NO: 0000-17902-076 | SHEET: 1 of 24



SECTION A-A
Single track

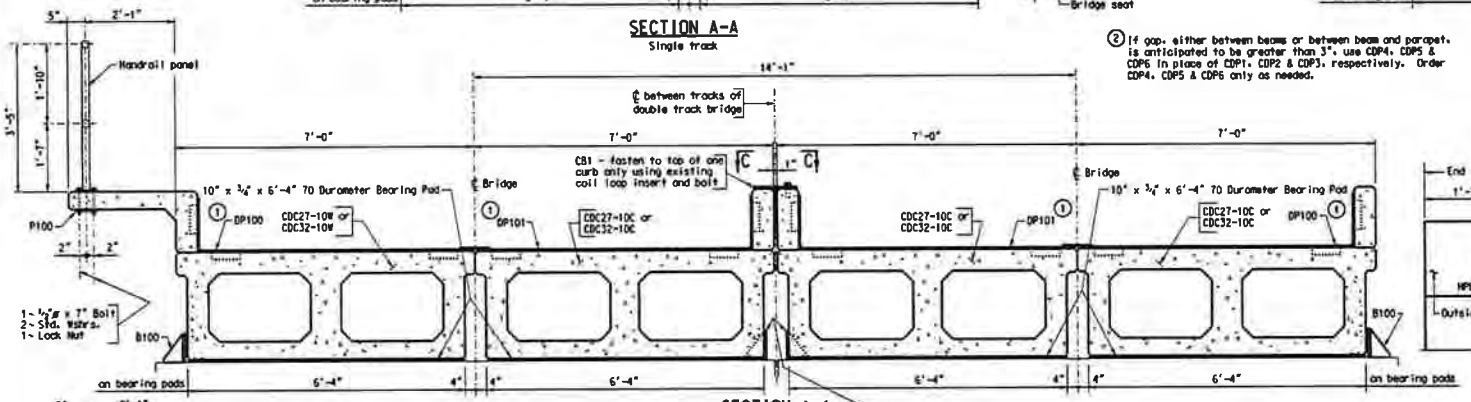


SECTION A-A
Single track, Sloped Curb

② If gap, either between beams or between beam and parapet, is anticipated to be greater than 3", use CDP4, CDP5 & CDP6 in place of CDP1, CDP2 & CDP3, respectively. Order CDP4, CDP5 & CDP6 only as needed.

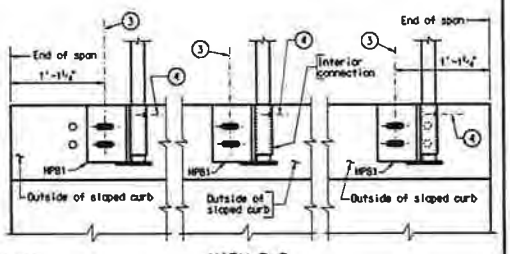
③ 2-7/8"ø x 9" Bolts
2-Washers
2-Lock Nuts

④ 1-5/16"ø x 1 1/2" Self-Drilling Galvanized Screw



SECTION A-A
14' Double Track Centers

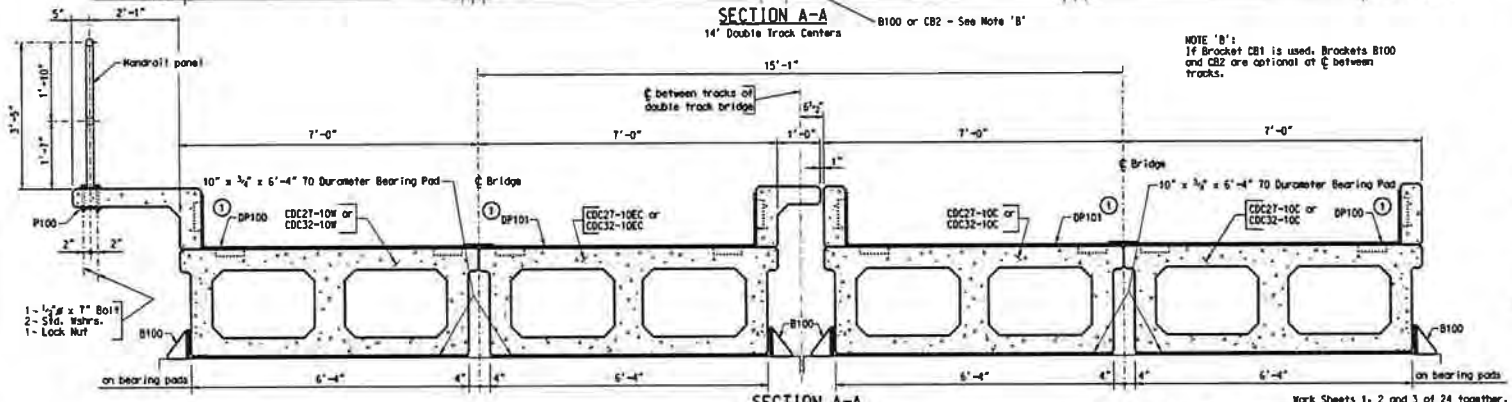
B100 or CB2 - See Note 'B'



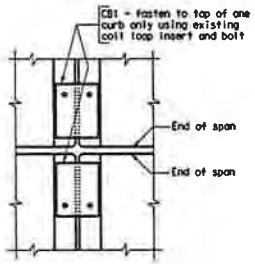
VIEW B-B

Handrail post must always be to the right of connecting bolts. View taken standing outside of beam looking at handrail

NOTE 'B':
If Bracket CB1 is used, Brackets B100 and CB2 are optional at ℄ between tracks.



SECTION A-A
15' Double Track Centers



VIEW C-C

① If gap, either between beams or between beam and parapet, is anticipated to be greater than 3", use DP104 & DP105 in place of DP100 & DP101, respectively. Order DP104 & DP105 only as needed.

Work Sheets 1, 2 and 3 of 24 together.

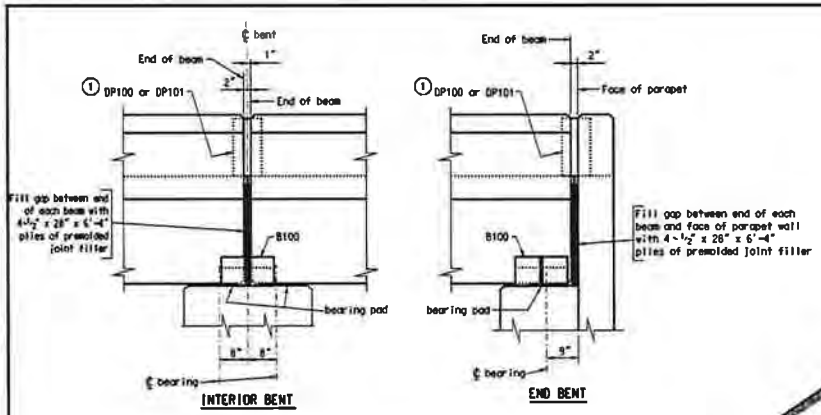
REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING — KANSAS CITY, KS
APPROVED: R.G. Berry
ASST. DIRECTOR STRUCTURES DESIGN

28' & 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM

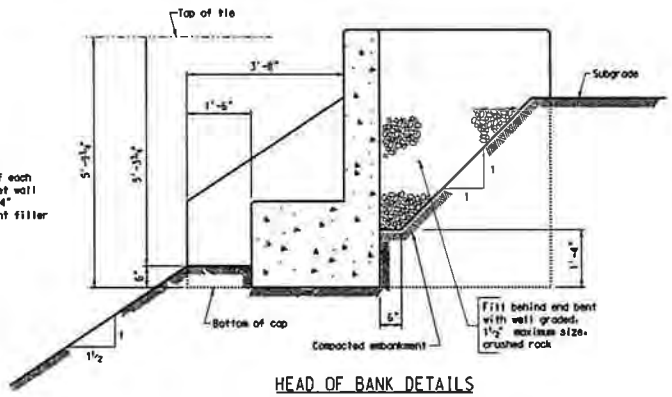
MISCELLANEOUS DETAILS

PLAN NO: 0000-17902-077 | SHEET: 2 of 24



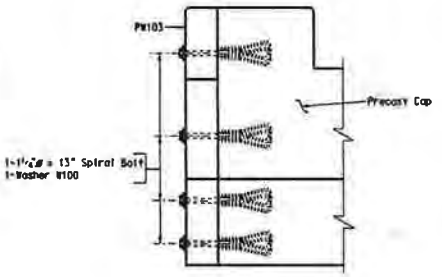
BEARING DETAILS

Handrails & wingwalls are not shown



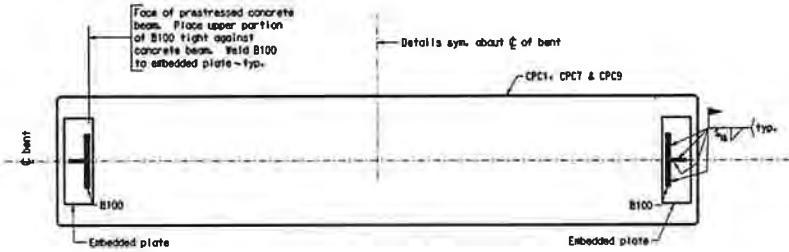
HEAD OF BANK DETAILS

Before backfilling end bents, apply a coating of petrolatum to pile plates and top one foot of piles.

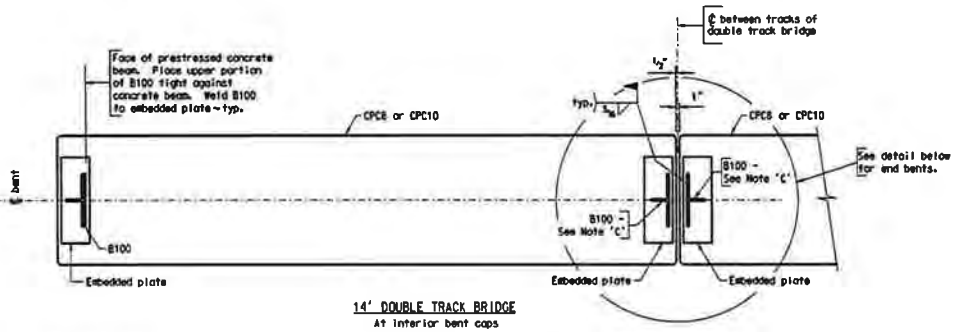


WING WALL TO END CAP DETAIL

① If gap, either between beams or between beam and parapet, is anticipated to be greater than 3", use DP104 & DP105 in place of DP100 & DP101, respectively. Order DP104 & DP105 only as needed.

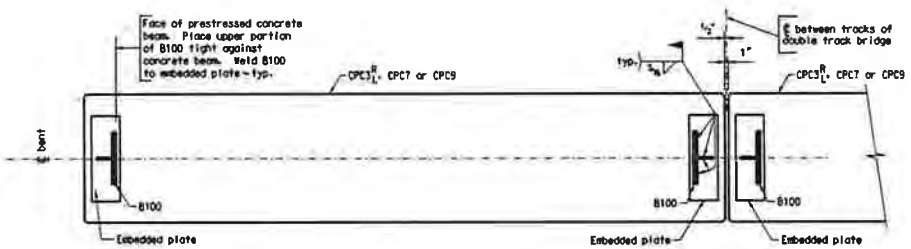


SINGLE TRACK BRIDGE

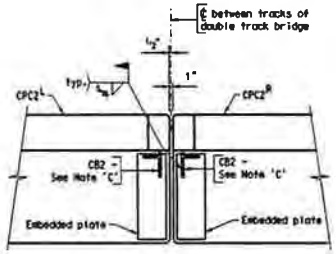


14' DOUBLE TRACK BRIDGE

At interior bent caps



15' DOUBLE TRACK BRIDGE



14' DOUBLE TRACK BRIDGE

At end bent caps

NOTE 'C':
Brackets B100 and CB2 at ℄ between tracks will need to be welded into position prior to setting spans for 14' Double Track Bridge.
Also see Note 'B' on Sheet 2 of 24.

WELDING OF LATERAL RESTRAINTS B100 & CB2

Plan view of caps shown

Work Sheets 1, 2 and 3 of 24 together.

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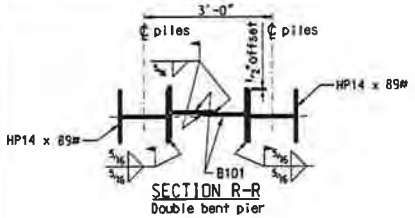
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED: R G Besse
ASST. DIRECTOR STRUCTURES DESIGN

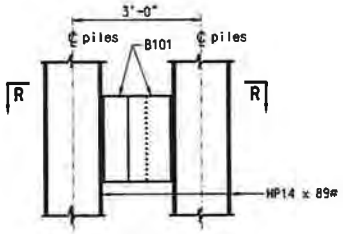
28' & 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM

MISCELLANEOUS DETAILS

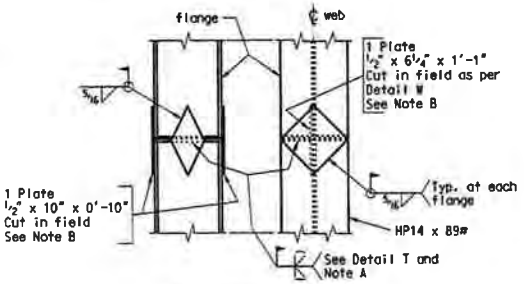
PLAN NO: 0000-17902-078 SHEET: 3 of 24



SECTION R-R
Double bent pier

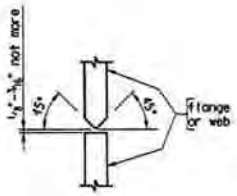


VIEW S-S
Side view of double bent pier
Cross bracing is not shown

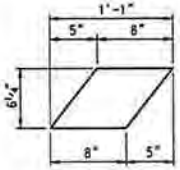


ALTERNATE PILE SPLICE 1

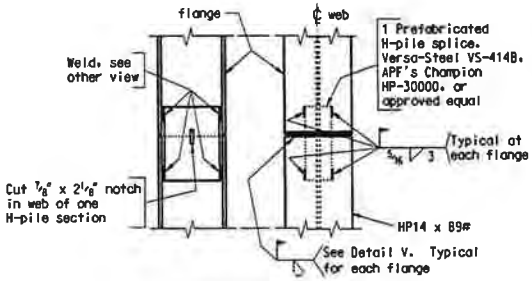
NOTE A: Before reinforcing plates are installed, grind the weld contours which will be covered by the reinforcing plates.
NOTE B: Reinforcing plates are required when pile splice is within 15 feet of the finished groundline.



DETAIL T

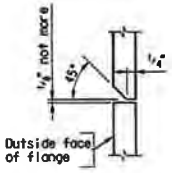


DETAIL W



ALTERNATE PILE SPLICE 2

Prefabricated pile splices, if used, shall be located a minimum of 15 feet below finished groundline.



DETAIL V

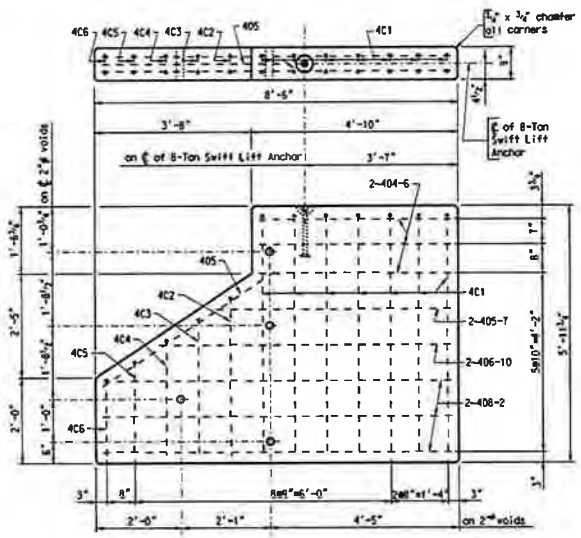
H-PILE SPLICE DETAILS (Alternate 1 & 2)

REVISIONS			REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
						CHECK: RGB
						DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED: Ron G Berry
ASST. DIRECTOR STRUCTURES DESIGN

28'& 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM SINGLE TRACK, 14' AND 15' DOUBLE TRACK CENTERS
MISCELLANEOUS DETAILS

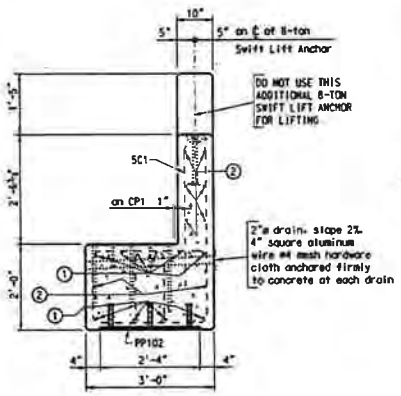
PLAN NO: 0000-17902-088 | SHEET: 13 of 24



PRECAST WING WALL PW103

Wt. = 4,800 lbs., Vol. = 1.13 cu. yds., Reinf. Steel = 143 lbs.

STEEL REQUIRED PER PRECAST MEMBER	
PW103	DESCRIPTION
	REINFORCING STEEL
7	4C1 (SEE DETAIL, SH. 17 OF 24)
1	4C2 (SEE DETAIL, SH. 17 OF 24)
1	4C3 (SEE DETAIL, SH. 17 OF 24)
1	4C4 (SEE DETAIL, SH. 17 OF 24)
1	4C5 (SEE DETAIL, SH. 17 OF 24)
1	4C6 (SEE DETAIL, SH. 17 OF 24)
6	404-6 (STRAIGHT)
1	405 (STRAIGHT)
2	405-7 (STRAIGHT)
2	406-10 (STRAIGHT)
6	408-2 (STRAIGHT)
	STRUCTURAL STEEL
1	B-TON SWIFT LIFT ANCHOR

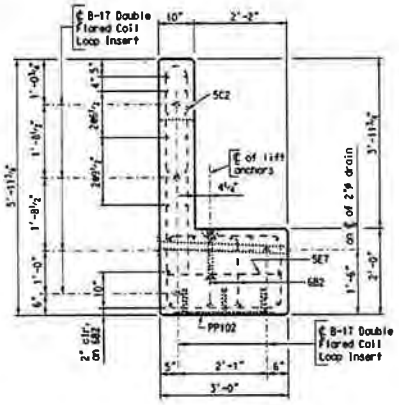


SECTION A-A

For further designation of horizontal bars see elevations of precast members

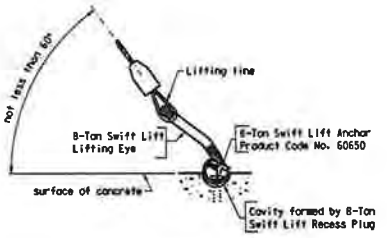
① T18-2 for CPC1
T15-11 for CPC2L
T16-5 for CPC3L

② S18-2 for CPC1
S15-11 for CPC2L
S16-5 for CPC3L



VIEW B-B

For further designation of horizontal bars, see elevations of precast members



LIFTING DETAIL

B-Ton Swift Lift Recess Plugs, Anchors and Lifting Eyes are available from Dayton/Richmond T21 Richard St., Miamisburg, Ohio 45342, Telephone (937) 866-0711. The materials for this lifting system are not included in the Bill of Material but are to be ordered as required.

NOTES:

GENERAL: ALL MATERIAL AND WORKMANSHIP SHALL BE AS PER THE CURRENT BNSF STANDARD SPECIFICATIONS.

CONCRETE: THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE SHALL BE NOT LESS THAN 4000 p.s.i. IN 28 DAYS. CONCRETE MEMBERS SHALL NOT BE REMOVED FROM THE CASTING BED BEFORE THE CONCRETE REACHES A STRENGTH OF 2500 p.s.i.

ALL EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE CHAMFERED ¾ INCH.

REINFORCEMENT: MILD STEEL REINFORCEMENT SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A615 OR A706, GRADE 60.

FABRICATION OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH CHAPTER 7 OF THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE.

MINIMUM CONCRETE COVER ON REINFORCEMENT SHALL BE TWO (2) INCHES.

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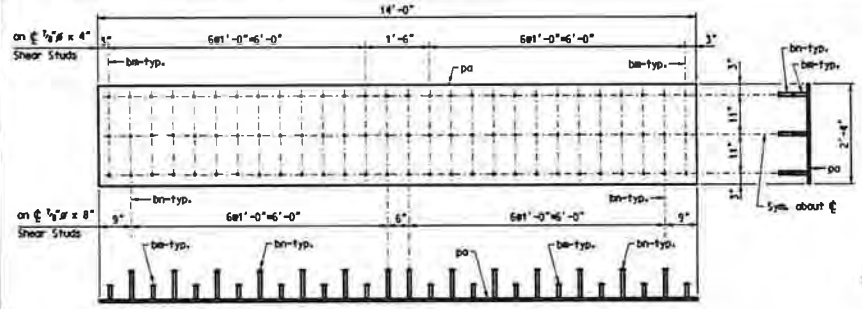
DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING — KANSAS CITY, KS
APPROVED: R G Berry
ASST. DIRECTOR STRUCTURES DESIGN

28'& 33' PRESTRESSED CONCRETE SPANS – BNSF/UP COMMON BEAM SINGLE TRACK, 14' AND 15' DOUBLE TRACK CENTERS
PRECAST CONCRETE MEMBERS

PLAN NO: 0000-17902-091 | SHEET: 16 of 24



PILE PLATE PP102

1-Plate 3/4" x 28" x 14'-0"-pa
42-7/8"ø x 4" Shear Studs-bn
42-7/8"ø x 8" Shear Studs-bn
Weight = 1,087 lbs.

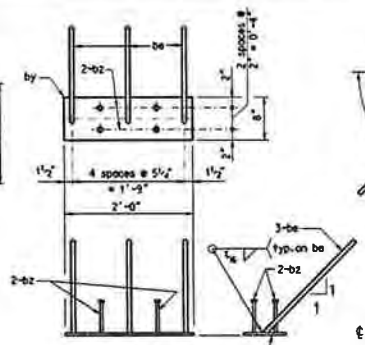


PLATE CP1

This is a combined BNSF-UP element
1-Bar 8"x 1/2" x 2'-0"-by
3-Bars #6x 2'-0"(A706)-be
4-1/2"ø x 6" Shear Studs-bz
Weight = 40 lbs.

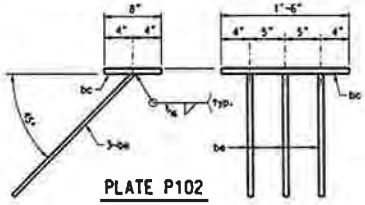


PLATE P102

1-Bar 8" x 3/4" x 1'-6"-bc
3-Bars #6 x 2'-0"(A706)-be
Weight = 39.6 lbs.

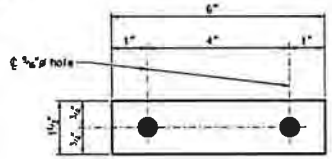
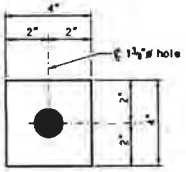


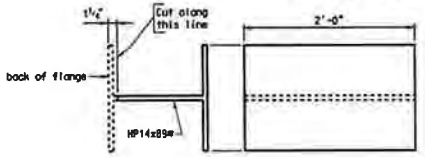
PLATE P100

1-Bar 1 1/2" x 1/4" x 0'-6"
Weight = 0.6 lbs.
Galvanize after fabrication



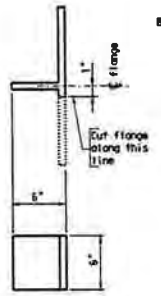
WASHER W100

1-Bar 4" x 1/4" x 0'-4"
Weight = 3.4 lbs.
Galvanize after fabrication



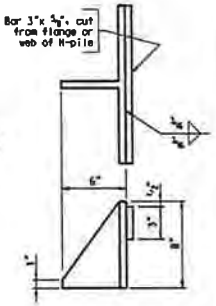
BRACKET B101

Field cut from HP14 x 89# Pile
Weight = 113 lbs.



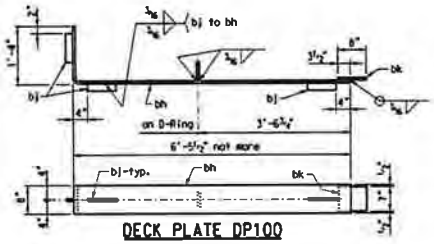
BRACKET CB2

Cut from HP14 x 89# Pile
Weight = 15 lbs.



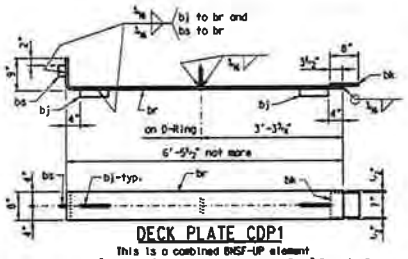
BRACKET B100

Cut from HP14 x 89# Pile
Weight = 30 lbs.



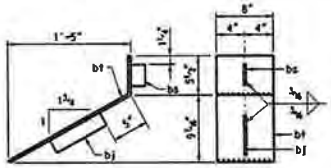
DECK PLATE DP100

1-Bar 8" x 3/8" x 7'-9 1/2" (Bent)-bh
3-Bars 2" x 3/8" x 0'-8"-bj
1-Bar 7" x 3/8" x 0'-8"-bk
1-O-Ring
Weight = 93 lbs.
Galvanize after fabrication



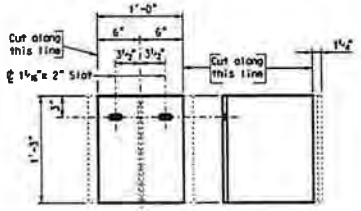
DECK PLATE CDP1

This is a combined BNSF-UP element
1-Bar 8" x 3/8" x 7'-2 1/2" (Bent)-br
1-Bar 7" x 3/8" x 0'-8"-bk
2-Bars 2" x 3/8" x 0'-8"-bj
1-Bar 2" x 3/8" x 0'-3"-bs
1-O-Ring
Weight = 86 lbs.
Galvanize after fabrication



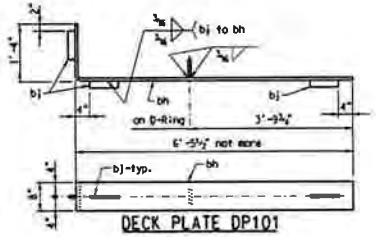
DECK PLATE CDP3

This is a combined BNSF-UP element
1-Bar 8" x 3/8" x 2'-0 1/2"(Bent)-bt
1-Bar 2" x 3/8" x 0'-8"-bj
1-Bar 2" x 3/8" x 0'-3"-bs
Weight = 23 lbs.
Galvanize after fabrication



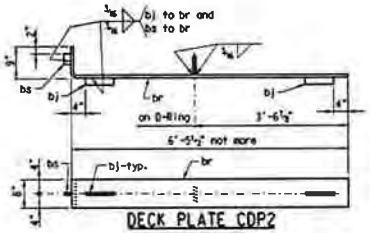
BRACKET CB1

Field cut from HP14 x 89# Pile
Weight = 65 lbs.



DECK PLATE DP101

1-Bar 8" x 3/8" x 7'-9 1/2" (Bent)-bh
3-Bars 2" x 3/8" x 0'-8"-bj
1-O-Ring
Weight = 87 lbs.
Galvanize after fabrication



DECK PLATE CDP2

This is a combined BNSF-UP element
1-Bar 8" x 3/8" x 7'-2 1/2" (Bent)-br
2-Bars 2" x 3/8" x 0'-8"-bj
1-Bar 2" x 3/8" x 0'-3"-bs
1-O-Ring
Weight = 80 lbs.
Galvanize after fabrication

GENERAL NOTES:

MATERIAL: STRUCTURAL STEEL PLATES AND BARS SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A36.

SHEAR CONNECTOR STUDS SHALL MEET THE REQUIREMENTS OF SECTION 7 OF THE CURRENT A.W.S. STRUCTURAL WELDING CODE D1.1 FOR GRADE 1020 SOLID FLUX FILLED HEADED STUDS.

D-RINGS SHALL BE 3" I.D., MADE OF STEEL FOR HEAVY-DUTY USE, PROVIDED WITH WELD-ON BRACKET, AND HAVE A MIN. SAFE WORKING LOAD OF 1,000 LBS.

FABRICATION NOTES:

SHOP NOTES: FABRICATION AND ARC WELDING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH CHAPTER 15, PART 3 OF THE CURRENT A.R.E.M.A. MANUAL FOR RAILWAY ENGINEERING.
OPEN HOLES: AS NOTED. SHOP PAINT: NONE.

DEFORMED BILLET REINFORCING BARS THAT ARE WELDED TO THE STEEL PLATES SHALL CONFORM TO A.S.T.M. A706, GR. 60.

SHEAR CONNECTOR STUDS SHALL BE AUTOMATICALLY END WELDED WITH COMPLETE FUSION IN ACCORDANCE WITH SECTION 7 OF THE CURRENT A.W.S. STRUCTURAL WELDING CODE D1.1.

GALVANIZING: CDP1, CDP2, CDP3, DP100, DP101, P100 AND W100 SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE CURRENT A.S.T.M. DESIGNATION: A123.

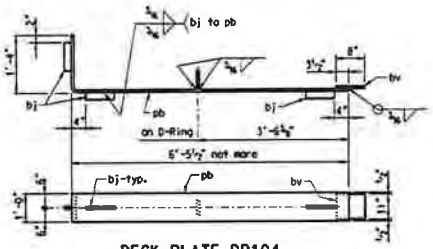
AFTER GALVANIZING ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES AND OTHER SURFACE DEFECTS.

REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING — KANSAS CITY, KS
APPROVED: R G Beery
ASST. DIRECTOR STRUCTURES DESIGN

28' & 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM SINGLE TRACK, 14' AND 15' DOUBLE TRACK CENTERS
STEEL DETAILS

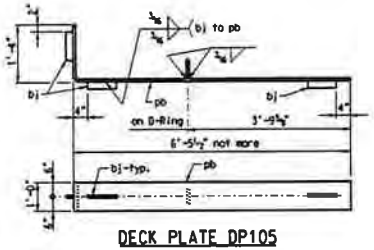
PLAN NO: 0000-17902-094 | SHEET: 19 of 24



DECK PLATE DP104

1-Plate ⅜" x 12" x 7'-9½" (Bent)-pb
3-Bars 2" x ⅜" x 0'-8"-bj
1-Bar 8" x ⅜" x 0'-11"-bv
1-O-Ring

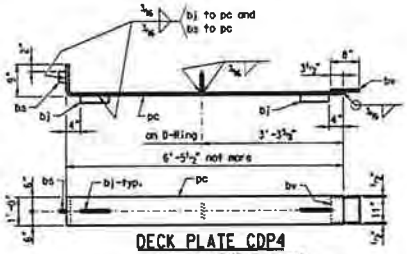
Weight = 136 lbs.
Galvanize after fabrication



DECK PLATE DP105

1-Plate ⅜" x 12" x 7'-9½" (Bent)-pb
3-Bars 2" x ⅜" x 0'-8"-bj
1-O-Ring

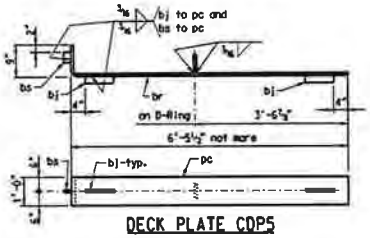
Weight = 127 lbs.
Galvanize after fabrication



DECK PLATE CDP4

This is a combined BNSF-UP element
1-Plate ⅜" x 12" x 7'-2½" (Bent)-pc
2-Bars 2" x ⅜" x 0'-8"-bj
1-Bar 2" x ⅜" x 0'-3"-bs
1-Bar 8" x ⅜" x 0'-11"-bv
1-O-Ring

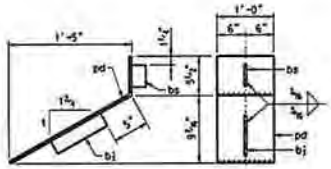
Weight = 127 lbs.
Galvanize after fabrication



DECK PLATE CDP5

This is a combined BNSF-UP element
1-Plate ⅜" x 12" x 7'-2½" (Bent)-pc
2-Bars 2" x ⅜" x 0'-8"-bj
1-Bar 2" x ⅜" x 0'-3"-bs
1-O-Ring

Weight = 117 lbs.
Galvanize after fabrication



DECK PLATE CDP6

This is a combined BNSF-UP element
1-Plate ⅜" x 12" x 2'-0½" (Bent)-pd
1-Bar 2" x ⅜" x 0'-8"-bj
1-Bar 2" x ⅜" x 0'-3"-bs
Weight = 34 lbs.
Galvanize after fabrication

GENERAL NOTES:

MATERIAL: STRUCTURAL STEEL PLATES AND BARS SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A36.

O-RINGS SHALL BE 3" I.D., MADE OF STEEL FOR HEAVY-DUTY USE. PROVIDED WITH WELD-ON BRACKET, AND HAVE A MIN. SAFE WORKING LOAD OF 1,000 LBS.

FABRICATION NOTES:

SHOP NOTES: FABRICATION AND ARC WELDING OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH CHAPTER 15, PART 3 OF THE CURRENT A.R.E.M.A. MANUAL FOR RAILWAY ENGINEERING.
OPEN HOLES: AS NOTED. SHOP PAINT: NONE.

GALVANIZING: CDP4, CDP5, CDP6, DP104 AND DP105 SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE CURRENT A.S.T.M. DESIGNATION: A123.

AFTER GALVANIZING ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES AND OTHER SURFACE DEFECTS.

REVISIONS			DES: VVT
DATE	LTR	DESCRIPTION	DRAWN: VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING — KANSAS CITY, KS
APPROVED: Ron G Berry
ASST. DIRECTOR STRUCTURES DESIGN

28' & 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM
SINGLE TRACK, 14' AND 15' DOUBLE TRACK CENTERS
STEEL DETAILS

PLAN NO: 0000-17902-095 | SHEET: 20 of 24

GENERAL NOTES:

GENERAL: ALL MATERIAL AND WORKMANSHIP SHALL BE AS PER THE CURRENT BNSF STANDARD CONSTRUCTION SPECIFICATIONS.

PILING: PILES SHALL MEET THE MATERIAL REQUIREMENTS OF AND SHALL BE DRIVEN IN ACCORDANCE WITH THE BNSF STANDARD CONSTRUCTION SPECIFICATIONS. STEEL BEARING PILES SHALL BE DRIVEN TO REFUSAL. IF POSSIBLE, OR TO A MINIMUM ULTIMATE RESISTANCE OF 250 TONS AS DETERMINED BY THE MODIFIED ENGINEERING NEWS-RECORD FORMULA AS PER THE BNSF ENGINEERING INSTRUCTIONS, 17.2.6. IF PENETRATION OF 25 FEET BELOW NATURAL OR FINISHED GROUND LINE, WHICHEVER IS LOWER, CANNOT BE ACHIEVED, CONTACT SYSTEM STRUCTURES OFFICE.

AFTER PILES ARE DRIVEN, THEY SHALL BE PULLED, IF NECESSARY, AND HELD IN THE PROPER LOCATION AND CUT OFF AT THE PROPER ELEVATION. THEY SHALL CONTINUE BEING HELD UNTIL THE PRECAST CAPS HAVE BEEN SET AND WELDED TO STEEL BEARING PILES.

PLACING PRECAST CAPS ON STEEL H-PILES: PRECAST CAPS SHALL BE PLACED IN THE PROPER LOCATION AND THE PILES SHALL BE WELDED TO THE PILE PLATES. CHANNEL BRACING SHALL THEN BE WELDED TO THE PILES. SEE SHEETS 4 THRU 12 OF 24 FOR WELDING OF PILES TO PILE PLATES AND CHANNEL BRACING TO PILES. ARC WELDING SHALL BE AS PER THE CURRENT A.W.S. STRUCTURAL WELDING CODE D1.1.

ERECTION OF BEAMS: BEAMS SHALL BE SET IN THE PROPER LOCATION USING CARE NOT TO DAMAGE CONCRETE MEMBERS. AFTER BEAMS ARE SET, BURN OFF LIFTING LOOPS TWO (2) INCHES ABOVE CONCRETE SURFACE. REMAINING PORTION OF LIFTING LOOPS ARE TO BE COATED WITH PAINT. PATCH RECESSES, IF NECESSARY, AROUND LIFTING LOOPS WITH EPOXY MORTAR AS USED FOR SETTING BEAMS.

MORTAR FOR SETTING BEAMS: BEAMS SHALL HAVE FULL AND EVEN BEARING UPON THE BRIDGE SEAT AREAS. IF NEEDED, MORTAR CONSISTING OF EQUAL PARTS BY VOLUME OF CLASS B EPOXY AND DRY SILICA SAND, MIXED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS, SHALL BE SPREAD ON TOP OF BEARING PADS TO OBTAIN UNIFORM BEARING. SCRAPE EXCESS MORTAR FROM AROUND BEARING PADS AFTER BEAMS ARE SET.

DECK PLATES: THE DECK PLATES SHALL BE ADJUSTED AS NECESSARY TO INSURE THE PLATES FIT TIGHT AGAINST THE BEAMS AND CURBS.

HANDRAIL: HANDRAIL PANELS ON WALKWAYS SHALL BE ERECTED PLUMB AND IN LINE.

PAINTING: THE EXPOSED PORTION OF PILE PLATES, THE EXPOSED PORTION OF PILING BETWEEN BOTTOM OF CAP AND ONE (1) FOOT BELOW GROUND LINE AND THE CHANNEL BRACING SHALL BE PAINTED WITH ONE (1) FIELD COAT OF CHEMICAL-MASTIC CM-15, METALLIC ALUMINUM COLOR, APPLIED TO A DRY FILM THICKNESS OF 8 MILS, CORRESPONDING TO A WET FILM THICKNESS OF 10 MILS.

ALL AREAS TO BE PAINTED SHALL HAVE A "COMMERCIAL BLAST CLEANING" IN ACCORDANCE WITH THE STEEL STRUCTURES PAINTING COUNCIL SURFACE PREPARATION SPECIFICATION SSPC-SP6. PAINT APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

INFORMATION PERTAINING TO CHEMICAL-MASTIC CM-15 MAY BE OBTAINED FROM THE MANUFACTURER:

GULF COAST PAINT MANUFACTURING, INC.
30075 COUNTY ROAD 49
LOXLEY, AL 36551
PHONE (251) 964 - 7911
FAX (251) 964 - 7918

PATCHING: PATCHING OR REPAIR OF SPALLED OR CHIPPED PRECAST CONCRETE MEMBERS SHALL BE DONE USING COMPATCH V/O MORTAR, MIXED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.

COMPATCH V/O MORTAR CAN BE ORDERED FROM:

CONSPEC MARKETING & MANUFACTURING CO., INC.
4226 KANSAS AVENUE
KANSAS CITY, KS 66106
TOLL FREE (877) 416 - 3439

EPOXY: THE FOLLOWING EPOXY MATERIALS ARE APPROVED FOR USE.

CLASS B EPOXY: AS23-18 A&B GEL TYPE EPOXY (1)

SPEC-BOND 200 EPOXY (2)

(1) AS23-18 EPOXY IS AVAILABLE FROM:

DELTA PLASTICS CO.
10513 ROAD 236
TERRA BELLA, CA 93270
PHONE (559) 535 - 1332
FAX (559) 535 - 3723

OR

PERMALITE
1537 MONROVIA AVE.
NEWPORT BEACH, CA 92663
PHONE (949) 548 - 1137
FAX (949) 548 - 1130

(2) SPEC-BOND EPOXY IS AVAILABLE FROM:

CONSPEC MARKETING & MANUFACTURING CO., INC.
4226 KANSAS AVENUE
KANSAS CITY, KS 66106
TOLL FREE (877) 416 - 3439

'H' PILE INTERIOR BENTS *						
	SINGLE BENTS			DOUBLE BENT PIERS		
SPANS \ "X"	UP TO 12'-0	12'-1 22'-0	22'-1 30'-0	UP TO 12'-0	12'-1 22'-0	22'-1 30'-0
2-28' S.T.	H1	H2	H3	H7	H8	H9
1-28' & 1-33' S.T.	H1	H2	H5	H7	H8	H9
2-33' S.T.	H4	H5	H6	H7	H8	H9
BENT TYPES FOR 14'-0 TRACK CENTERS						
2-28' D.T.	H10	H11	H12	H16	H17	H18
1-28' & 1-33' D.T.	H10	H11	H15	H16	H17	H18
2-33' D.T.	H13	H14	H15	H16	H17	H18
BENT TYPES FOR 15'-0 TRACK CENTERS						
2-28' D.T.	H19	H20	H21	H25	H26	H27
1-28' & 1-33' D.T.	H19	H20	H24	H25	H26	H27
2-33' D.T.	H22	H23	H24	H25	H26	H27

* NOT FOR CONSTRUCTION. FOR PLANNING AND ESTIMATING PURPOSES ONLY. FOR BENTS TO BE CONSTRUCTED SEE 'BILL OF MATERIAL SHEET'.

S.T. = SINGLE TRACK
D.T. = DOUBLE TRACK

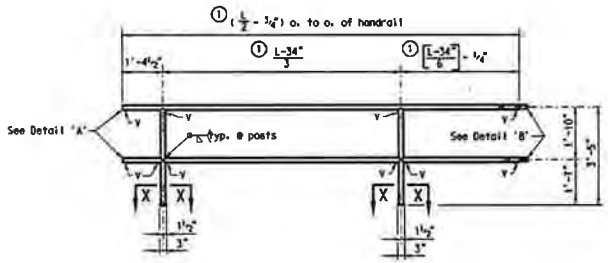
REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DRAWN: RU/VVT
			CHECK: RGB
			DATE: SEPT. 2009

BNSF RAILWAY
BRIDGE ENGINEERING — KANSAS CITY, KS
APPROVED: R. G. Berry
ASST. DIRECTOR STRUCTURES DESIGN

28'& 33' PRESTRESSED CONCRETE SPANS - BNSF/UP COMMON BEAM SINGLE TRACK, 14' AND 15' DOUBLE TRACK CENTERS
GENERAL NOTES

PLAN NO: 0000-17902-099 | SHEET: 24 of 24

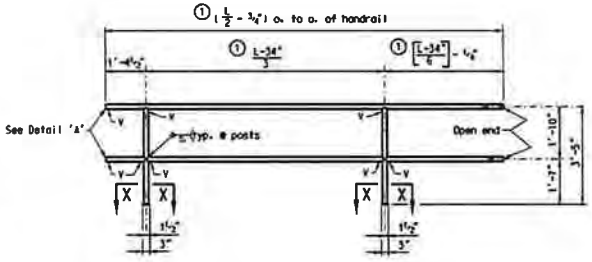
① 'L' is the length of the 30" x 7'-0 Prestressed Concrete Double Cell Box Beams as per Plan Numbers 0000-17003-001 and 0000-17003-002.



INTERIOR HANDRAIL PANEL (MALE)

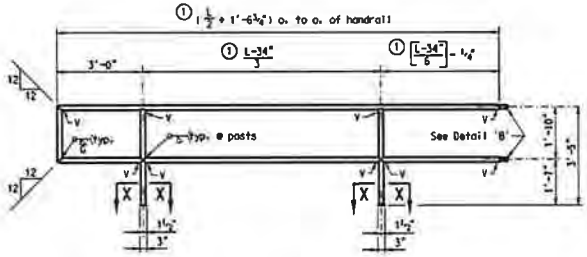
Handrail panels are to be fabricated using 1½"ø std. black pipe. Galvanize after fabrication.

V = ¾"ø drilled vent hole 1" from joint, except as dimensioned in Detail 'B'.



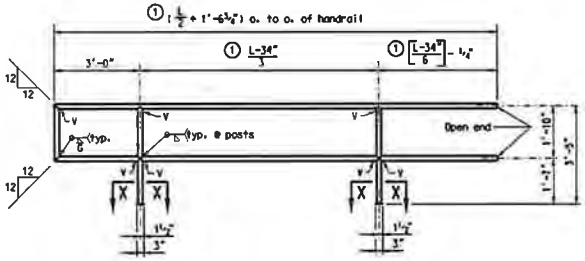
INTERIOR HANDRAIL PANEL (FEMALE)

Handrail panels are to be fabricated using 1½"ø std. black pipe. Galvanize after fabrication.



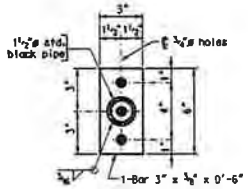
END HANDRAIL PANEL (MALE)

Handrail panels are to be fabricated using 1½"ø std. black pipe. Galvanize after fabrication.

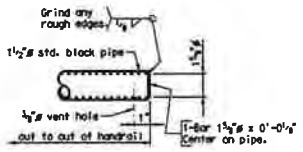


END HANDRAIL PANEL (FEMALE)

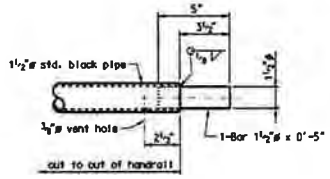
Handrail panels are to be fabricated using 1½"ø std. black pipe. Galvanize after fabrication.



SECTION X-X



DETAIL 'A'



DETAIL 'B'

NOTES:

MATERIAL: STRUCTURAL STEEL BARS SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A36.

STANDARD BLACK PIPE SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A53. UNCOATED PIPE SHALL BE USED.

SHOP NOTES: FABRICATION AND ARC WELDING OF STRUCTURAL STEEL AND HANDRAIL PANELS SHALL BE IN ACCORDANCE WITH CHAPTER 15, PART 3 OF THE CURRENT A.R.E.M.A. MANUAL FOR RAILWAY ENGINEERING. MIG WELDING SHALL BE USED ON HANDRAIL PANELS. OPEN HOLES: AS NOTED. SHOP PAINT: NONE.

GALVANIZING: HANDRAIL PANELS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE CURRENT A.S.T.M. DESIGNATION: A123.

AFTER GALVANIZING ALL ELEMENTS SHALL BE FREE OF FINS, ABRASIONS, ROUGH OR SHARP EDGES AND OTHER SURFACE DEFECTS.

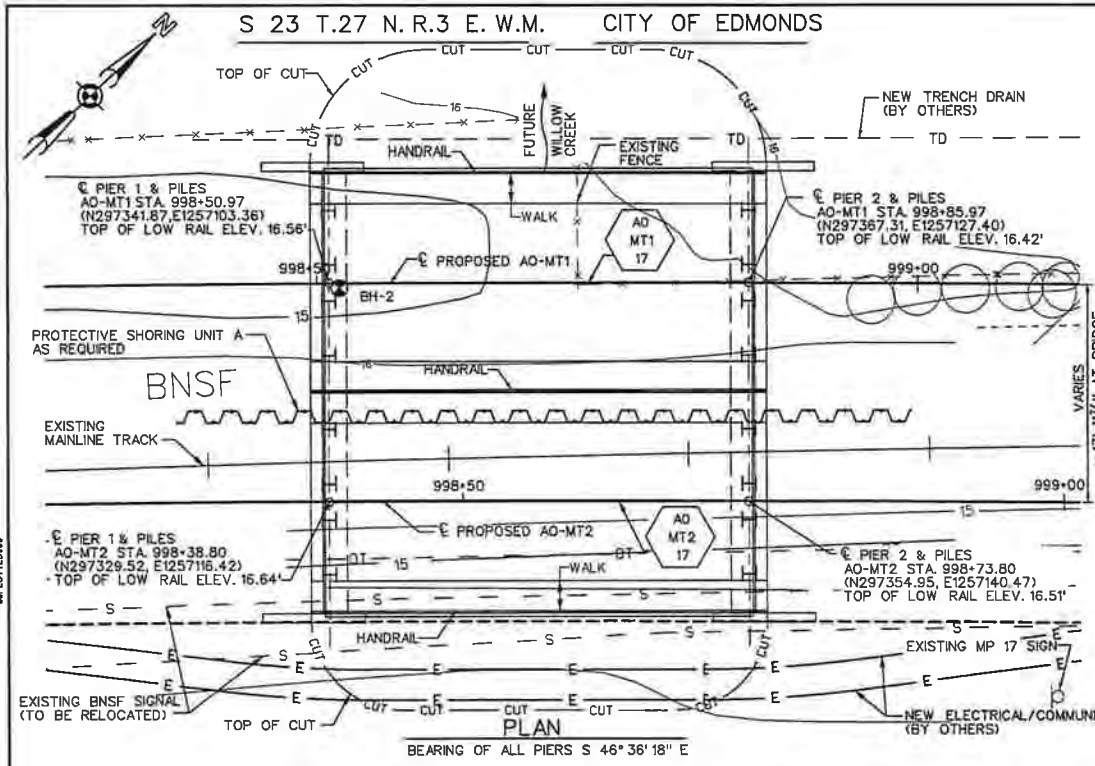
REVISIONS			DES: RU
DATE	LTR	DESCRIPTION	DRAWN: RU
4/98	A	HANDRAIL FORMULA	CHECK: KHJ
1/06	B	TITLE BLOCK	DATE: MAR. 1998

BNSF RAILWAY
BRIDGE ENGINEERING KANSAS CITY, KS
APPROVED: Ken G Berry
ASST. DIRECTOR STRUCTURES DESIGN

30" x 7'-0 PRESTRESSED CONCRETE DOUBLE BOX BEAMS AND BNSF/UP COMMON BEAM
HANDRAIL PANEL DETAILS FOR MULTIPLE LENGTH BEAMS

PLAN NO: 0000-17000-001B | SHEET: 1 of 1

APPENDIX C
CONSTRUCTION PLANS



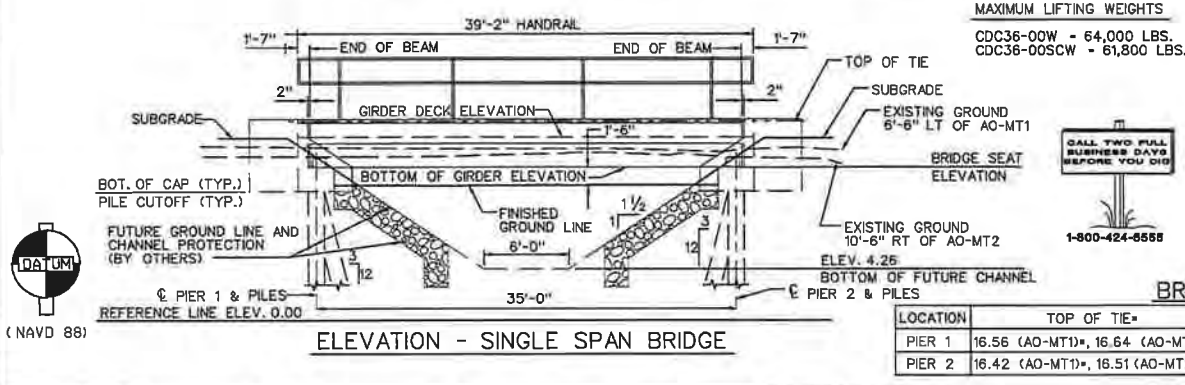
GENERAL NOTES:

1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT PLANS AND CONTRACT DOCUMENTS.
2. A GEOTECHNICAL INVESTIGATION HAS BEEN CONDUCTED, A REPORT PREPARED AND IS ATTACHED AS AN APPENDIX TO THE SPECIFICATIONS.
3. THE BRIDGE SHALL BE CONSTRUCTED USING 30" X 7'-0" PRESTRESSED CONCRETE DOUBLE BOX BEAMS IN ACCORDANCE WITH THE FOLLOWING BNSF STANDARD PLANS, AND THE GEOMETRY AND MODIFICATIONS SHOWN ON THESE PLANS:

STANDARD PLAN NO.	SHEET NO.	STANDARD PLAN NO.	SHEET NO.
500000 BG1	1 OF 3	0000-17902-088	13 OF 24
500000 BG2	2 OF 3	0000-17902-091	16 OF 24
500000 BG3	3 OF 3	0000-17902-094	19 OF 24
0000-17902-076	1 OF 24	0000-17902-095	20 OF 24
0000-17902-077	2 OF 24	0000-17902-099	24 OF 24
0000-17902-078	3 OF 24	0000-17000-01B	1 OF 1

OTHER STANDARD PLANS AS APPLICABLE AND APPROVED BY THE ENGINEER.

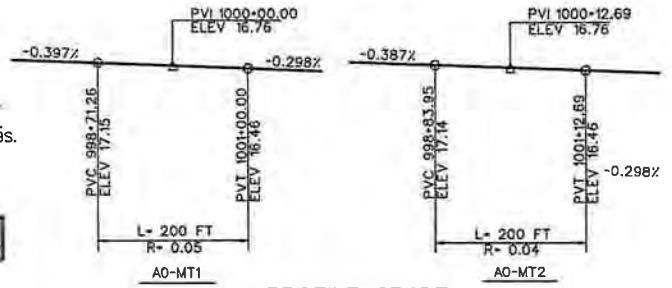
4. THE BEAM ARRANGEMENT SHALL BE IN ACCORDANCE WITH THE TYPICAL SECTION ON DRAWING BR3.
5. PILES SHALL BE H-PILES WITH MATERIALS AS SPECIFIED IN THE BNSF STANDARD SPECIFICATIONS AND STANDARD PLANS, AND DIMENSIONS AS SHOWN IN THESE PLANS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. TEMPORARY SUPPORTS AND FALSEWORK SHALL BE GRADUALLY RELEASED TO PREVENT IMPACT OR UNDUE STRESSES IN THE STRUCTURE.
7. THE LOCATIONS OF ALL EXISTING UTILITIES WITHIN THE VICINITY OF THE STRUCTURES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO EXCAVATING OR DRIVING PILES.
8. UNLESS OTHERWISE NOTED IN THE PLANS, ALL DIMENSIONS ARE HORIZONTAL AND VERTICAL BASED ON A TEMPERATURE OF 64 DEGREES F (MEAN TEMPERATURE DURING CONSTRUCTION).
9. FOR TRACK ALIGNMENT GEOMETRY SEE BNSF EDMONDS DRAWING NO'S P207-P208 AND P216-P217.
10. SHORING SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE BNSF "GUIDELINES FOR TEMPORARY SHORING".
11. FOR SURVEY CONTROL AND BENCHMARK ELEVATIONS AND LOCATIONS, SEE BNSF EDMONDS DRAWING G208.



ELEVATION - SINGLE SPAN BRIDGE

MAXIMUM LIFTING WEIGHTS

CDC36-00W - 64,000 LBS.
CDC36-00SCW - 61,800 LBS.



PROFILE GRADE

PROFILE SHOWN IS AT TOP OF LOW RAIL

BRIDGE ELEVATION TABLE

* ELEVATION IS AT TOP OF TIE AT LOW RAIL

LOCATION	TOP OF TIE*	GIRDER DECK	BOT. OF GIRDER	BRIDGE SEAT	BOT. OF CAP/PILE CUTOFF
PIER 1	16.56 (AO-MT1)*, 16.64 (AO-MT2)*	15.17	12.67	12.60	10.60
PIER 2	16.42 (AO-MT1)*, 16.51 (AO-MT2)*	15.17	12.67	12.60	10.60

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

ISSUE			
NO.	DATE	BY	DESCRIPTION

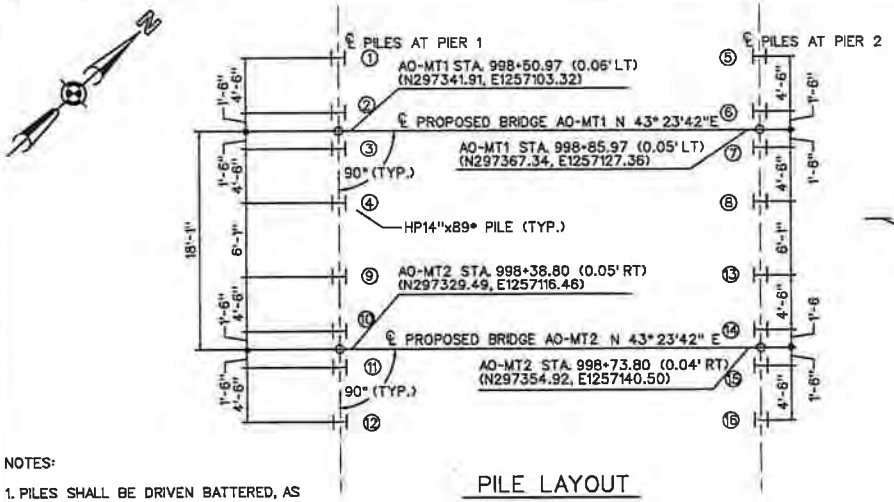
BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5500 Fax: (425) 454-0220

BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
BRIDGE LAYOUT
LS 50, BR.16.90

DWG NO BR1
SHEET 1 OF 4 SHEETS



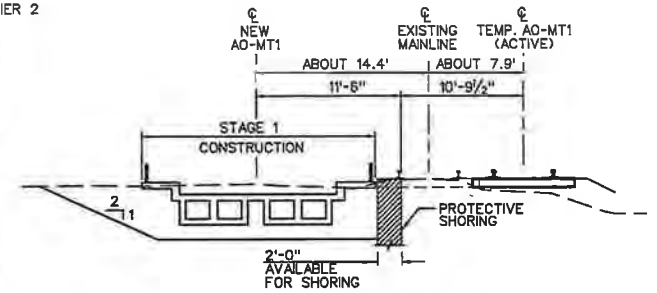
PILE LAYOUT

NOTES:

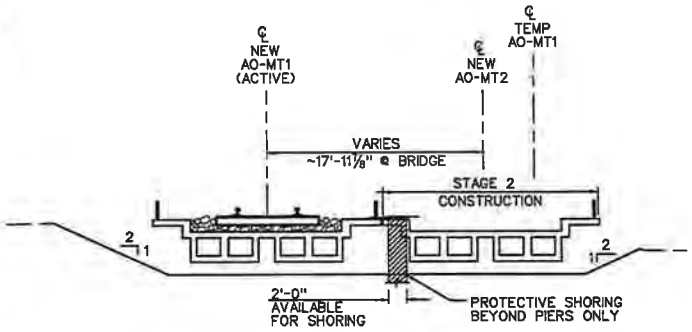
1. PILES SHALL BE DRIVEN BATTERED, AS SHOWN ON DRAWING BR4.
2. PILE LOCATIONS SHOWN ARE AT THE BOTTOM OF THE CAP BEAM.
3. ESTIMATED PILE EMBEDMENT IS 36 FEET BELOW THE BOTTOM OF THE CAP BEAM.

PILE COORDINATE TABLE

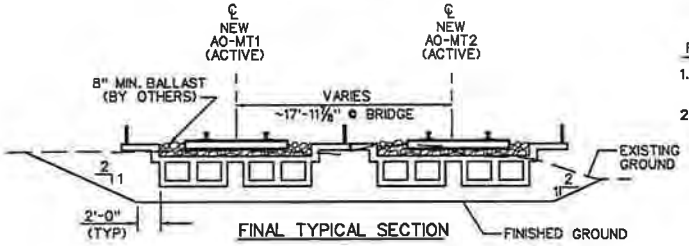
PILE NO.⊙	NORTHING	EASTING
①	297346.03	1257098.96
②	297342.94	1257102.23
③	297340.88	1257104.41
④	297337.79	1257107.68
⑤	297371.46	1257123.00
⑥	297368.37	1257126.27
⑦	297366.31	1257128.45
⑧	297363.22	1257131.72
⑨	297333.61	1257112.10
⑩	297330.52	1257115.37
⑪	297328.46	1257117.55
⑫	297325.36	1257120.82
⑬	297359.04	1257136.14
⑭	297355.95	1257139.41
⑮	297353.89	1257141.59
⑯	297350.80	1257144.86



STAGE 1



STAGE 2



FINAL TYPICAL SECTION

BRIDGE STAGING
LOOKING NORTH (RR EAST)

STAGE 1 CONSTRUCTION:

1. CONSTRUCT AO-MT1 SUBGRADE IN TEMPORARY LOCATION (BY OTHERS).
2. SHIFT EXIST MAINLINE TRACK AND TRAFFIC TO TEMPORARY AO-MT1 (BY BNSF).
3. CONSTRUCT PROTECTIVE SHORING.
4. EXCAVATE AND CONSTRUCT BRIDGE AT PROPOSED AO-MT1.

STAGE 2 CONSTRUCTION:

1. CONSTRUCT AO-MT1 SUBGRADE (BY OTHERS).
2. CONSTRUCT AO-MT1 TRACK AND SHIFT TRAFFIC FROM TEMP. AO-MT1 TO AO-MT1 (BY BNSF).
3. REMOVE PROTECTIVE SHORING BETWEEN PIERS 1 & 2. PROTECTIVE SHORING BEYOND PIERS TO REMAIN.
4. REMOVE AO-MT2 TRACK AT BRIDGE (BY BNSF).
5. EXCAVATE AND CONSTRUCT BRIDGE AT PROPOSED AO-MT2.
6. CONSTRUCT AO-MT2 SUBGRADE (BY OTHERS).
7. REMOVE REMAINING PROTECTIVE SHORING.

FINAL:

1. CONSTRUCT PROPOSED AO-MT2 AND INSTALL TRACK ACROSS BRIDGE (BY BNSF).
2. OPEN AO-MT2 TO TRAFFIC (BY BNSF).

5/20/2010

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

ISSUE			
NO.	DATE	BY	DESCRIPTION

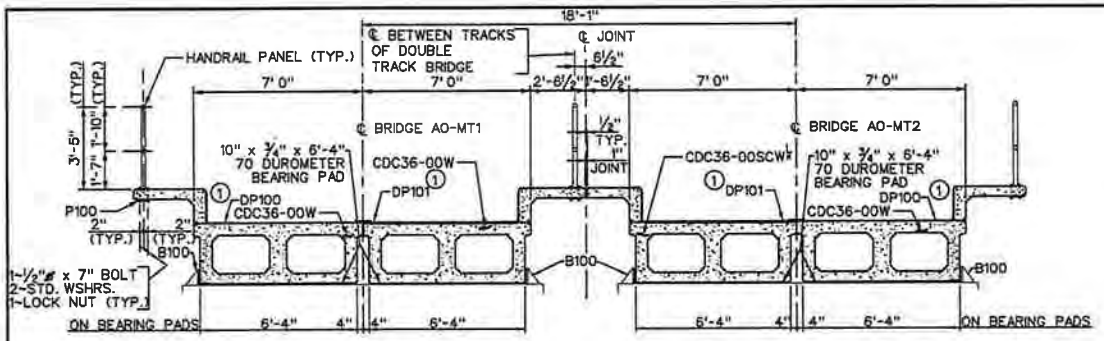
BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-9600 Fax: (425) 454-0220

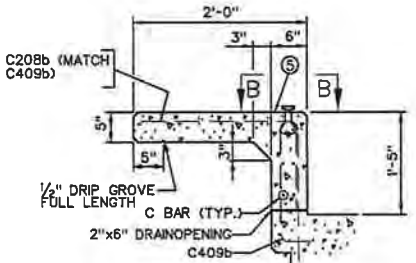
BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
PILE LAYOUT AND CONSTRUCTION STAGING
LS 50, BR.16.90

DWG NO. BR2
SHEET 2 OF 4 SHEETS



TYPICAL SECTION
LOOKING NORTH



NOTE: SEE BNSF-UP STANDARD PLAN SHEET 500000 BG1 FOR VIEW B AND BNSF-UP STANDARD PLAN SHEETS 500000 BG1, BG2, & BG3 FOR ADDITIONAL DETAILS

SPECIAL CURB SCW^{L} DETAIL
PRECAST CURB SCW^{R} IS OPPOSITE HAND OF SCW^{L}

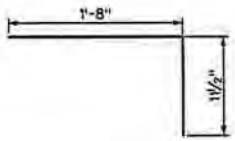
① IF GAP, EITHER BETWEEN BEAMS OR BETWEEN BEAM AND PARAPET, IS ANTICIPATED TO BE GREATER THAN 3", USE DP104 & DP105 IN PLACE OF DP100 & DP101, RESPECTIVELY. ORDER DP104 & 105 ONLY AS NEEDED.

* SEE SPECIAL CURB SCW^{L} DETAIL ON THIS SHEET

⑤ 3"x6" I.D. PLATE IS TO BE EMBEDDED FLUSH IN TOP OF CURB AND CENTERED 6" FROM END OF CURB. PLATE SHALL CONTAIN THE FOLLOWING INFORMATION IN ½" LETTERING: ITEM NAME, LENGTH, WEIGHT, DATE MANUFACTURED AND NAME OF MANUFACTURER.

BILL OF MATERIAL (SEE NOTE 1)

LINE	QTY.	UNIT	DESCRIPTION	MARK	SIZE	LENGTH	REMARKS
1	71,200	LBS.	STEEL BEARING PILE ASTM A36 (16 PIECES)		HP14X89	50'-0"	SEE NOTE 2
2							
3	4	EA.	PRECAST CONC. CAP - END BENT	CPC3W	3'-0"x5'-11¾"	18'-3"	PER DWG BR4 & PLAN 17902-090
4	4	EA.	PRECAST CONC. WINGWALL	PW103	9"x5'-11¾"	8'-6"	PER PLAN 17902-091
5	1	EA.	PRESTRESSED DOUBLE BOX BEAM WITH CUSTOM SPECIAL CURB	CDC36-00SCW*	2'-6"x7'-0"	36'-0"	PER PLAN 500000 & DWG BR3
6	3	EA.	PRESTRESSED DOUBLE BOX BEAM WITH WALK	CDC36-00W	2'-6"x7'-0"	36'-0"	PER PLAN 500000
7							
8	16	EA.	SPIRAL BOLT		1¼" DIA.	1'-1"	PER PLAN 17902-078
9	16	EA.	WASHER, GALVANIZED	W100	4"x¾"	0'-4"	PER PLAN 17902-094
10	4	EA.	DECK PLATE, GALVANIZED	DP100	8"x⅜"	7'-9½"	PER PLAN 17902-094
11	4	EA.	DECK PLATE, GALVANIZED	DP101	8"x⅜"	7'-9½"	PER PLAN 17902-094
12							
13	8	EA.	RESTRAINER BRACKET	B100	PC OF HP14x89		PER PLAN 17902-094
14							
15	3	EA.	HANDRAIL PANEL, GALVANIZED	EHPM19-6.75	1½" DIA. PIPE	19'-6¾"	PER PLAN 17000-001B
16	3	EA.	HANDRAIL PANEL, GALVANIZED	EPHF19-6.75	1½" DIA. PIPE	19'-6¾"	PER PLAN 17000-001B
17	12	EA.	PLATE, GALVANIZED	P100	1½"x¼"	0'-6"	PER PLAN 17902-094
18							
19	24	EA.	BOLT, HEX HEAD, GALVANIZED		1½" DIA.	0'-7"	HANDRAIL POST
20	48	EA.	STANDARD WASHER FOR ½"ø BOLT, GALVANIZED		1½" DIA.		HANDRAIL POST
21	24	EA.	LOCK NUT FOR ½"ø BOLT, GALVANIZED		1½" DIA.		HANDRAIL POST
22							
23	8	EA.	URETHANE BEARING PAD - 70 DUROMETER		¾"x10"	6'-4"	PER PLAN 17902-077
24							
25	32	EA.	PREMOLDED JOINT FILLER, ASPH. IMPREG.		½"x28"	6'-4"	PER PLAN 17902-078



BAR C308b
SIZE IS #4

NOTE: FOR BAR DESIGNATION, SEE BNSF-UP STANDARD PLAN 500000 BG2.

NOTES:

1. BNSF TO FURNISH BRIDGE ITEMS SHOWN IN ABOVE BILL OF MATERIAL. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE PILE DRIVING, PILE SPLICES (IF NECESSARY), PAINT, AND ALL OTHER MATERIALS NOT LISTED IN THE ABOVE BILL OF MATERIALS TO PROPERLY ERECT THIS BRIDGE IN ACCORDANCE WITH THESE PLANS, SPECIAL PROVISIONS, AND BNSF STANDARD CONSTRUCTION SPECIFICATIONS.
2. ESTIMATED PILE EMBEDMENT PER GEOTECHNICAL REPORT RECOMMENDATION IS 36'-0" BELOW THE BOTTOM OF THE CAP BEAM. CONTRACTOR SHALL BE PREPARED TO SPLICE PILES OR USE LONGER PILES AS REQIRED TO DEVELOP REQUIRED PILE CAPACITY.

CONSULTANT		DATE
DESIGNED BY	V BACURIN	04-02-10
ENTERED BY	V BACURIN	04-02-10
CHECKED BY	K LINTS	04-02-10
PROJ. MGR.	K LINTS	04-02-10

ISSUE			
NO.	DATE	BY	DESCRIPTION

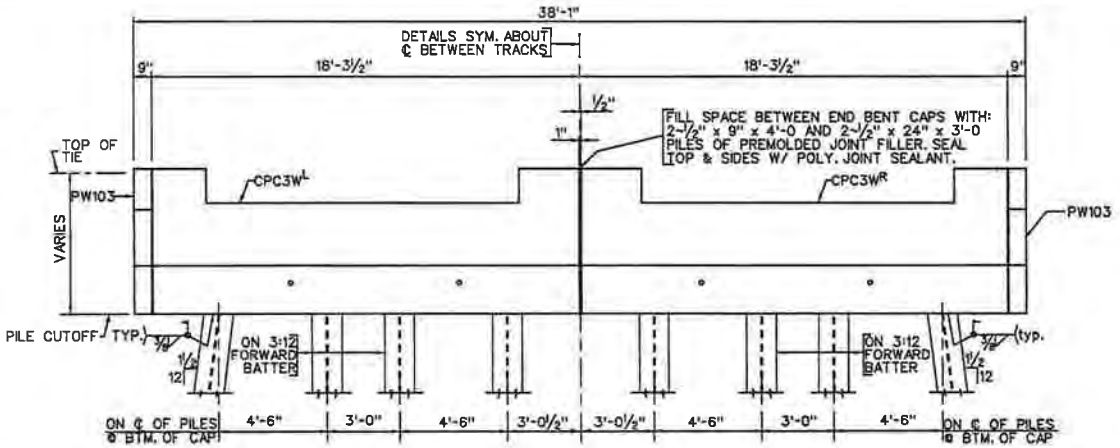
BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5600 Fax: (425) 454-0220

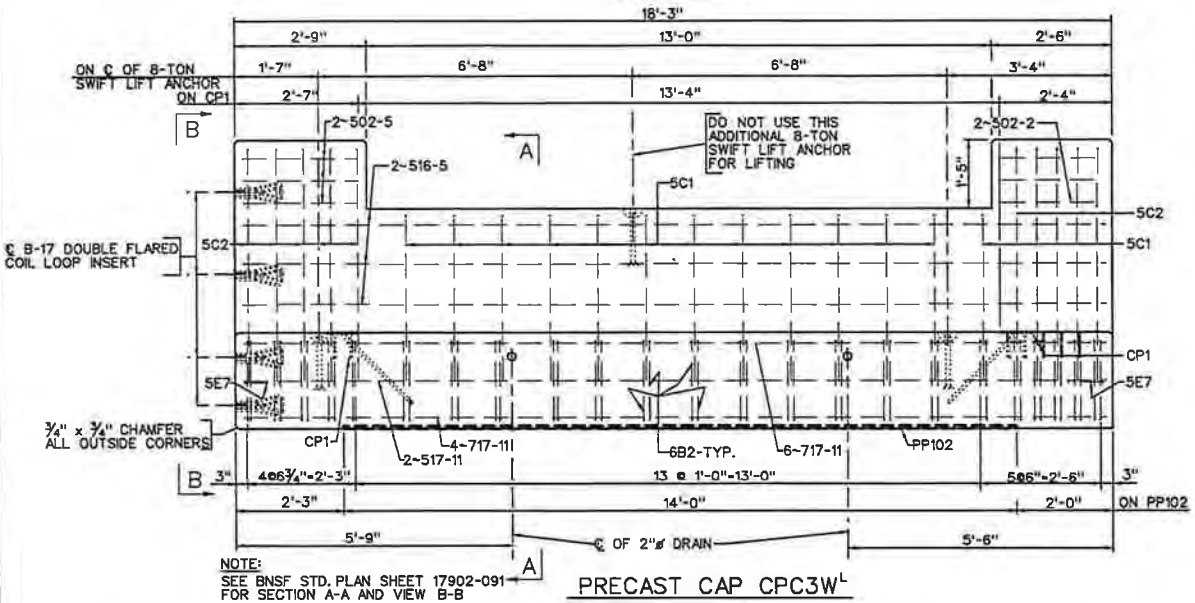
BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
PRECAST MEMBER DETAILS
LS 50, BR.16.90

DWG NO BR3
SHEET 3 OF 4 SHEETS



END BENT



NOTE:
SEE BNSF STD. PLAN SHEET 17902-091 FOR SECTION A-A AND VIEW B-B

PRECAST CAP CPC3W^L

WT.= 23,800 LBS., VOL.= 5.88 CU. YDS., REINF. STEEL= 1,440 LBS.
PRECAST CAP CPC3^R IS OPPOSITE HAND OF CPC3^L

NOTES:

ALL PILES ARE HP14" x 89# STEEL BEARING PILES SEE BNSF STD. PLAN SHEET 17902-088 FOR "TYPICAL PILE SPLICE" DETAIL.

AFTER PRECAST CONCRETE MEMBERS ARE SET, FILL RECESSES AT LIFT ANCHORS WITH CEMENT GROUT TO TOP OF SURROUNDING CONCRETE.

GENERAL ALL MATERIAL AND WORKMANSHIP SHALL BE AS PER THE CURRENT BNSF STANDARD SPECIFICATIONS.

COIL LOOP INSERTS ARE TO BE DOUBLE FLARED TYPE B17 1¼" DIA. x 12" AS MANUFACTURED BY DAYTON-SUPERIOR AND HAVE A SAFE WORKING LOAD OF 13,500 LBS. WITH A 4 TO 1 SAFETY FACTOR. THE INSERTS ARE TO BE COMPLETELY RECESSED WITH 1¼" DIA. x 13" SPIRAL BOLTS ATTACHED TO THE CAP FOR SHIPMENT.

CONCRETE: THE ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE SHALL BE NOT LESS THAN 4000 P.S.I. IN 28 DAYS. CONCRETE MEMBERS SHALL NOT BE REMOVED FROM THE CASTING BED BEFORE THE CONCRETE REACHES A STRENGTH OF 2500 P.S.I.

ALL EXPOSED EDGES OF CONCRETE MEMBERS SHALL BE CHAMFERED ¾".

REINFORCEMENT: MILD STEEL REINFORCEMENT SHALL MEET THE REQUIREMENTS OF THE CURRENT A.S.T.M. DESIGNATION: A615 OR A706, GRADE 60.

FABRICATION OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH CHAPTER 7 OF THE CURRENT C.R.S.I. MANUAL OF STANDARD PRACTICE.

STEEL REINFORCEMENT MAY BE MOVED SLIGHTLY SO AS TO MISS PP102 OR CP1.

MINIMUM CONCRETE COVER ON REINFORCEMENT SHALL BE TWO (2) INCHES.

STEEL REQUIRED PER PRECAST MEMBER		
PRECAST MEMBER CPC3W^L	PRECAST MEMBER CPC3W^R	DESCRIPTION
REINFORCING STEEL		
46	46	6B2 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
13	13	5C1 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
10	10	5C2 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
2	2	5E7 (SEE DETAIL, BNSF STD. PLAN 0000-17902-092)
6	6	502-2 (STRAIGHT, SIZE: #5, LENGTH: 2'-2")
6	6	502-5 (STRAIGHT, SIZE: #5, LENGTH: 2'-5")
8	8	517-11 (STRAIGHT, SIZE: #5, LENGTH: 17'-11")
10	10	717-11 (STRAIGHT, SIZE: #7, LENGTH: 17'-11")
STRUCTURAL STEEL		
4	4	1¼" x 12" DAYTON SUPERIOR B-17 DOUBLE FLARED COIL LOOP INSERT 1¼" x 12" LONG, 13,500 LBS. SWL (SAFE WORKING LOAD), PLAIN
3	3	8-TON SWIFT LIFT ANCHOR
2	2	PLATE CP1 (SEE DETAIL, BNSF STD. PLAN 0000-17902-094)
1	1	PILE PLATE PP102 (SEE DETAIL, BNSF STD. PLAN 0000-17902-094)

5/20/2010

CONSULTANT	DATE
DESIGNED BY V BACURIN	04-02-10
ENTERED BY V BACURIN	04-02-10
CHECKED BY K LINTS	04-02-10
PROJ. MGR. K LINTS	04-02-10

ISSUE				BNSF APPROVALS		
NO.	DATE	BY	DESCRIPTION	DEPARTMENT	SIGNATURE	DATE

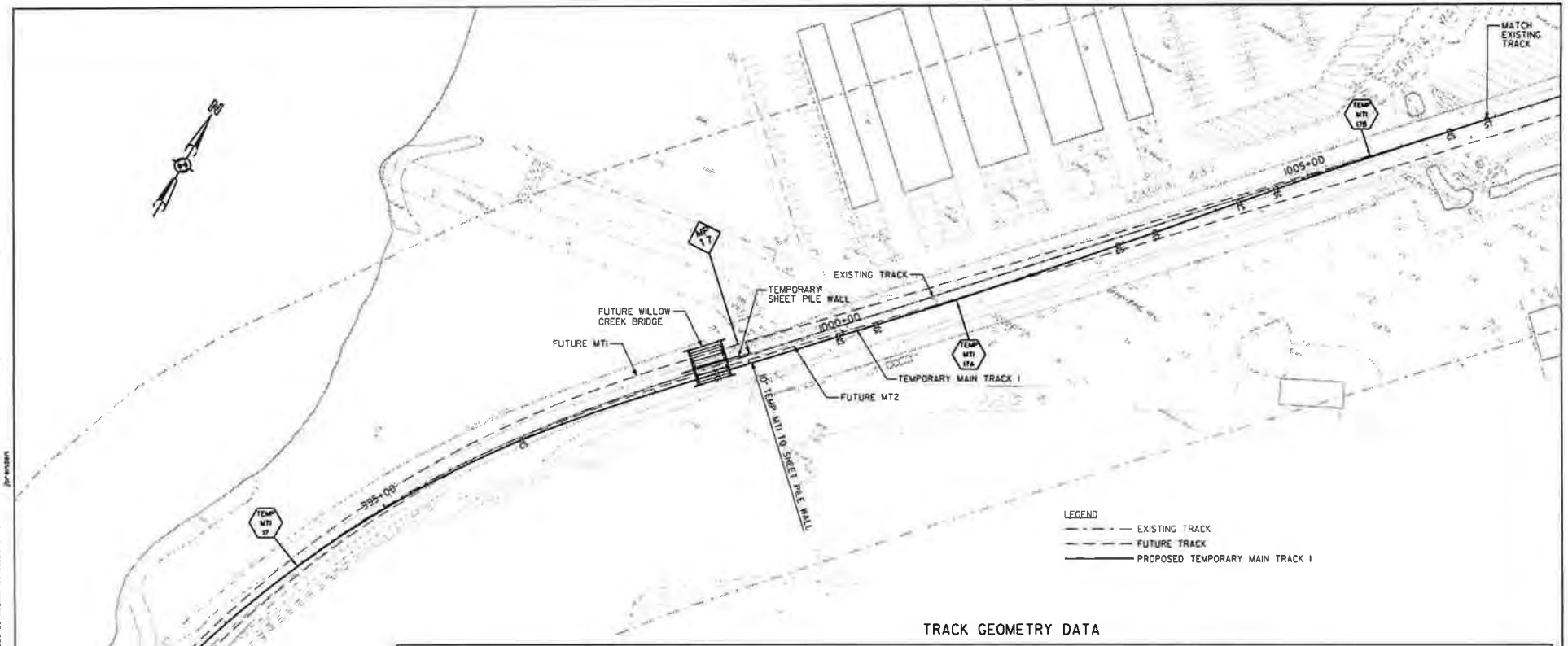
AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5600 Fax: (425) 454-0220

BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES
BRIDGE TYP. SECTION & END BENT DETAILS
LS 50, BR.16.90

DWG NO BR4
SHEET 4 OF 4 SHEETS

APPENDIX D
TEMPORARY MAIN TRACK PLAN



TRACK GEOMETRY DATA

ALIGNMENT NAME: TEMP MT1 DESCRIPTION: EDMONDS TEMPORARY MAINLINE TRACK 1 FOR CONSTRUCTION OF PHASE 1 OF WILLOW CREEK BRIDGE

ID NO.	DESC	STATION	NORTHING	EASTING	BEARING	DISTANCE	R	Dc	L	I	DELTA	THETA	Ls	X	Y	Ea Vp/Vf(MPH)
17	CS	991+81.88	296760.50	1256793.30												
	SC	992+21.88	296799.26	1256803.19								2°01'58"	40.00	39.99	0.71	4½" 45/40
	CS	996+55.25	297184.52	1256995.57			1109.23	5°10'00"	433.37	29°50'21"	22°23'00"					
	ST	998+65.25	297342.12	1257134.23								5°25'23"	210.00	209.81	6.62	
					N 43°08'59" E	129.16										
17A	TS	999+94.41	297436.35	1257222.56								0°09'00"	40.00	40.00	0.03	¾" 60/50
	SC	1000+34.41	297465.55	1257249.89			-7639.49	0°45'00"	259.68	2°14'51"	1°56'51"					
	CS	1002+94.09	297658.44	1257423.73								0°09'00"	40.00	40.00	0.03	
	ST	1003+34.09	297688.65	1257449.95												
					N 40°54'08" E	90.67										
17B	TS	1004+24.76	297757.19	1257509.32								0°09'00"	40.00	40.00	0.03	¾" 60/50
	SC	1004+64.76	297787.40	1257535.53			7639.49	0°45'00"	186.17	1°41'47"	1°23'47"					
	CS	1006+50.93	297926.29	1257659.50								0°09'00"	40.00	40.00	0.03	
	ST	1006+90.93	297955.76	1257686.55												
					N 42°35'54" E											

CONSULTANT		DATE
DESIGNED BY	J B BRENDEN	09-18-09
ENTERED BY	J B BRENDEN	09-18-09
CHECKED BY	B M WILLIAMS	09-18-09
PROJ. MGR.	D HOOK	09-18-09

ISSUE			
NO.	DATE	BY	DESCRIPTION

BNSF APPROVALS		
DEPARTMENT	SIGNATURE	DATE

HNTB

BNSF RAILWAY

SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES

TEMPORARY MAIN TRACK 1
PHASE 1 CONSTRUCTION AT WILLOW CREEK

ENG NO.

SHEET OF SHEETS

18-SEP-2009 14:02
\\seaa001-jobs\28400.BNSF\05422.Edmonds\Textbook\08_TechProd\Resubmittal\Design\Temp MT1 at Willow Ck.dgn
jbrenden

SCHEDULE B

Inspection and Replacement Costs

DESCRIPTION	AMOUNT	NOTES
Capital cost	$78,400.	Invested in inflation-indexed US Treasury bonds @ 2% for 100 years.
Inspection & Replacement	$60,000.	$600. annual for 100 years
TOTAL CAPITAL & REPLACEMENT	**$138,400.**	

SCHEDULE C

9.4. Primary Contacts

Sound Transit:

Ellie Ziegler
Senior Environmental Planner
401 South Jackson
Seattle, WA 98104-2826
ellie.ziegler@soundtransit.org

BNSF:

Donald R. Omsberg
BNSF Manager Engineering
2454 Occidental Ave. S., Ste 2D
Seattle, WA 98134

9.5 Notice

Sound Transit:

Ellie Ziegler
Senior Environmental Planner
401 South Jackson
Seattle, WA 98104-2826
ellie.ziegler@soundtransit.org

with a copy to the following:

Jordan Wagner
Legal Counsel
Sound Transit
401 South Jackson
Seattle, WA 98104-2826
wagnerj@soundtransit.org

BNSF:

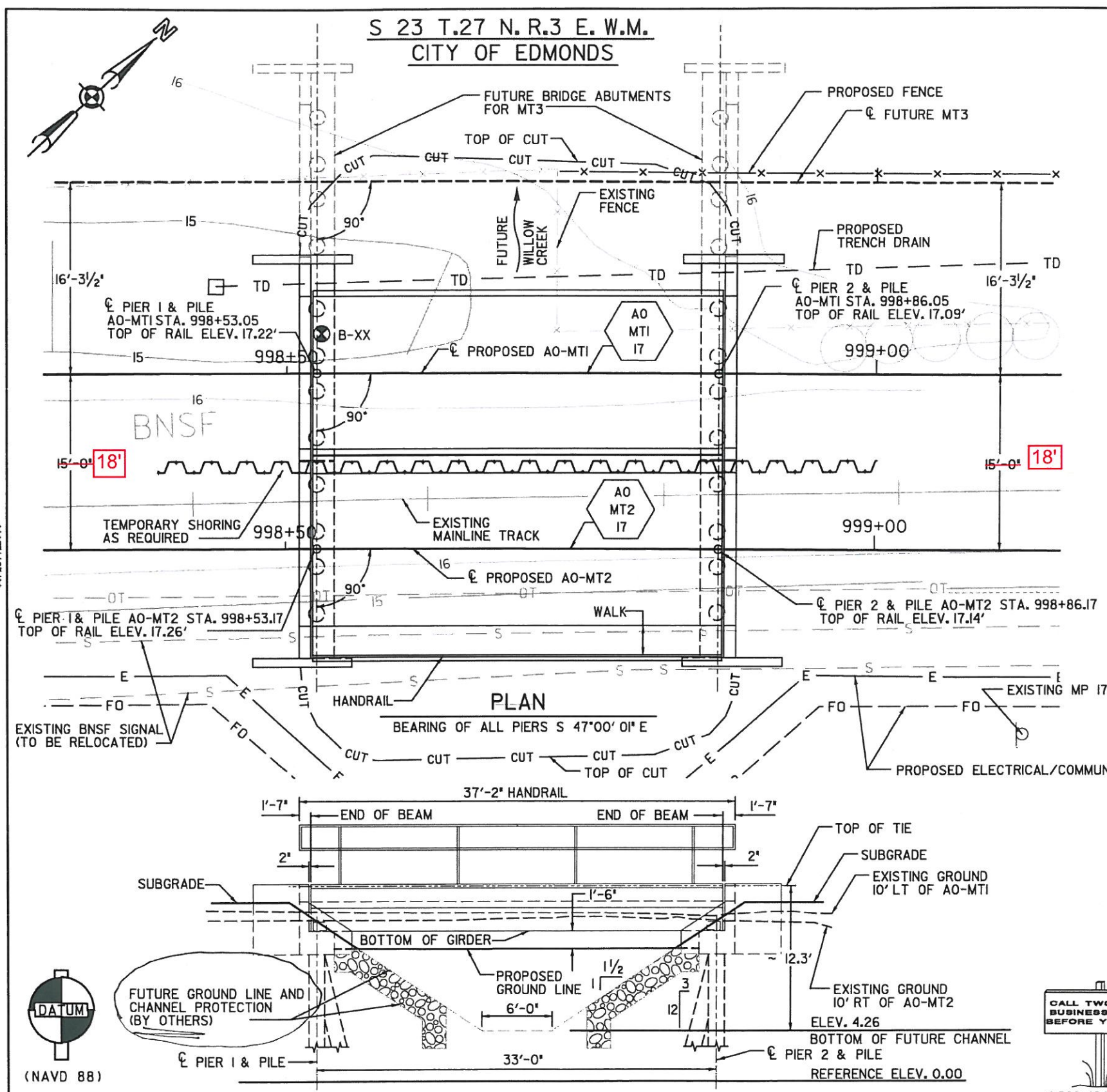
Walt Smith
General Director Commuter Construction
2454 Occidental Ave. S, Ste 2D
Seattle, WA 98134
Walter1.smith@bnsf.com

With copy to the following:

David Rankin
Senior General Attorney
2500 Lou Menk
Ft. Worth, TX 76131
David.rankin@bnsf.com

APPENDIX N.5

BNSF TRESTLE AS-BUILTS



GENERAL NOTES:

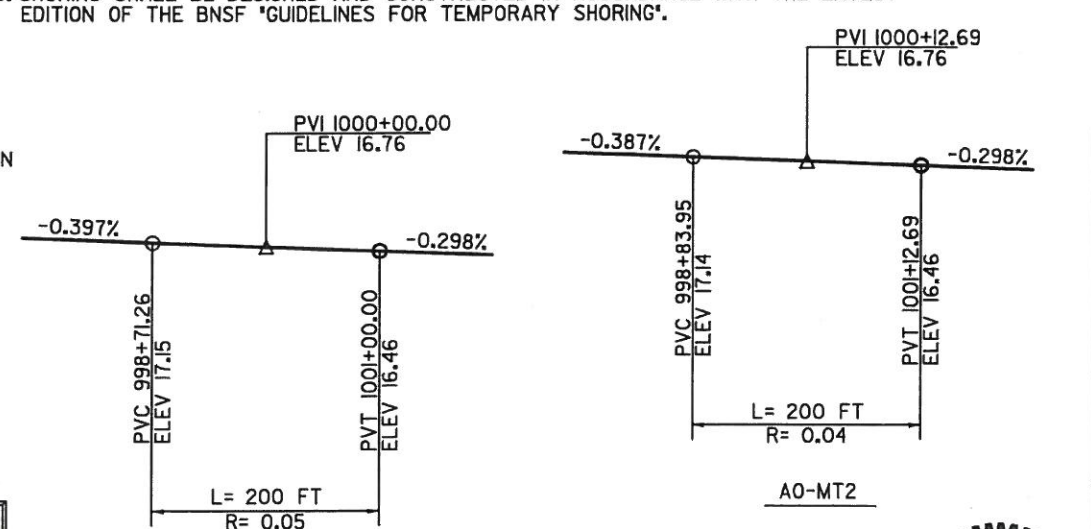
1. ALL MATERIAL AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT BNSF STANDARD SPECIFICATIONS.
2. THE BRIDGE SHALL BE CONSTRUCTED USING 30' X 7'-0" PRESTRESSED CONCRETE DOUBLE BOX BEAMS IN ACCORDANCE WITH THE FOLLOWING BNSF STANDARD PLANS, AND THE GEOMETRY AND MODIFICATIONS SHOWN ON THESE PLANS:

STANDARD PLAN NO.	SHEET NO.
0000-17000-01B	1 OF 1
0000-17003-01C	1 OF 2
0000-17003-02B	2 OF 2
0000-17902-01C	1 OF 32
0000-17902-02A	2 OF 32
0000-17902-03C	3 OF 32
0000-17902-12B	12 OF 32
0000-17902-25C	32 OF 32
0000-17902-26E	26 OF 32
0000-17902-29E	29 OF 32
0000-17902-30E	30 OF 32
0000-17902-31D	31 OF 32
0000-17902-32C	32 OF 32

Standard Plans to be verified in final design.

AND OTHER STANDARD PLANS AS APPLICABLE AND APPROVED BY THE ENGINEER.

3. THE BEAM ARRANGEMENT SHALL BE A TYPE -VII WITH A SINGLE WALKWAY AND HANDRAIL ON THE RIGHT SIDE OF TRACK MT2
4. PILES SHALL BE METAL SHELL PILES WITH MATERIALS AND DIMENSIONS AS SPECIFIED IN THE BNSF STANDARD SPECIFICATIONS AND STANDARD PLANS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. TEMPORARY SUPPORTS AND FALSEWORK SHALL BE GRADUALLY RELEASED TO PREVENT IMPACT OR UNDUE STRESSES IN THE STRUCTURE.
6. THE LOCATIONS OF ALL EXISTING UTILITIES WITHIN THE VICINITY OF THE STRUCTURES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO EXCAVATING OR DRIVING PILES.
7. UNLESS OTHERWISE NOTED IN THE PLANS, ALL DIMENSIONS ARE HORIZONTAL AND VERTICAL BASED ON A TEMPERATURE OF 64 DEGREES F (MEAN TEMPERATURE DURING CONSTRUCTION).
8. FOR TRACK ALIGNMENT GEOMETRY SEE DWG NO'S C202 AND C203.
9. SHORING SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE BNSF 'GUIDELINES FOR TEMPORARY SHORING'.



CALL TWO FULL BUSINESS DAYS BEFORE YOU DIG
1-800-424-5555

Plans & Specs subject to final design.

CONSULTANT			ISSUE				BNSF APPROVALS		
		DATE	NO.	DATE	BY	DESCRIPTION	DEPARTMENT	SIGNATURE	DATE
DESIGNED BY	Y DARMAWAN	08-15-08							
ENTERED BY	Y DARMAWAN	08-15-08							
CHECKED BY	R PATTERSON	12-08-08							
PROJ. MGR.	K LINTS	12-08-08							

AECOM
10900 NE 8th Street, Suite 750
Bellevue, Washington 98004
Phone: (425) 454-5600 Fax: (425) 454-0220

BNSF RAILWAY

FINAL DESIGN
FOR SOUND TRANSIT COMMUTER RAIL
SEATTLE TO EVERETT, WASHINGTON
GRADING AND STRUCTURES

BRIDGE LAYOUT

DWG NO BRI
SHEET 1 OF 3 SHEETS

KIVA LINTS STATE OF WASHINGTON 19878 REGISTERED PROFESSIONAL ENGINEER

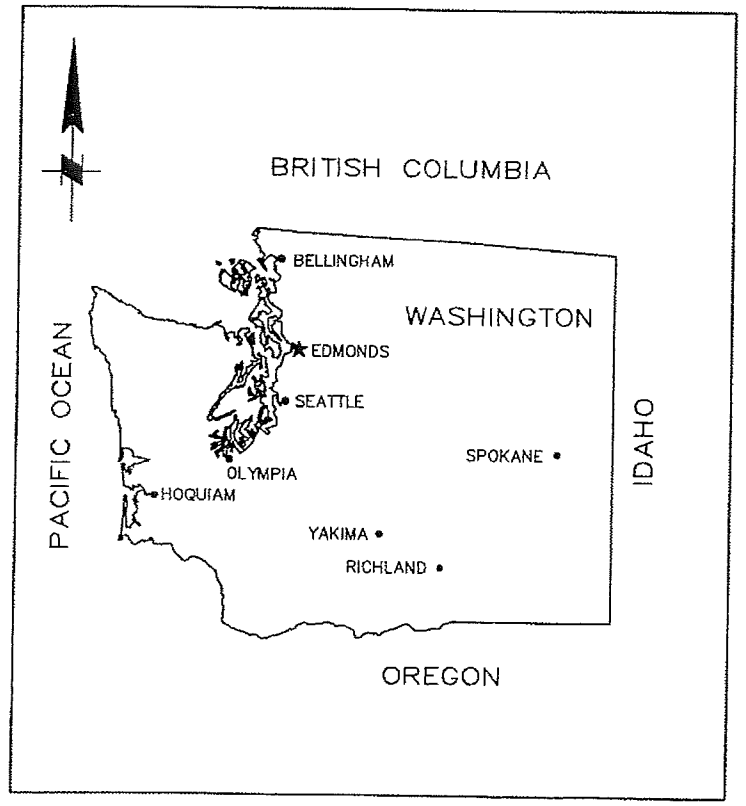
APPENDIX N.6

CITY OF EDMONDS
WILLOW CREEK STORMWATER OUTFALL AS-BUILTS

CITY OF EDMONDS

WILLOW CREEK OUTFALL PIPE EXTENSION

EDMONDS, WASHINGTON



LOCATION MAP
NTS

DRAWINGS LIST

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	EXISTING CONDITION SITE PLAN AND DEMOLITION
3	PLAN AND PROFILE
4	TYPICAL SECTIONS AND ELEVATION
5	PRECAST CONCRETE ANCHOR–PLAN, SECTIONS AND DETAILS
6	MISCELLANEOUS DETAILS

GENERAL NOTES:

1. STRUCTURAL DESIGN CRITERIA

A. CONCRETE

i. PRECAST & CAST–IN–PLACE, F'c = 5000 PSI

ii. REINFORCING STEEL, ASTM A615/A615M GRADE 60 (60,000 PSI).

B. STAINLESS STEEL BOLTS, WASHERS, AND NUTS, TYPE 316, ASTM F593.

2. EXISTING UTILITIES

UTILITIES AS SHOWN ARE BASED ON AVAILABLE INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES WITHIN THE PROJECT SITE. CHECK WITH APPROPRIATE AGENCIES THAT MAY HAVE UNDERGROUND FACILITIES WITHIN THE PROJECT SITE. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO UNDERGROUND FACILITIES RESULTING FROM CONTRACTORS OPERATION.

3. EXISTING WORK AND NEW WORK

CONTRACTOR SHALL VERIFY DIMENSIONS OF EXISTING WORK WHERE SUCH WORK CONNECTS TO OR AFFECTS NEW WORK. MATERIALS AND WORK SHOWN ON THESE DRAWINGS ARE NEW EXCEPT AS OTHERWISE INDICATED.

4. PERMITS CONFORMANCE REQUIREMENT

A. CONSTRUCTION SHALL CONFORM TO THE CONDITIONS AND REQUIREMENTS OF ALL PERMITS PROVIDED IN THE SPECIFICATIONS AND CONTRACT DOCUMENTS.

B. PROTECT EEL GRASS AND AVOID IMPACTS WHERE EVER PRACTICAL.

C. COMPLY WITH DEPARTMENT OF ECOLOGY STORM WATER MANUAL (LATEST EDITION) AND BEST MANAGEMENT PRACTICES.

5. SEQUENCE OF CONSTRUCTION

A. INSTALL NEW HDPE OUTFALL PIPE.

B. CUT OVER NEW OUTFALL PIPE TO EXISTING MANHOLE "A".

C. REMOVE ALL CMP.

6. EXISTING FEATURES

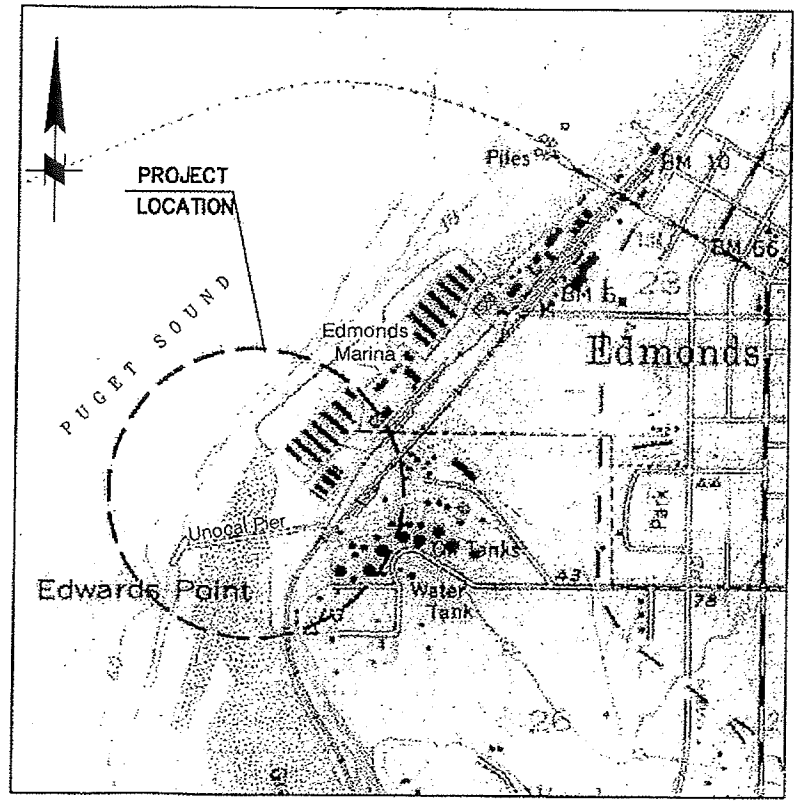
REMOVE DRIFTWOOD, LOGS, CONCRETE BLOCKS, ROCKS, BOULDERS, ANY OTHER MATERIAL AS NECESSARY TO CLEAR ACCESS TO/FROM PROJECT SITE. CONSTRUCT TEMPORARY RAMP AND DRIVEWAY AS NECESSARY. PROTECT IN PLACE AND/OR REPLACE IN KIND CATCH BASIN, CURB, PAVEMENT, SIGN, MONUMENT OR STRUCTURE AS PART OF THIS WORK.

7. ACCESS

REMOVE, SALVAGE, STORE, AND REPLACE ALL EXISTING SIGNS, BARBECUE STANDS, PICNIC TABLES, MONUMENTS, DRIFTWOOD, ECOLOGY BLOCKS, VOLLEY BALL POLES AND NET AND TRASH CANS IN APPROXIMATELY THE SAME LOCATION AS THEY WERE PRIOR TO CONSTRUCTION. PROVIDE IN TABULAR FORM THE QUANTITY AND LOCATION OF EACH FEATURE PRIOR TO MOBILIZING EQUIPMENT ONTO THE SITE.

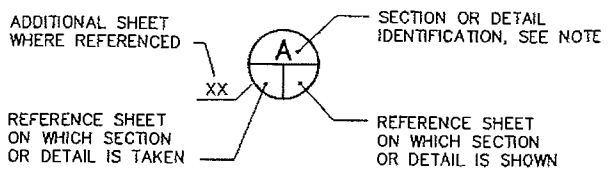
ABBREVIATIONS

&	AND
@	AT
ACP	ASPHALT CONCRETE PAVEMENT
APPROX	APPROXIMATE
℄	CENTERLINE
CIP	CAST–IN–PLACE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
DIA, ø	DIAMETER
DWG	DRAWING
(E)	EXISTING
EA	EACH
EF	EACH FACE
EL	ELEVATION
EQ	EQUAL
EW	EACH WAY
F'c	28–DAY COMPRESSIVE STRENGTH FOR CONCRETE
GALV	GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HORIZ	HORIZONTAL
ID	INSIDE DIAMETER
INV	INVERT
JT	JOINT
LF	LINEAR FEET (FOOT)
MAX	MAXIMUM
MHW	MEAN HIGH WATER
MHHW	MEAN HIGHER HIGH WATER
MIN	MINIMUM
MLLW	MEAN LOWER LOW WATER
(N)	NEW
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
ℙ	PLATE
REINF	REINFORCED, REINFORCING
REQD	REQUIRED
SIM	SIMILAR
SPECS	SPECIFICATION
STD	STANDARD
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
USCGS	U.S. COAST & GEODETIC SURVEY
VERT	VERTICAL
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION



VICINITY MAP
NTS

CROSS–REFERENCE LEGEND



NOTE: LETTER INDICATES SECTION, NUMBER INDICATES DETAIL. WHERE THERE IS NO REFERENCE SHEET INDICATED, IT MEANS THE DETAIL OR SECTION IS TAKEN AND SHOWN ON THE SAME SHEET.

FOR REFERENCE

Moffatt & Nichol
710 SECOND AVENUE, SUITE 720
SEATTLE, WA 98104

NO.	DATE	BY	REVISION

	BY	DATE
DESIGN	JFJ	2004
DRAWN	AB/AD	6/28/04
CHECKED	FU/MH/HH	8/9/04
QA/QC		

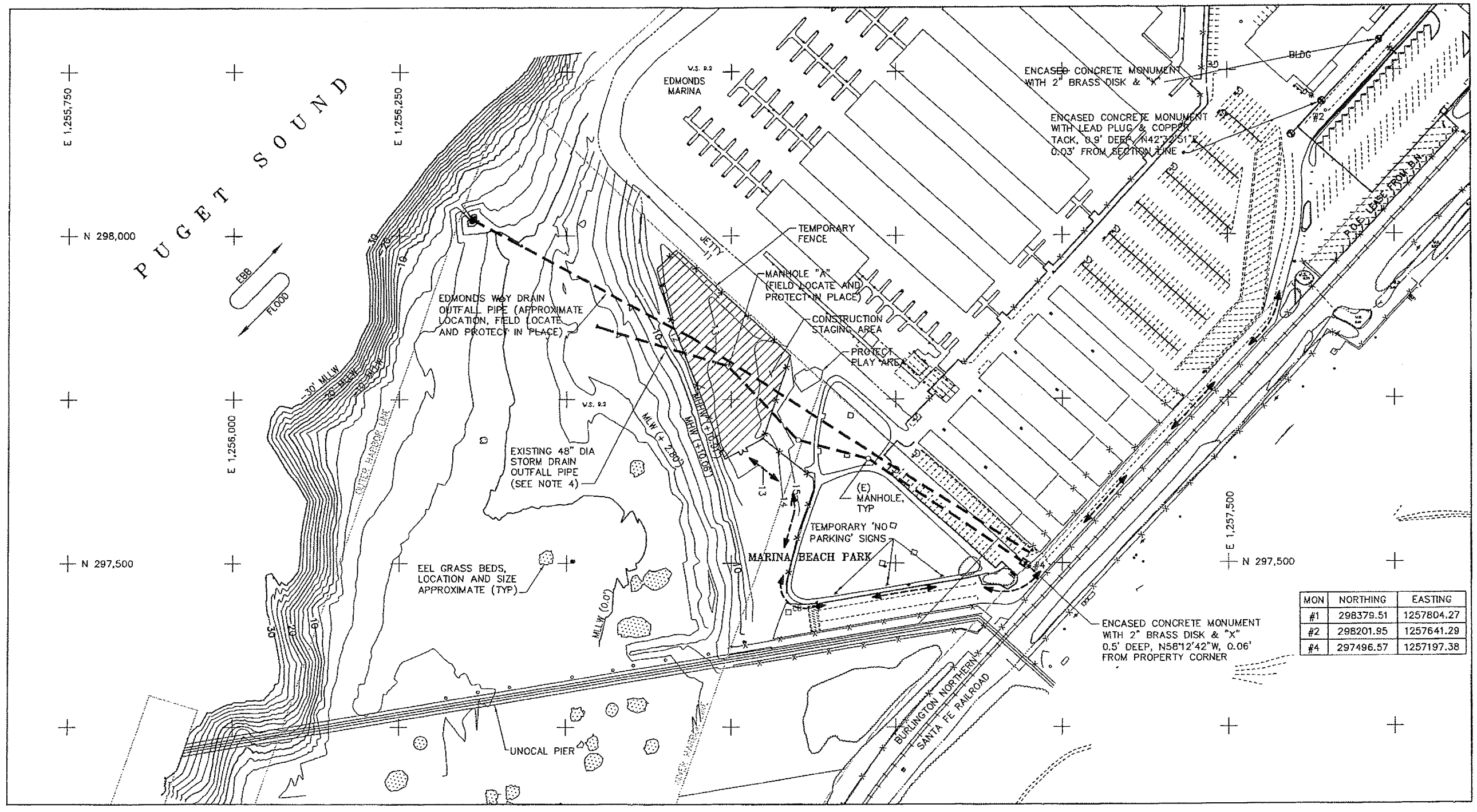
APPROVED BY
CITY ENGINEER
DATE

ENGINEERING DIVISION
121 FIFTH AVENUE NORTH
EDMONDS, WASHINGTON 98020
(425) 771–0220

WILLOW CREEK OUTFALL PIPE EXTENSION

TITLE SHEET

H. SCALE
V. SCALE
SHEET 1
1 OF 6 SHEETS
JOB NO. 4991



MON	NORTHING	EASTING
#1	298379.51	1257804.27
#2	298201.95	1257641.29
#4	297496.57	1257197.38

SITE PLAN

SCALE: 1" = 80'

NOTES:

1. VERTICAL DATUM = MEAN LOWER LOW WATER. BENCHMARK = USC&GS BRASS CAP MONUMENT, "TIDAL 9," AT SW CORNER OF PORT OF EDMONDS YACHT CLUB BUILDING. ELEVATION = 15.67 FEET.
2. HORIZONTAL DATUM: WASHINGTON PLANE COORDINATES, NAD83 (1991).
3. TOPOGRAPHIC MAP AND CONTOUR LINES BELOW ELEVATION 10.0 FT WERE BASED ON TOPOGRAPHIC SURVEY CONDUCTED ON 5/30/01 BY REID MIDDLETON, INC. IN THE NW 1/4, SECTION 26, T27N., R3E., WM EDMONDS, SNOHMISH COUNTY, WASHINGTON. CONTOUR LINES ABOVE ELEVATION 10.0 FT WERE APPROXIMATED BASED ON TOPOGRAPHIC MAP PROVIDED BY THE CITY OF EDMONDS (SURVEY BY A. L. CHRISMAN, DATES: 7/9/02, 11/20/02, AND 4/9/03).
4. DEMOLISH AND REMOVE EXISTING 48" DIA (CMP) BURIED OUTFALL. FROM THE LAST MANHOLE (MANHOLE "A") TO THE OUTBOARD END OF THE PIPE, (APPROXIMATELY 200 FT LONG) BACKFILL THE EXCAVATION TRENCH (FOR PIPE REMOVAL), AND RESTORE THE FINISH SURFACE TO PRE-CONSTRUCTION CONDITION. EXISTING PIPE IS CORRUGATED METAL WITH CONCRETE ANCHORS AND HAS ASBESTOS-BONDED ASPHALT COATING.
5. CONTRACTOR ACCESS ROUTE IS LIMITED TO THAT SHOWN ON THIS DRAWING, AS DESCRIBED IN THE SPECIFICATIONS, AND THE FOLLOWING:
   A. ALONG THE EXISTING OUTFALL PIPE TO BE REMOVED
   B. ALONG THE ALIGNMENT OF THE NEW OUTFALL PIPE EXTENSION
   C. ALONG THE NORTH SIDE AND PARALLEL TO THE UNOCAL PIER.

   THE AREA BETWEEN THE NEW OUTFALL PIPE AND THE UNOCAL PIER SHALL NOT BE USED FOR ANY CONSTRUCTION ACTIVITY. CONTRACTOR SHALL COMPLY WITH THE CITY OF EDMONDS TRAFFIC CONTROL REQUIREMENTS.
6. SURVEY EXISTING AND FINAL OUTFALL ALIGNMENT INCLUDING FINISHED GRADE AND INVERT ELEVATIONS. PROVIDE BEARING AND DISTANCE. SURVEY SHALL BE PERFORMED BY A LICENSED SURVEYOR REGISTERED IN WASHINGTON STATE.

FOR REFERENCE

LEGEND:

- RAILROAD TRACK
- CONTRACTOR ACCESS ROUTE
- FENCE
- CONSTRUCTION STAGING AREA

GRAPHIC SCALE (IN FEET)

60 0 80 160

1" = 80'

Moffatt & Nichol
710 SECOND AVENUE, SUITE 720
SEATTLE, WA 98104

NO.	DATE	BY	REVISION
DESIGN	JFJ	2004	
DRAWN	AB/MO	8/6/04	
CHECKED	JFJ/APH	8/6/04	
APPROVED	TJH		

APPROVED BY

CITY ENGINEER

DATE

ENGINEERING DIVISION
121 FIFTH AVENUE NORTH
EDMONDS, WASHINGTON 98020
(425) 771-0220

WILLOW CREEK OUTFALL PIPE EXTENSION

EXISTING CONDITION SITE PLAN AND DEMOLITION

X SCALE

Y SCALE

SHEET 2

2 OF 6 SHEETS

JOB NO. 4991

Plotted: Nov 08, 2004 - 7:32am

File: P:\4991 - Willow Creek Outfall\CADD\Submittals\100%_Sub\4991100T002.dwg

PUGET SOUND

30

20

10

FIELD VERIFY LOCATION

C

B

A

N 83°35'22"W

60" RCP (FIELD VERIFY LOCATION AND PROTECT IN PLACE

DEMOLISH & REMOVE EXISTING (200' APPROX) CMP STORM DRAIN OUTFALL PIPE INCLUDING ALL CONCRETE ANCHORS AND APPURTENANCES

RELOCATE "NO DOGS ALLOWED" SIGN AND POST

(E) PIPE TO REMAIN

STA 5+00

STA 4+85

STA 4+00

STA 3+00

MLW (+2.80')

STA 2+00

CONCRETE ANCHOR, TYP (SEE SHEET 5)

STA 1+00

STA 0+75

MHW (+10.06')

MHHW (+10.91')

EXISTING MANHOLE "A" (TO REMAIN, SEE NOTE)

STA 0+00

500 LF OF 48" DIA HDPE STORM DRAIN OUTFALL PIPE EXTENSION

E 1,256,250

N 297,750

N 297,750

E 1,256,500

E 1,256,750

NOTE:
MAINTAIN STORM WATER FLOW THROUGH EXISTING OUT FALL DURING CONSTRUCTION

PLAN
1" = 20'

FIELD VERIFY ELEVATION OF OUTFALL

ELEVATION, FT

+15.00
+10.00
+5.00
0.00
-5.00
-10.00
-15.00

MHHW EL. +10.91

MHW EL. +10.06

EXISTING "NO DOGS" SIGN AND POST

℄ EXISTING MANHOLE (STA 0+00)

INV EL. +0.93 ± SEE NOTE 2

EXISTING GRADE ±

MLW EL. +2.80

MLLW EL. 0.00

SEE DETAIL 1

END OF PIPE INV EL. -12.00

48" DIA STORM DRAIN, SEE NOTE 1

CONCRETE ANCHOR, TYP (SEE SHEET 5)

STA 1+11

FLANGED JOINT

CONNECT TO MANHOLE, SEE SPECIFICATIONS

EXISTING 48" DIA STORM DRAIN

5+00
4+00
3+00
2+00
1+00
0+00

NOTES:

1. STORM DRAIN PIPE SHALL HAVE A UNIFORM SLOPE FROM THE EXISTING MANHOLE TO THE OUTBOARD END OF PIPE. DREDGED BOTTOM SHALL BE SMOOTH TO MATCH THE UNIFORM SLOPE OF THE PIPE.
2. CONTRACTOR SHALL VERIFY AND MATCH THE EXISTING INVERT OF THE PIPE AT THE MANHOLE. INVERT ELEVATION SHOWN IS APPROXIMATE ONLY.

PROFILE
1' = 20' HORIZ
1' = 5' VERTICAL

GRAPHIC SCALES (IN FEET)
5 0 5 10
1" = 5'
20 0 20 40
1" = 20'

FOR REFERENCE

Moffatt & Nichol
710 SECOND AVENUE, SUITE 720
SEATTLE, WA 98104

NO.	DATE	BY	REVISION

	BY	DATE
DESIGN	JFJ	2004
DRAWN	AB/MD	8/18/04
CHECKED	JFJ/MPH	9/8/04
APPROVED	T.M.	

APPROVED BY
CITY ENGINEER
DATE

ENGINEERING DIVISION
220 4TH AVENUE SOUTH
EDMONDS, WASHINGTON 98020
(425) 771-0220

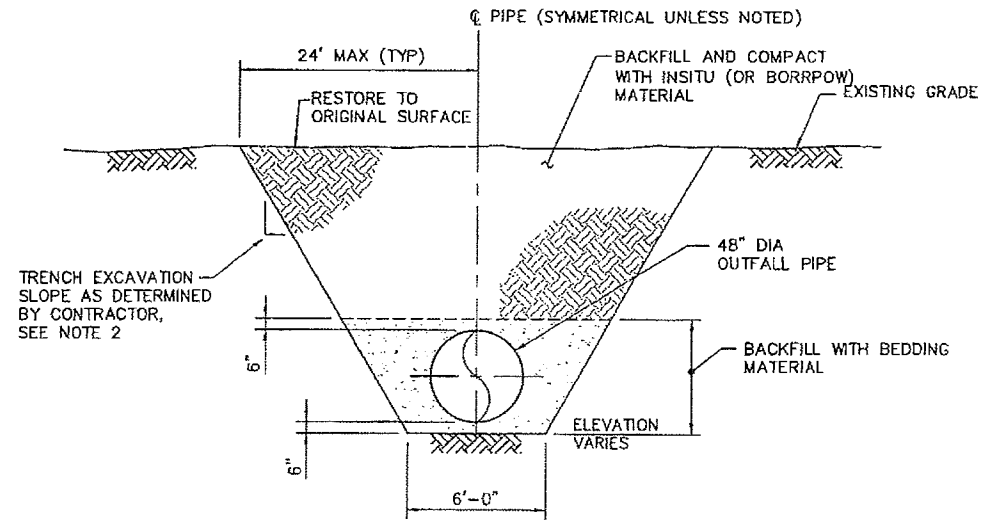
WILLOW CREEK OUTFALL PIPE EXTENSION

PLAN AND PROFILE

H. SCALE
V. SCALE

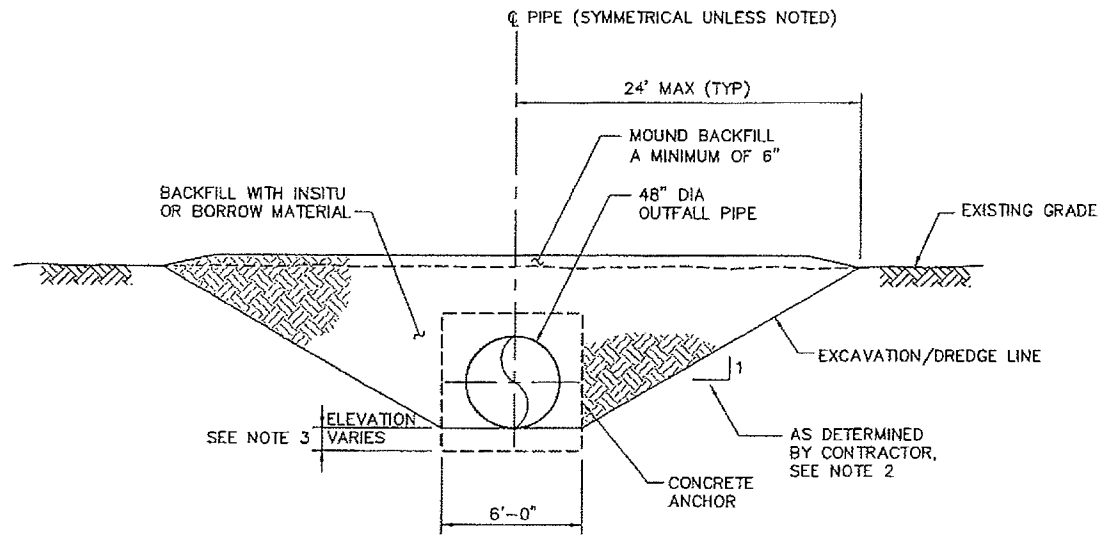
SHEET
3
3 OF 6 SHEETS

JOB NO. 4991



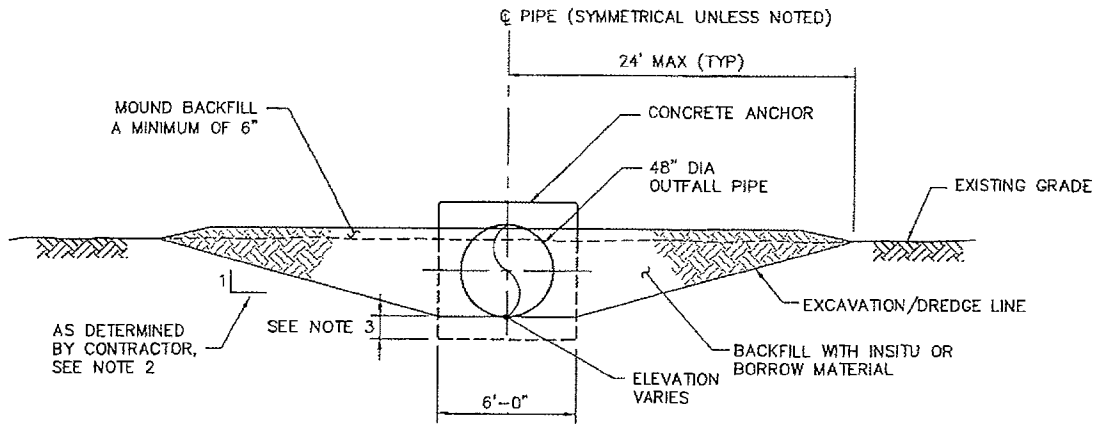
STATION 0+00 TO STATION 0+75±
(OR WHERE EXISTING GRADE IS ABOVE MHW)

TYPICAL SECTION A 3 4
1/4" = 1'-0"



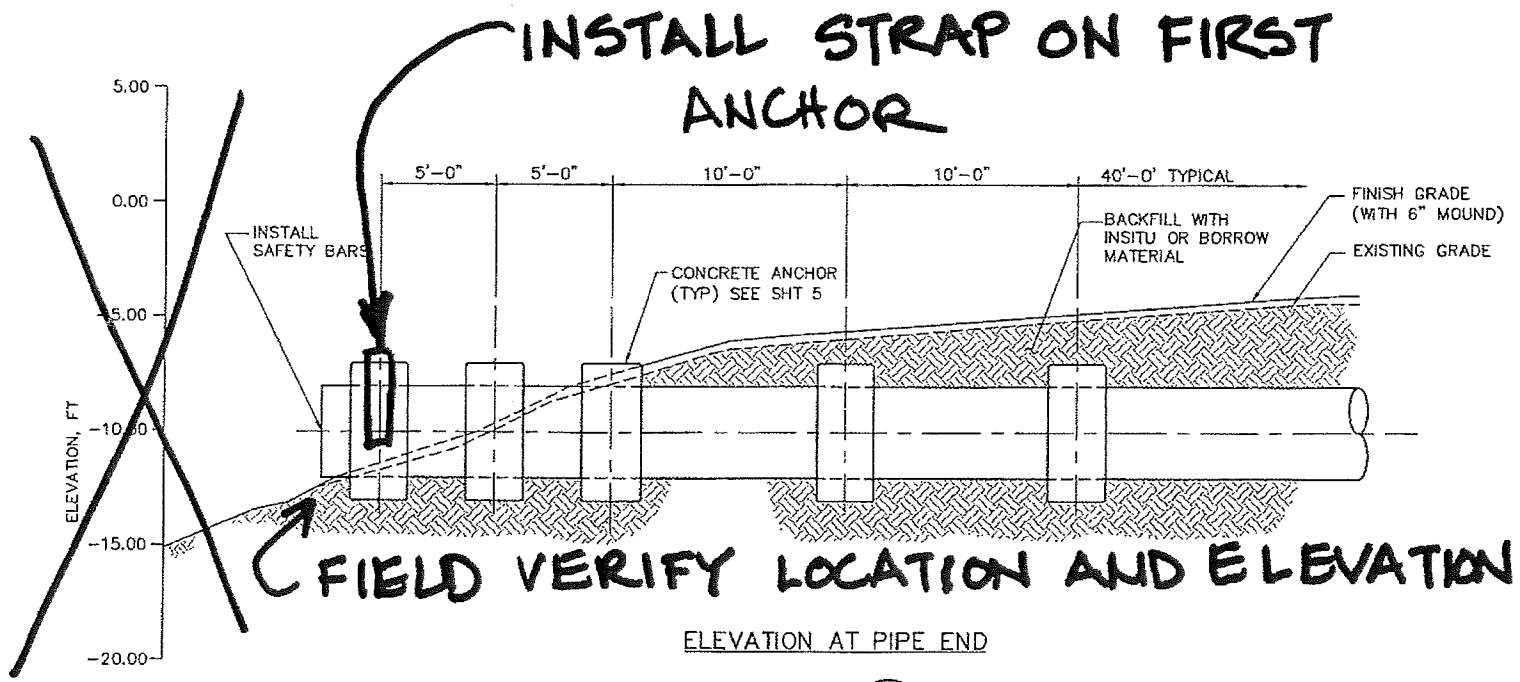
STATION 0+75± TO STATION 4+85±

TYPICAL SECTION B 3 4
1/4" = 1'-0"



STATION 4+85± TO OUTBOARD END OF PIPE

TYPICAL SECTION C 3 4
1/4" = 1'-0"



ELEVATION AT PIPE END

DETAIL 1 3 4
1/4" = 1'-0"

FOR REFERENCE

NOTES:

1. DREDGED/EXCAVATED MATERIALS MAY BE PLACED TEMPORARILY ALONG SIDE OF THE PIPELINE AT CONTRACTORS RISK.
2. DO NOT EXCEED 24' MAX. EXCAVATION LIMITS. PROVIDE SHORING OR OTHER APPROPRIATE MEANS AND METHODS AS REQUIRED TO MAINTAIN AN OPEN TRENCH.
3. EXCAVATE AT ANCHOR LOCATIONS AS NECESSARY TO MAINTAIN CONSTANT SLOPE IN PIPE.

GRAPHIC SCALE
2 0 2 4 6
1/4" = 1'-0"

Moffatt & Nichol
710 SECOND AVENUE, SUITE 720
SEATTLE, WA 98104

NO.	DATE	BY	REVISION
DESIGN	DATE 2004	BY JFJ	
DRAWN	8/6/04	JAS	
CHECKED	8/6/04	JFJ/MPH	
APPROVED		T.M.	

APPROVED BY
CITY ENGINEER
DATE

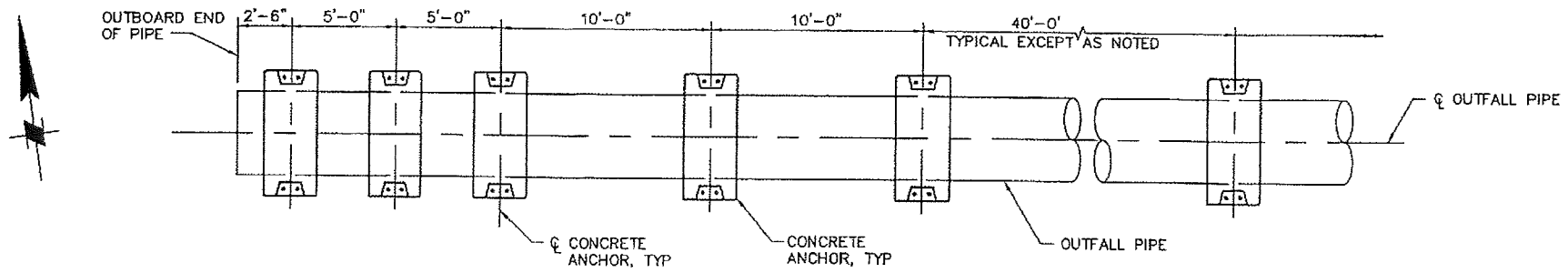
ENGINEERING DIVISION
121 FIFTH AVENUE NORTH
EDMONDS, WASHINGTON 98020
(425) 771-0220

WILLOW CREEK OUTFALL PIPE EXTENSION

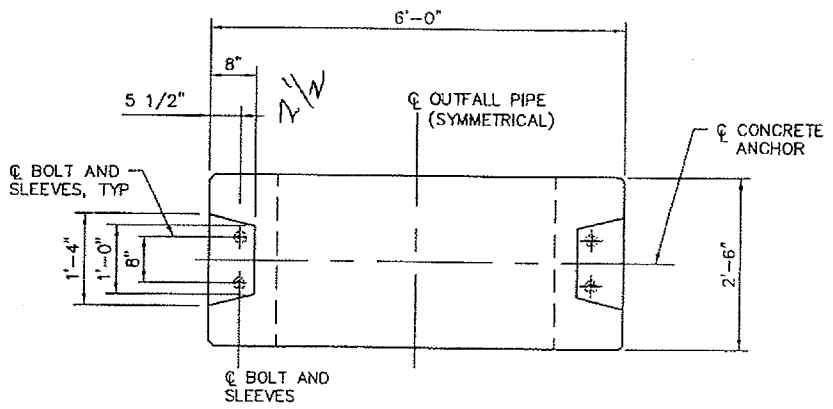
TYPICAL SECTIONS AND ELEVATION

H. SCALE
V. SCALE
SHEET 4
4 OF 6 SHEETS
JOB NO. 4991

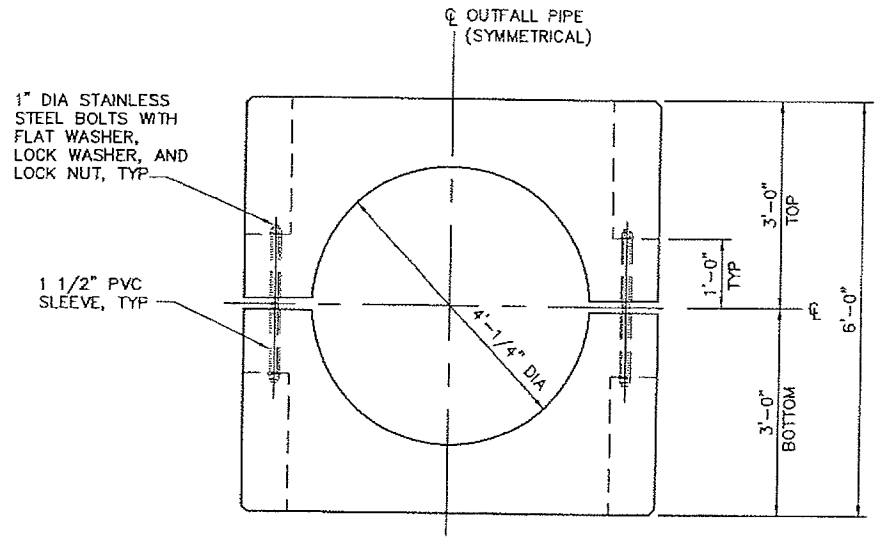
Plotted: Dec 13, 2004 - 1:20pm
File: P:\4991 - Willow Creek Outfall\CAD\Submittals\1005_Sub\4991007004.dwg



PARTIAL PLAN
1/4" = 1'-0"



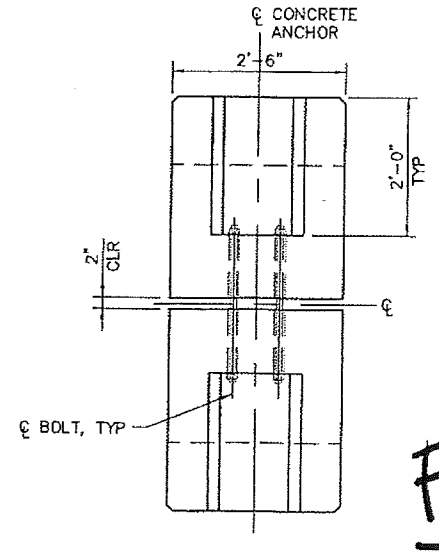
PLAN
3/4" = 1'-0"



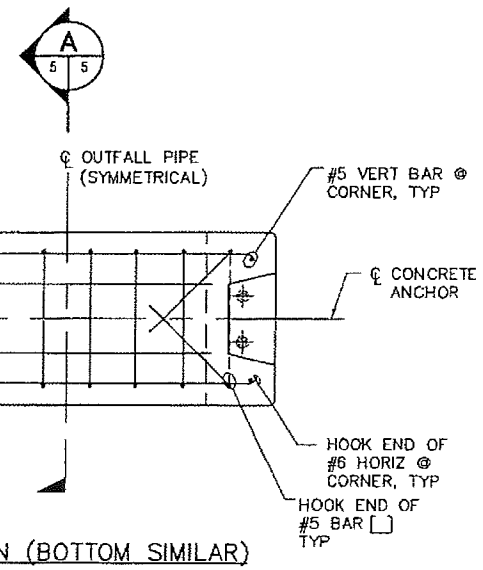
ELEVATION
3/4" = 1'-0"

NOTES:

1. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 1 INCH UNLESS OTHERWISE NOTED.
2. PROVIDE 1/8 INCH THICK BLACK RUBBER SHEET OR NEOPRENE PADDING AROUND THE PIPE AT CONCRETE ANCHOR LOCATIONS. WIDTH OF SHEET OR PADDING SHALL BE 2 INCHES WIDER THAN THE CONCRETE TO PREVENT DIRECT CONTACT BETWEEN THE PIPE AND THE CONCRETE ANCHORS.
3. TOLERANCE FOR LOCATION OF PVC SLEEVE AS INDICATED IS 1/8 INCH MAX.

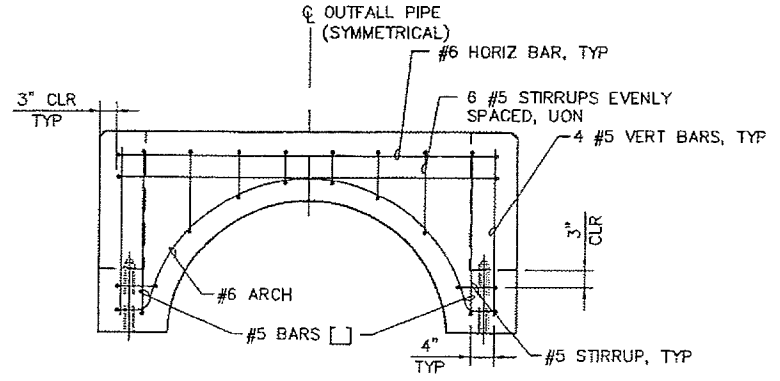


SIDE ELEVATION
3/4" = 1'-0"



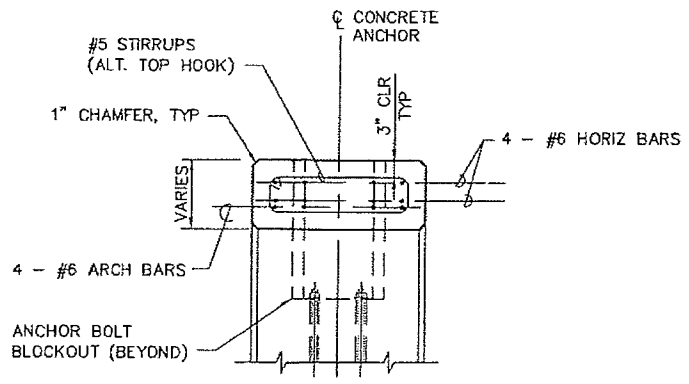
TOP PLAN (BOTTOM SIMILAR)

DETAIL — REINFORCEMENT
3/4" = 1'-0" — 1 (5 5)



SECTION

DETAIL — REINFORCEMENT
3/4" = 1'-0" — 2 (5 5)



SECTION
3/4" = 1'-0" — A (5 5)

FOR REFERENCE

GRAPHIC SCALE
1 0 1 2 3 4
3/4" = 1'-0"

Moffatt & Nichol
710 SECOND AVENUE, SUITE 720
SEATTLE, WA 98104

REVISION | BY | DATE | NO.

	BY	DATE
DESIGN	JFJ	2004
DRAWN	KB, EP	8/6/04
CHECKED	JFJ/MPH	8/6/04
APPROVED	TAM	

APPROVED BY
CITY ENGINEER
DATE

ENGINEERING DIVISION
121 FIFTH AVENUE NORTH
EDMONDS, WASHINGTON 98020
(425) 771-0220

WILLOW CREEK OUTFALL PIPE EXTENSION

PRECAST CONCRETE ANCHOR
PLAN, SECTION & DETAILS

H. SCALE
V. SCALE

SHEET 5
5 OF 6 SHEETS
JOB NO. 4991

Plotted: Oct 13, 2004 - 1:20pm

File: P:\4991 - Willow Creek Outfall\CADD\Submittals\100%_Sub\4991100705.dwg

APPENDIX N.7

CITY OF EDMONDS AND CHEVRON / UNOCAL
QUITCLAIM DEED AND MAINTENANCE ACCESS AGREEMENT

14r 7248.8

CITY CLERK
Civic Center
Edmonds, Washington

QUIT CLAIM DEED, EASEMENTS AND AGREEMENT

811223018 8

THIS QUIT CLAIM DEED, EASEMENTS AND AGREEMENT dated this 17th day of November, 1981, between UNION OIL COMPANY OF CALIFORNIA, a corporation qualified to do business in the State of Washington, (hereinafter referred to as "Union Oil"), and the CITY OF EDMONDS, a municipal corporation organized and existing under the laws of the State of Washington, (hereinafter referred to as "the City").

W I T N E S S E T H:

WHEREAS, Union Oil is the owner of certain real property legally described in Exhibit "A" which is attached hereto and incorporated herein by this reference, which property compromises 81 acres more or less, (hereinafter referred to as "the Property"); and,

WHEREAS, the Property is located within the City and has been subdivided into Parcels I, II, III and IV as described in Exhibit "A"; and,

WHEREAS, Union Oil presently uses Parcels I, II and III for petroleum products storage and distribution and for other uses incidental thereto; and,

WHEREAS, Union Oil has agreed to deed by gift all of Parcel IV to the City of Edmonds to be used for certain public purposes; and,

WHEREAS, the City has agreed to accept the gift of Parcel IV which is commonly known as the Union Oil marsh; and,

WHEREAS, the parties have agreed to certain additional terms and conditions relating to the maintenance, operation and use of the marsh; now, therefore,

IN CONSIDERATION of the mutual covenants and promises herein contained and other valuable consideration, receipt of which is hereby acknowledged, the City and Union Oil do hereby agree as follows:

I. Union Oil, as a gift, hereby conveys, releases and quit claims to the City for the specific public purposes set forth hereinafter, all of the following described property:

NO SALES TAX REQUIRED

DEC 24 1981

KIRKE SIEVERS, Snohomish County Treasurer
By [illegible]

811223018 8

VOL 1733 PAGE 1019

That portion of Government Lot 3, Section 23 and that portion of the Northeast Quarter of Section 26, all in Township 27 North, Range 3 East, W.M., in Snohomish County, Washington, described as follows:

Commencing at a concrete monument at the intersection of the North line of said Section 26, with the Easterly margin of the Burlington Northern Railway right-of-way and from whence the Northeast corner of said Section 26 bears South 88°55'41" East; thence North 42°34'34" East along said Easterly margin 327.47 feet to the true point of beginning; thence South 47°30'00" East 716.15 feet; thence South 42° 30'00" West 195.00 feet; thence South 48°00'00" East 440.00 feet; thence South 44°30'00" East 400.00 feet; thence South 64°11'45" East 248.85 feet to the westerly margin of SR 104 as condemned by the State of Washington for state road 104 by decree entered in Snohomish County Superior Court cause No. 106375; thence North 12°49'15" East along said westerly margin 155.00 feet; thence continuing along said westerly margin North 1°08'54" East 1015.00 feet; thence South 73°00'00" West 240.00 feet; thence North 88°30' 00" West 110.00 feet; thence North 66°00'00" West 140.00 feet; thence North 40°00'00" West 125.00 feet; thence North 1°00'00" West 200.00 feet; thence North 37°00'00" West 260.00 feet; thence South 71°00'00" West 401.09 feet to a point on the said easterly margin of the Burlington Northern Railway right-of-way, said point being North 42°34'34" East 288.90 feet from the true point of beginning; thence South 42°34'34" West along said easterly margin 288.90 feet to the true point of beginning. Situate in the City of Edmonds, County of Snohomish, State of Washington. Also known as Parcel IV in Short Plat 5-2-80.

(hereinafter referred to as "Parcel IV").

Parcel IV shall be used by the City only as a public park and recreational facility with the primary public purpose as a wildlife preserve and open space. In the event the City ceases using the Property for such primary purpose, the property (Parcel IV) shall revert automatically to the Grantor, its successors or assigns, without notice being required.

Union Oil reserves unto itself, its successors and assigns a permanent access, construction, and maintenance easement and right-of-way twenty (20) feet in width along the entire southwesterly, northwesterly and southwesterly portion of Parcel IV for the benefit of Parcels I, II, and III, for construction, maintenance and access to an earth berm and drainage channel which Union Oil may construct along the entire southwesterly, northwesterly and southwesterly lines of Parcel IV or portions thereof adjacent to

Parcel II and adjacent to the Burlington Northern railroad right-of-way for the purpose of controlling runoff from the Union Oil facility located on Parcels I, II and III of the Property, and for such other purposes determined by Union Oil, the description of said permanent access, construction and maintenance easement being:

RESERVED EASEMENT ONE
20' Wide

Beginning at the most westerly corner of said Parcel IV in the southeasterly line of the Burlington Northern Railway right-of-way; thence along the southwesterly, northwesterly and southwesterly lines of said Parcel IV South 47°30'00" East 716.15 feet, South 42°30'00" West 195.00 feet, South 48°00'00" East 440.00 feet, South 44°30'00" East 400.00 feet and South 64°11'45" East 248.85 feet to the southeast corner of said Parcel; thence along the easterly line of said Parcel North 12°49'15" East 20.53 feet; thence leaving said line entering said Parcel North 64°11'45" West 240.77 feet; thence North 44°30'00" West 397.14 feet; thence North 48°00'00" West 420.44 feet; thence North 42°30'00" East 194.83 feet; thence North 47°30'00" West 736.12 feet to said southeasterly right-of-way line; thence along said line south 42°34'34" West 20.00 feet to the point of beginning.

Also reserving unto Union Oil, its successors and assigns, an easement for ingress, egress and utilities over, under, and across Parcel IV, 15 feet in width along the entire northwesterly portion of Parcel IV adjacent to the railroad right-of-way; the description of said easement being:

RESERVED EASEMENT TWO
15' Wide

Beginning at the most westerly corner of said Parcel IV in the southeasterly line of said Burlington Northern Railway right-of-way; thence along said line North 42°34'34" East 288.90 feet to the most northwesterly corner of said Parcel IV; thence along the northerly line of said Parcel North 71°00'00" East 31.51 feet; thence leaving said line entering said Parcel South 42°34'34" West 316.59 feet to the southwesterly line of said Parcel; thence along said line North 47°30'00" West 15.00 feet to the point of beginning.

II. Union Oil hereby grants and conveys a nonexclusive easement, right-of-way, and right of use to the City for the purposes of operating and maintaining a drainage system over, under, and across Parcels I and II of the Property for the benefit of Parcel IV; the description of said easement being:

35' Wide Easement Description

That portion of Government Lot 3, Section 23 and of Government Lot 1, Section 26, Township 27 North, Range 3 East, W.M., in Snohomish County, Washington, described as follows:

Beginning at the intersection of the northerly line of said Section 26 with the southeasterly line of the Burlington Northern Railway right-of way; thence along said southeasterly line North 42°34'34" East 327.47 feet; thence leaving said line South 47°30'00" East 35.00 feet to a line parallel with and distant southeasterly 35.00 feet measured at right angles from said southeasterly line; thence along said parallel line South 42°34'34" West 420.00 feet; thence leaving said parallel line at right angles North 47°25'26" West 35.00 feet to said southeasterly line; thence along said line North 42°34'34" East 92.48 feet to the point of beginning.

and

20' Wide Easement

That portion of the land shown as Parcel I on the map recorded as part of the document recorded in Volume 1696, Pages 2295 through 2306, in the Office of the Auditor, Snohomish County, Washington, lying within a strip of land 20.00 feet wide, the center line of which shall be the center line of an existing Union Oil Company of California 48 inch Metal Culvert pipe.

III. Union Oil hereby grants and conveys to the City, title to the improvements which constitute the drainage system within the easement described in paragraph II above, excluding the real property and including but not limited to all of the fixtures and personal property, all pipes, tidal gates, valves and all other such personal property and fixtures used for drainage of Parcel IV. The City agrees to operate and maintain in reasonable condition at all times the drainage system described in paragraph II above. However, Union Oil reserves the right to activate the tidal gates located within the easement described in paragraph II above whenever necessary in the opinion of Union Oil.

IV. The City, its successors and assigns, releases Union Oil, its successors and assigns, of and from all manner of actions, cause or causes of actions, suits, debts, sums of money, promises, trespasses, damages, judgments, claims and demands whatsoever, in law or in equity, which the City may have against Union Oil, arising out of any present or future petroleum products spillage which affects or in any way or manner damages Parcel IV;

provided that in the event that as a result of any future petroleum products spillage, any damage shall occur to any portion of Parcel IV, Union Oil shall collect and remove said petroleum products and restore said portion of Parcel IV as nearly as possible to its former condition using all practical methods available to reasonably restore Parcel IV and, if it is not feasible to collect or remove said petroleum products, Union Oil shall take all practical actions to contain, treat and disburse the same. The City further agrees not to sue or be a part of any suit against Union Oil for any such damage except for damages caused by Union Oil's own gross negligence or wilfull misconduct. The City retains all rights against Union Oil with respect to damage suffered by City property other than Parcel IV on account of a spill.

V. Union Oil reserves the right to use all easement areas herein granted for all purposes not inconsistent with the rights herein contained. In the event the easement or easements herein granted by Grantor interfere with any future improvements or use of Grantor's property by Grantor, its successors or assigns, such easements may be relocated at the expense of Grantee.

VI. The City agrees not to construct or build any structure, building or development whatsoever on Parcel IV or use Parcel IV in any manner which would unreasonably interfere with Grantor's present or future use of Parcels I, II, and III for petroleum products storage and distribution or other uses incidental thereto.

VII. The covenants, conditions, and easements herein granted and the rights and restrictions herein created shall be covenants running with the Property and the benefits and obligations of the parties herein shall inure to the benefit of and shall be binding upon the respective heirs, successors and assigns.

EXECUTED the day and year first above written.

UNION OIL COMPANY OF CALIFORNIA

By _____
J. A. Gordon, President
Real Estate Division

By _____
Asst. Secretary

CITY OF EDMONDS

By _____
Mayor

Attest:

_____
City Clerk

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.

ON November 17, 1981, before me, the undersigned, a Notary Public in and for the State of California, personally appeared J. A. GORDON, known to me to be the President, Union Real Estate Division, and J. R. COURTNEY, known to me to be the Assistant Secretary of UNION OIL COMPANY OF CALIFORNIA, the corporation that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that they are authorized to execute the said instrument and the seal affixed is the corporate seal of said corporation.

WITNESS my hand and official seal.

SEAL
JEAN L. TACKELS
NOTARY PUBLIC-CALIFORNIA
PRINCIPAL OFFICE IN
LOS ANGELES COUNTY
My Commission Expires October 24, 1982

_____

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CITY CLERK
Civic Center
Edmonds, Washington

LEGAL DESCRIPTION OF ENTIRE PARCEL TO BE SHORT SUBDIVIDED

THAT PORTION OF GOVERNMENT LOT 3, SECTION 23 AND THAT PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 26, ALL IN TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT A CONCRETE MONUMENT AT THE INTERSECTION OF THE NORTH LINE OF SAID SECTION 26, WITH THE EASTERLY MARGIN OF THE BURLINGTON NORTHERN RAILWAY RIGHT-OF-WAY AND FROM WHENCE THE NORTHEAST CORNER OF SAID SECTION 26 BEARS SOUTH 88°55'41" EAST; THENCE NORTH 42°34'34" EAST ALONG SAID EASTERLY MARGIN 616.37 FEET TO THE TRUE POINT OF BEGINNING; THENCE NORTH 71°00'00" EAST 401.09 FEET; THENCE SOUTH 37°00'00" EAST 260.00 FEET; THENCE SOUTH 1°00'00" EAST 200.00 FEET; THENCE SOUTH 40°00'00" EAST 125.00 FEET; THENCE SOUTH 66°00'00" EAST 140.00 FEET; THENCE SOUTH 88°30'00" EAST 110.00 FEET; THENCE NORTH 73°00'00" EAST 240.00 FEET TO THE WESTERLY RIGHT-OF-WAY MARGIN OF SR 104 AS PER DECREE ENTERED IN SNOHOMISH COUNTY SUPERIOR COURT CAUSE NO. 106375, CONDEMNED BY STATE OF WASHINGTON FOR STATE ROAD 104; THENCE SOUTH 1°08'54" WEST ALONG SAID RIGHT-OF-WAY MARGIN 1015.00 FEET; THENCE SOUTH 12°49'15" WEST ALONG SAID RIGHT-OF-WAY MARGIN 342.97 FEET; THENCE SOUTH 83°07'35" WEST ALONG SAID RIGHT-OF-WAY MARGIN 297.82 FEET; THENCE SOUTH 1°08'15" WEST 50.00 FEET TO A POINT ON THE SOUTH LINE OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 26; THENCE NORTH 88°51'46" WEST ALONG THE SOUTH LINES OF GOVERNMENT LOT 1 AND OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 26, 2201.93 FEET TO AN INTERSECTION POINT ON THE EASTERLY MARGIN OF THE BURLINGTON NORTHERN RIGHT-OF-WAY, SAID POINT BEING ON A 976.60 FOOT RADIUS CURVE CONCAVE TO THE SOUTHEAST, A RADIAL AT SAID POINT BEARING SOUTH 70°12'20" EAST; THENCE NORTHEASTERLY ALONG SAID RIGHT-OF-WAY MARGIN AND CURVE AN ARC DISTANCE OF 388.31 FEET TO A POINT OF TANGENCY; THENCE NORTH 42°34'34" EAST ALONG SAID EASTERLY RIGHT-OF-WAY MARGIN 1933.20 FEET TO THE TRUE POINT OF BEGINNING

TOGETHER WITH

ALL THAT PORTION OF GOVERNMENT LOT 1 AND OF TIDELAND, LOT 1, IN SECTION 26, TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, LYING WESTERLY OF THE WESTERLY LINE OF THE GREAT NORTHERN RAILWAY COMPANY RIGHT-OF-WAY AS CONVEYED BY INSTRUMENT RECORDED IN VOLUME 17 OF DEEDS, PAGE 132 AND IN VOLUME 38 OF DEEDS, PAGE 412, AND LYING SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT OF INTERSECTION OF ORIGINAL WESTERLY LINE OF GREAT NORTHERN RAILWAY COMPANY'S RIGHT-OF-WAY WITH THE NORTH LINE OF SAID SECTION 26, SAID POINT BEING 688.03 FEET WESTERLY OF THE NORTH QUARTER CORNER OF SAID SECTION; THENCE SOUTH 42°34'34" WEST 54.17 FEET; THENCE SOUTH 47°25'26" EAST 150.00 FEET; THENCE SOUTH 42°34'34" WEST 765.65 FEET, ALONG THE WESTERLY LINE OF THE GREAT NORTHERN RAILWAY COMPANY'S RIGHT-OF-WAY TO THE TRUE POINT OF BEGINNING OF SAID LINE; THENCE NORTH 47°25'26" WEST 418.11 FEET, MORE OR LESS, TO POINT OF INTERSECTION WITH THE INNER HARBOR LINE, AND THE END OF SAID DESCRIBED LINE.

AUTHORIZED
FOR
RECORDING
CITY OF EDMONDS
By _____
Page -

GARY W. KIRCHNER
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

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VOL ~~1733 PAGE 1025~~

Gary W. Kirchner
CERTIFICATE NO. 16914

NOV. 21, 1979

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CITY CLERK
Civic Center
Edmonds, Washington

LEGAL DESCRIPTION OF PARCEL I:

ALL THAT PORTION OF GOVERNMENT LOT 1 AND OF TIDELAND, LOT 1, IN SECTION 26, TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, LYING WESTERLY OF THE WESTERLY LINE OF THE GREAT NORTHERN RAILWAY COMPANY RIGHT-OF-WAY AS CONVEYED BY INSTRUMENT RECORDED IN VOLUME 17 OF DEEDS, PAGE 132 AND IN VOLUME 38 OF DEEDS, PAGE 412, AND LYING SOUTHERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT OF INTERSECTION OF ORIGINAL WESTERLY LINE OF GREAT NORTHERN RAILWAY COMPANY'S RIGHT-OF-WAY WITH THE NORTH LINE OF SAID SECTION 26, SAID POINT BEING 688.03 FEET WESTERLY OF THE NORTH QUARTER CORNER OF SAID SECTION; THENCE SOUTH 42°34'34" WEST, 54.17 FEET; THENCE SOUTH 47°25'26" EAST 150.00 FEET; THENCE SOUTH 42°34'34" WEST, 765.65 FEET, ALONG THE WESTERLY LINE OF THE GREAT NORTHERN RAILWAY COMPANY'S RIGHT-OF-WAY TO THE TRUE POINT OF BEGINNING OF SAID LINE; THENCE NORTH 47°25'26" WEST 418.11 FEET, MORE OR LESS, TO POINT OF INTERSECTION WITH THE INNER HARBOR LINE AND THE END OF SAID DESCRIBED LINE.

GARY W. KIRCHNER
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

Gary W. Kirchner
CERTIFICATE NO. 16914 NOV. 21, 1979

AUTHORIZED
FOR
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CITY OF EDMONDS
By H. Lenz
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Edmonds, Washington

LEGAL DESCRIPTION OF PARCEL II:

THAT PORTION OF GOVERNMENT LOT 3, SECTION 23, AND OF GOVERNMENT LOT 1 AND THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE CONCRETE MONUMENT AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 26, THENCE NORTH 88°51'46" WEST ALONG THE SOUTH LINE OF SAID GOVERNMENT LOT 1, A DISTANCE OF 571.23 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING NORTH 88°51'46" WEST, 850.37 FEET TO A POINT ON THE EASTERLY MARGIN OF THE BURLINGTON NORTHERN RAILWAY RIGHT-OF-WAY, SAID POINT BEING ON A 976.60 FOOT RADIUS CURVE CONCAVE TO THE SOUTHEAST, A RADIAL AT SAID POINT BEARING SOUTH 70°12'20" EAST; THENCE NORTHERLY ALONG SAID RIGHT-OF-WAY LINE AND CURVE, AN ARC DISTANCE OF 388.31 FEET TO A POINT OF TANGENCY; THENCE NORTH 42°34'34" EAST ALONG SAID RIGHT-OF-WAY LINE 1316.83 FEET TO A CONCRETE MONUMENT AT THE INTERSECTION OF THE NORTH LINE OF SAID SECTION 26 WITH SAID EASTERLY MARGIN OF THE BURLINGTON NORTHERN RAILWAY RIGHT--OF-WAY AND FROM WHENCE THE NORTHEAST CORNER OF SAID SECTION 26 BEARS SOUTH 88°55'41" EAST; THENCE CONTINUING NORTH 42°34'34" EAST ALONG SAID RIGHT-OF-WAY, 327.47 FEET; THENCE SOUTH 47°30'00" EAST, 716.15 FEET; THENCE SOUTH 42°30'00" WEST 195.00 FEET; THENCE SOUTH 48°00'00" EAST 440.00 FEET; THENCE SOUTH 44°30'00" EAST 400.00 FEET; THENCE SOUTH 64°11'45" EAST 248.85 FEET TO THE WESTERLY MARGIN OF SR 104 AS CONDEMNED BY THE STATE OF WASHINGTON FOR STATE ROAD 104 BY DECREE ENTERED IN SNOHOMISH COUNTY SUPERIOR COURT CAUSE NO. 106375; THENCE SOUTH 12°49'15" WEST ALONG SAID MARGIN 187.97 FEET; THENCE SOUTH 83°07'35" WEST ALONG SAID MARGIN 297.82 FEET; THENCE SOUTH 1°08'15" WEST 24.00 FEET TO A POINT 26.00 FEET NORTH 1°08'15" EAST OF THE SOUTH LINE OF SAID NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 26; THENCE NORTH 88°51'46" WEST PARALLEL WITH SAID SOUTH LINE 577.31 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE RIGHT HAVING A RADIUS OF 480.00 FEET; THENCE NORTHWESTERLY ALONG SAID CURVE 284.84 FEET TO THE POINT OF TANGENCY; THENCE NORTH 54°51'46" WEST 207.70 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE LEFT HAVING A RADIUS OF 520.00 FEET; THENCE NORTHWESTERLY ALONG SAID CURVE 97.30 FEET TO THE POINT OF TANGENCY; THENCE NORTH 65°35'00" WEST 37.89 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE LEFT HAVING A RADIUS OF 205.00 FEET; THENCE WESTERLY ALONG SAID CURVE, A DISTANCE OF 264.77 FEET TO A POINT OF A COMPOUND CURVE HAVING A RADIUS OF 120.00 FEET; THENCE SOUTHERLY ALONG SAID CURVE 129.85 FEET TO THE POINT OF TANGENCY; THENCE SOUTH 21°35'00" EAST 113.72 FEET TO THE TRUE POINT OF BEGINNING;

SUBJECT TO A 10 FOOT WIDE SLOPE EASEMENT ALONG THE SOUTHERLY LINE ADJACENT TO THE PINE STREET EXTENSION ROAD.

GARY W. KIRCHNER
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

AUTHORIZED
CITY OF EDMONDS 1/15/81
By: JANE Bauman
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Gary W. Kirchner
CERTIFICATE NO. 16914 NOV. 21, 1979

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LEGAL DESCRIPTION OF PARCEL III

CITY CLERK
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Edmonds, Washington

THAT PORTION OF GOVERNMENT LOT 1, SECTION 26 AND THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 26 IN TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT A CONCRETE MONUMENT AT THE SOUTHWEST CORNER OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 26; THENCE NORTH 88°51'46" WEST ALONG THE SOUTH LINE OF SAID GOVERNMENT LOT 1, A DISTANCE OF 527.86 FEET; THENCE NORTH 21°35'00" WEST 130.47 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE RIGHT HAVING A RADIUS OF 80.00 FEET; THENCE NORTHERLY ALONG SAID CURVE 86.57 FEET TO A POINT OF A COMPOUND CURVE HAVING A RADIUS OF 165.00 FEET; THENCE EASTERLY ALONG SAID CURVE 213.10 FEET TO THE POINT OF TANGENCY; THENCE SOUTH 65°35'00" EAST 37.89 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE RIGHT HAVING A RADIUS OF 480.00 FEET; THENCE SOUTHEASTERLY ALONG SAID CURVE 89.81 FEET TO THE POINT OF TANGENCY; THENCE SOUTH 54°51'46" EAST 207.70 FEET TO THE POINT OF CURVATURE OF A CURVE TO THE LEFT HAVING A RADIUS OF 520.00 FEET; THENCE SOUTHEASTERLY ALONG SAID CURVE 187.64 FEET TO A POINT ON THE SOUTH LINE OF SAID NORTHWEST QUARTER OF THE NORTHEAST QUARTER, SAID POINT BEING SOUTH 88°51'46" EAST 83.18 FEET FROM THE POINT OF BEGINNING; THENCE NORTH 88°51'46" WEST ALONG SAID SOUTH LINE 83.18 FEET TO THE POINT OF BEGINNING;

SUBJECT TO A 10.00 FOOT WIDE SLOPE EASEMENT ALONG THE NORTHERLY AND WESTERL LINES ADJACENT TO THE PINE STREET EXTENSION ROAD.

Gary W. Kirchner

CERTIFICATE NO. 16914 NOV. 21, 1979

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FOR
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CITY OF EDMONDS
By
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LEGAL DESCRIPTION OF PARCEL IV

THAT PORTION OF GOVERNMENT LOT 3, SECTION 23 AND THAT PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 26, ALL IN TOWNSHIP 27 NORTH, RANGE 3 EAST, W.M., IN SNOHOMISH COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT A CONCRETE MONUMENT AT THE INTERSECTION OF THE NORTH LINE OF SAID SECTION 26, WITH THE EASTERLY MARGIN OF THE BURLINGTON NORTHERN RAILWAY RIGHT-OF-WAY AND FROM WHENCE THE NORTHEAST CORNER OF SAID SECTION 26 BEARS SOUTH 88°55'41" EAST; THENCE NORTH 42°34'34" EAST ALONG SAID EASTERLY MARGIN 327.47 FEET TO THE TRUE POINT OF BEGINNING; THENCE SOUTH 47°30'00" EAST 716.15 FEET; THENCE SOUTH 42°30'00" WEST 195.00 FEET; THENCE SOUTH 48°00'00" EAST 440.00 FEET; THENCE SOUTH 44°30'00" EAST 400.00 FEET; THENCE SOUTH 64°11'45" EAST 248.85 FEET TO THE WESTERLY MARGIN OF SR 104 AS CONDEMNED BY THE STATE OF WASHINGTON FOR STATE ROAD 104 BY DECREE ENTERED IN SNOHOMISH COUNTY SUPERIOR COURT CAUSE NO. 106375; THENCE NORTH 12°49'15" EAST ALONG SAID WESTERLY MARGIN 155.00 FEET; THENCE CONTINUING ALONG SAID WESTERLY MARGIN NORTH 1°08'54" EAST 1015.00 FEET; THENCE SOUTH 73°00'00" WEST 240.00 FEET; THENCE NORTH 88°30'00" WEST 110.00 FEET; THENCE NORTH 66°00'00" WEST 140.00 FEET; THENCE NORTH 40°00'00" WEST 125.00 FEET; THENCE NORTH 1°00'00" WEST 200.00 FEET; THENCE NORTH 37°00'00" WEST 260.00 FEET; THENCE SOUTH 71°00'00" WEST 401.09 FEET TO A POINT ON THE SAID EASTERLY MARGIN OF THE BURLINGTON NORTHERN RAILWAY RIGHT-OF-WAY, SAID POINT BEING NORTH 42°34'34" EAST 288.90 FEET FROM THE TRUE POINT OF BEGINNING; THENCE SOUTH 42°34'34" WEST ALONG SAID EASTERLY MARGIN 288.90 FEET TO THE TRUE POINT OF BEGINNING.

GARY W. KIRCHNER
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL LAND SURVEYOR

Gary W. Kirchner
CERTIFICATE NO. 16914 NOV. 21, 1979

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CITY OF EDMONDS
By H. Long
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CITY OF EDMONDS
P. W. DEPT. ENGINEERING DIV.
EXAMINED
BY [signature] DATE 3/7/80
REMARKS Approved for recording
~~VOL 1733 PAGE 1029~~
~~VOL 1696 PAGE 2285~~

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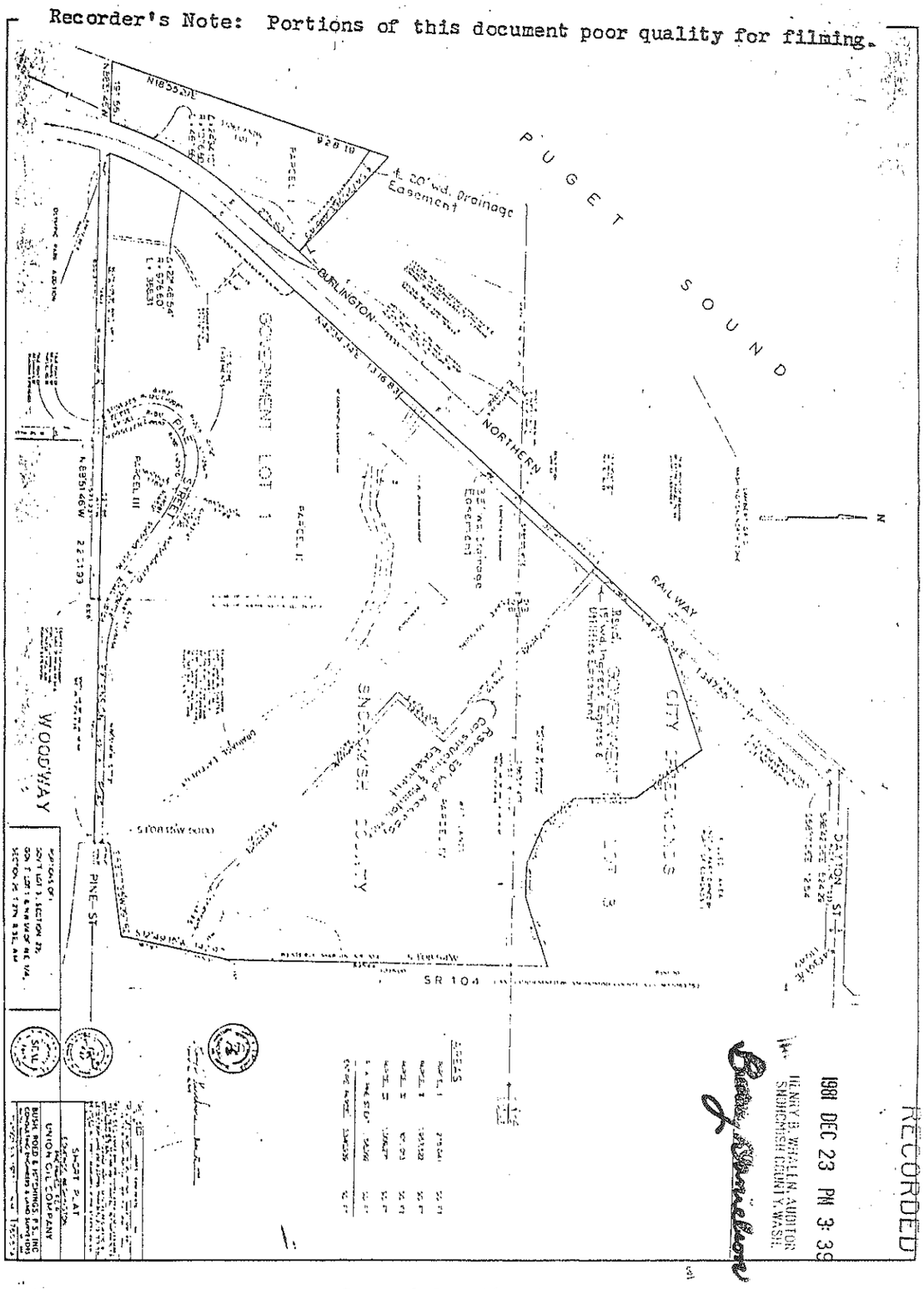
Edmonds, Washington

Recorder's Note: Portions of this document poor quality for filming.



General Location Map
of
Described Easements

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APPENDIX O

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 21-1-12393-409

Date: December 18, 2015
To: Mr. Jerry Shuster
City of Edmonds

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland