GENERAL SHORING NOTES

GOVERNING CODE: **The** design and construction of this project is governed by the **"International Building Code (IBC)", 2009 Edition**, hereafter referred to as the IBC, as adopted and modified by the City of **Portland** understood to be the Authority Having Jurisdiction (AHJ).

DEFINITIONS: The following definitions cover the meanings of certain terms used in these notes:

"**Architect/Engineer**" – The Architect of Record and the Structural Engineer of Record.

- "**Structural Engineer of Record" (SER)** – The structural engineer who is licensed to stamp & sign the structural documents for the project. The SER is responsible for the design of the Primary Structural System.
- "**Submit for review**" - Submit to the Architect/Engineer for review prior to fabrication or construction.
- "**Per Plan**" – Indicates references to the structural plans, elevations and structural general notes.
- "**BDS**" – City of Portland Bureau of Development Services

PROJECT DESCRIPTION: The pipe pile retaining wall constructed in 2007, on the north side of the property was founded on an unstable slope. GeoDesign, Inc., the geotechnical engineer, DCI and PLI Systems developed a repair plan to stabilize the existing wall with a continuous concrete whaler placed directly in front of the existing wall and tied back anchors. The repair involves stabilizing the base of the upper unit of soil by deepening the existing piles. A new section of pipe will be spliced to the top of the existing pipes and advance to the new depth. To further resist the down slope creep, the existing pipe pile wall will be tied-back with Titan grouted anchors, which will be braced against the new shotcrete whaler.

GEOTECHNICAL: Criteria outlined in the report by GeoDesign, Inc, dated September 07, 2011, were used in the design of the tie-back retaining wall.

PLAN NOTES: Notes on the individual structural drawings shall take priority over structural notes on this sheet.

DISCREPANCIES: In case of discrepancies between the plans, reference standards and governing code, the more stringent requirements shall govern. All discrepancies shall be brought to the attention of the Architect and Engineer of Record prior to proceeding with any work involved.

CONTRACTOR RESPONSIBILITIES: The contractor is responsible for conforming to all OSHA safety standards. The contractor is responsible for safety in and around the site and for the strength and stability of all partially completed structures. The contractor shall at his discretion employ the aid of a Oregon State registered structural engineer to design all other temporary bracing and shoring necessary to complete the work described in these contract documents.

UTILITY LOCATION: The shoring contractor will determine the location of all adjacent underground utilities prior to any excavation and prior to drilling pile holes, or tieback anchors. The utilities information shown on the plans and details are approximate and not necessarily complete.

SUBMITTALS: Shop drawings shall be submitted to the Architect and Engineer of Record prior to any fabrication or construction for the following structural items: reinforcing steel, grouts and concrete. If the shop drawings differ from or add to the design of the structural drawings, they shall bear the seal and signature of the Oregon State Registered Structural Engineer who is responsible for the design.

SPECIAL CONDITIONS: Contractor shall verify all dimensions in the field and shall provide adequate shoring and bracing of all structural members during construction. Contractor shall notify the Architect and Structural Engineer of all field changes prior to installation or fabrication.

INSPECTIONS: All construction is subject to inspection by the Building Official in accordance with IBC Sec. 108. The contractor shall coordinate all required inspections with the Building Official.

SPECIAL INSPECTIONS:
In addition to inspections required by the local jurisdiction per IBC Sec. 109, special inspectors shall, in accordance with IBC Sec. 109, shall be reviewed and approved by the EOR prior to commencement of work. Special inspectors shall be listed with BDS. Additionally, the special inspectors shall, in accordance with IBC Chapter 17, inspect the following structural work:

Shotcrete Whaler:
- Full time during shotcrete installation.
- Periodic verification of the use of the required design mix.
- Periodic verification of reinforcing steel requirements.
- Continuous inspection during the sampling of fresh shotcrete and during slump, air content and temperature determinations.

STRUCTURAL STEEL per IBC Section 1704.3 and Table 1704.3 at the site and the fabrication Shop shall be done in accordance with the following requirements:

- **Periodic** inspection required:
  - Prior to the start of Fabrication for:
    - Verification of Shop compliance with IBC Section 1704.2.1 for completeness and adequacy of Fabrication and Quality Control procedures.
    - Verification of Shop compliance with AWS D1.1-2004 Structural Welding Code
    - Verification of Shop compliance with AISC 360-05 Chapter M & Code of Standard Practice.
  - During welding of Single-pass Fillet Welds NOT exceeding 5/16" size as noted in IBC Table 1704.3.
  - During the welding operations - Verification of welder qualifications
  - During the welding operations - Verification of valid weld procedure specifications per AWS D1.1.
  - Prior to painting, shipping to site and erection - Verification of all welded joints per AWS D1.1 Table 6.1.
  - Prior to the start of Erection - Verification of framing requirements per AISC.
  - During welding of guardrails.

SOILS & FOUNDATION CONSTRUCTION per IBC Section 1704.7
- Owner shall employ the geotechnical engineer to observe the tie-back anchors installation. The geotechnical engineer shall document the installation of tie-backs, documenting any unusual occurrences and other information that may be pertinent. The geotechnical engineer shall review:
- Tie-back anchor installation, full time, on-site review of the installation, keeping records of equipment used, depth of anchor penetration.
- Tie-back anchor performance testing, records of equipment used, depth of anchor penetration results of tests.
- Tie-back anchor proof-testing. All anchors will be proof tested. The geotechnical engineer shall be on site for all proof tests and document the results. (See testing procedures below)
- Tie-back anchor lock-off and final stressing
- Owner shall employ a testing agency to sample and test the ie-back anchor grout: During production, tie-back pile grout shall be tested for compressive strength in accordance with ASHTO T106/ASTM C109 at a frequency of no less than one set of three 2-inch grout cubes each day of operation. The compressive strength shall be the average of the 3 cubes tested.

STRUCTURAL OBSERVATION: Structural Observation shall be provided for structures in accordance with OSSC Section 1710 and Section 107.3.4.1. Structural observation site visits will be as follows:
- **During tie-back installation**
- **During whaler rebar installation prior to concrete pour**

Contractor shall notify the SER in a timely manner to allow scheduled Observations to occur. Field (Observation) Reports will be distributed to the Contractor.

DESIGN CRITERIA

LATERAL SOIL PRESSURE: Reference soil pressure diagrams.

TIEBACK DESIGN and TESTING DATA: Titan tie-back anchor loads:

Allowable Design load:	63 kips
Performance testing load:	95 kips
Proof test load:	95 kips
Lock-off load:	0.3 X 63 kips

TIE-BACK ANCHORS:

Titan tie-back anchors will be used to add lateral support to the existing steel pipe pile wall. The allowable pullout force for each tie-back should be developed with a total embedment length of 40 feet, and a minimum of 20 feet bonded length. Lengths may be modified if either the performance or proof testing indicates different capacities.

The contractor shall protect existing structures, piping, and above- or underground utilities from damage due to tie-back installation.

All tie-back anchors shall be 40/16 (mm) diameter Titan or #11 Williams grade 75 all thread rebar grouted anchors. Rods shall be centered in a minimum 5.2" diameter bore hole. The tie-backs shall be installed at an angle 20 deg below the horizontal.

The tie-backs anchor grout shall be neat cement or sand/cement mixture, with a minimum 3-day compression strength of 4000 psi minimum 28-day compressive strength. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The grouting equipment used shall produce a grout free of lumps and un-dispersed cement. (See Tests and Inspections section of these notes for grout testing requirements)

Anchors shall be protected from corrosion in the un-bonded zone near the soldier pile wall by one of the following methods:
- Epoxy coated and embedment in grout
- Zinc-rich "cold galvanizing" paint for exposed plates and nuts

PERFORMNCE TEST:
Before the production tie-back anchors are installed, three (3) performance anchors shall be installed and tested. After grout has cured for at least 3 days, the three test tie-back anchors shall be tested. The test tie-back anchors shall be loaded in tension to at least 1.5 times the allowable design load. The test load shall be maintained for a minimum of 10 minutes. Anchor displacement (creep) shall be recorded at 0, 1, 2, 3, 4, 5, 6 and 10 minutes and a plot made against the log of time. If the tie-back anchor displacement between 1 and 10 minutes exceeds 0.04 inches, the proof load shall be maintained for an additional 50 minutes and the displacement recorded at 20, 30, 40, 50, and 60 minutes. The anchor is then considered acceptable if the additional measured displacement does not exceed 0.04 inches between the proof tests. If the displacement limit is exceeded the additional anchors shall be installed and tested.
- Stress anchors lightly to seat the bar anchorage and remove slack. Release the load and record the position of the jacking ram.
- Load the anchors in 25% increments to 150% of the specified design load, and record elongation at each increment. Hold the 150% load for 10 minutes.
- The criteria for a successful test is a creep rate at the maximum load of less than 0.04 inches between 1 minute and 10 minutes and the same total movement criteria as the performance tests.
- Performance test anchors shall not be used as permanent anchors.
- See soils report for additional requirements.

PROOF TEST:
After grout has cured, all tie-back anchors shall be tensioned and tested prior to placement of final backfill. All tie-back anchors shall be proof loaded in tension to 1.5 times the allowable design load. The proof load shall be maintained for a minimum of 10 minutes. Anchor displacement (creep) shall be recorded at 0, 1, 2, 3, 4, 5, 6 and 10 minutes and a plot made against the log of time. If the tie-back anchor displacement between 1 and 10 minutes exceeds 0.04 inches, the proof load shall be maintained for an additional 50 minutes and the displacement recorded at 20, 30, 40, 50, and 60 minutes. The anchor is then considered acceptable if the additional measured displacement does not exceed 0.04 inches between the proof tests. If the displacement limit is exceeded the anchor shall be deepened and retested, or abandoned and a new, redesigned replacement anchor installed. Following proof testing, all soil anchors shall be locked off at 100% of the design load.
- Stress bars lightly to seat the bar anchorage and remove slack. Release the load and record the position of the jacking ram.
- Load the anchors in 25% increments to 150% of the specified design load, and record elongation at each increment. Hold the 150% load for 10 minutes.
- The criteria for a successful proof test is a creep rate at the maximum load of less than 0.04 inches between 1 minute and 10 minutes and the same total movement criteria as the performance tests.
- At the end of the successful test, release and lock off the anchor to 100% the specified design load and record the permanent elongation of the bar. See soils report for additional requirements. LOCK ANCHORS OFF AT 30% OF DL.

PIPE PILE INSTALLATION PROCEDURE

STEEL PIPE PILING: Existing steel pipe piles will be driving further into stiffer underlying soils to improve resistance to down slope movement. The following describes the basic parameters of the advancement of the existing steel pipe piles:
- Owner shall employ the geotechnical engineer to observe driving and keep driving records. Records shall include type and size and hammer used, depth of additional pile penetration, final blow counts and unusual occurrences and other information that may be pertinent.
- The contractor shall protect existing structures, piping, above or underground utilities or any other site amenities from damage.
- All piles are to be 3" diameter extra strong pipe - ASTM A53, Type E or S, Grade B
- Piles to be installed with a 140# Rhino pneumatic hammer. Drop hammers not allowed.
- 10 foot sections of pipe are to be spliced to the top of the existing pipes and fully driven. The top 2 feet may be damaged during driving. A minimum of a 8 feet of undamaged pipe embedment will be anticipated
- All piles shall be galvanized.
- It should be anticipated that some piles may meet refusal on boulders or other debris in the fill material. These piles will be noted and reported to engineers if this occurs.

CAST-IN-PLACE CONCRETE

REFERENCE STANDARDS: Concrete construction shall conform to ACI 301 "Specifications for Structural Concrete for Buildings".

MATERIALS:

CEMENT: Conform to ASTM C-150.

AGGREGATES: Conform to ASTM C-33.

ADMIXTURES: Conform to ACI 301, Section 2.2.

WATER: Conform to ASTM C-94.

CONCRETE REQUIREMENTS:

Location	Strength (psi)	Test Age (days)	Max. Agg. Size (inch)	Max. W/C Ratio	Min Sack	Slump (Inch)
Tieback Grout	4000	3	**	0.50	6	*
Shotcrete whaler beam	4000	3	1	0.45	_	_

* No specific requirements.
** Structural Grout

WATER/CEMENT RATIO: W/C ratio shall be calculated on the basis of total cementitious material.

FLY ASH CONTENT: Up to 10% of the cement can be replaced with fly ash as long as the minimum sack requirements are maintained. Fly ash shall conform to ASTM C618.

SLUMP: Slump requirements may be waived, upon approval of the Engineer of Record, if water/cement (W/C) ratios are maintained. Tolerance for slump shall conform to ASTM C-94.

MIX DESIGN: Submit a mix design for each class of concrete to the Architect and the Engineer of Record for review prior to construction.

EMBEDDED ITEMS: Verify the location for embedded items with suppliers or design consultants' drawing, latest revision, before placing concrete. Location of embedded items not conforming to the drawings shall be reviewed by the Architect and the Engineer of Record before placing concrete.

MIXING: Concrete shall be batched, mixed and transported in accordance with ACI 301, Chapter 7.

PLACING: Concrete shall be placed in footings and grade beams as nearly as practicable in its final position to avoid segregation due to flowing. Concrete shall be pumped into the pile borings using tremie methods.

CONSOLIDATION: Concrete shall be consolidated by suitable means and thoroughly worked around reinforcement, embedded items, and into corners of forms.

WEATHER CONDITIONS: Adequate precautions shall be taken during hot and cold weather in accordance with ACI 301, Section 12.3.

TESTING AND EVALUATION:

NUMBER OF TESTS: Make cylinders for each class of concrete based on the most restrictive of the following three conditions:

1) At least one set each day
2) At least one set per 150 cubic yards placed
3) At least one set per batch of concrete.

A set of cylinders shall consist of 3 cylinders for 28 day test age.

TESTING: Break one cylinder at 7 days and 2 at 28 days. Provide test results to the Structural Engineer for evaluation.

EVALUATION: Strength is satisfactory if: 1) no individual test falls more than 500 psi below the specified strength, and 2) the average of all sets of 3 consecutive tests exceeds the specified strength. If fewer than 3 sets of cylinders were made, each test shall exceed the specified strength. A test is the average of 2 cylinders made from the same sample.

SHOTCRETE REINFORCEMENT

REFERENCE STANDARDS: Conform to:
(1) ACI 301-05 "Standard Specifications for Structural Concrete", Section 3 "Reinforcement and Reinforcement Supports."
(2) ACI SP-66-04 "ACI Detailing Manual" including ACI 315-99 "Details and Detailing of Concrete Reinforcement."
(3) CRSI MSP-09, 28th Edition, "Manual of Standard Practice."
(4) ANSI/AWS D1.4 "Structural Welding Code - Reinforcing Steel."
(5) IBC Chapter 19-Concrete.
(6) ACI 318-08.
(7) ACI 117-10

SUBMITTALS: Conform to ACI 301 Section 3.1.1 "Submittals, data and drawings." Submit placing drawings showing fabrication dimensions and locations for placement of reinforcement and reinforcement supports.

MATERIALS:
- Reinforcing Bars .... ASTM A615, Grade 60, deformed bars.
- Bar Supports .... CRSI MSP-09, Chapter 3 "Bar Supports."
- Tie Wire .... 16 gage or heavier, black annealed.
- Headed Deformed Bars .... ASTM A970

FABRICATION: Conform to ACI 301, Section 3.2.2. "Fabrication", and ACI SP-66 "ACI Detailing Manual."

WELDING: Bars shall not be welded unless authorized. When authorized, conform to ACI 301, Section 3.2.2.2. "Welding" and provide ASTM A706, grade 60 reinforcement.

PLACING: Conform to ACI 301, Section 3.3.2 "Placement." Placing tolerances shall conform to ACI 117.

CONCRETE COVER: Conform to the following cover requirements unless noted otherwise in the drawings.
- Concrete cast against earth .... 3"
- Concrete exposed to earth or weather .... 2"
- Ties in columns and beams .... 1-½"
- Bars in slabs .... ¾"
- Bars in walls .... ¾"
- Exterior bars in Tilt-up Panels .... 1"

FIELD BENDING: Conform to ACI 301 Section 3.3.2.8. "Field Bending or Straightening." Bar sizes #3 through #5 may be field bent cold the first time. Other bars require preheating. Do not twist bars. Bars shall not be bent past 45 degrees.

TYPICAL SHOTCRETE REINFORCEMENT: Unless noted on the plans, concrete walls shall have the following minimum reinforcement. Contractor shall confirm minimum reinforcement of walls with SER prior to rebar fabrication.

SHOTCRETE

REFERENCE STANDARDS: Conform to:
(1) IBC Section 1913 "Shotcrete",
(2) ACI 506.2-95 "Specification for Shotcrete",
(3) ACI 506R-05 "Guide to Shotcrete",
(4) ACI 301-05 "Specifications for Structural Concrete."

SUBMITTALS: Submit shop drawings for review including:
(1) Proposed mix design shown below. Include data required by ACI 506.2 Sec. 1.5 "Submittals"
(2) Preconstruction test panel results. After shooting, the special inspector shall submit core evaluation reports to insure that proper rebar encasement and nozzling techniques have been achieved.
(3) Construction test specimen results. The special inspector shall submit core strength reports.

MATERIALS: Conform to ACI 506.2 Sec. 2 "Materials" for Cement, Aggregate, Reinforcement, Water, Admixtures and Curing Materials.

REINFORCEMENT: Conform to IBC Sec. 1913.4 "Reinforcement" and CONCRETE REINFORCEMENT section this sheet.

SPLICES: Conform to IBC Sec. 1913.4.3, "Splices", for non-contact lap splices.

PRECONSTRUCTION TESTS: Prepare pre-construction test panels, as defined by the EOR, for each proposed mix design and nozzelman in accordance with IBC Sec 1913.5 "Pre-construction Tests" and ACI 506.2 Sec. 1.6.1 "preconstruction Testing." Test panels will be cored at the most congested reinforcing and evaluated by the testing laboratory. Each nozzelman must pass the evaluation before proceeding with the work.

CONSTRUCTION TESTS: Conform to IBC Sec. 1913.10 "Strength Tests" and ACI 506.2 Sec. 1.6.2 "Construction Testing." Take core specimens for each 50 cu yds placed but not less than once each shift. The cores will be taken from sample panels shot during the course of work.

The pre-construction sample panels shall be at least 12" deep x 18" wide x 2'-0" long, with the actual reinforcing, including the tie-back anchor, as shown in the construction documents. Three cores shall be taken from the sample panel and the cores may be either field cured or laboratory cured. Laboratory cured samples shall have an average strength equal to or greater than f'c with no individual sample breaking at less than 0.75 fc'. Field cured samples shall have an average strength of at least .85 f'c with no individual samples breaking at less than 0.75 f'c.

CONSTRUCTION: Conform to IBC Sec. 1913 and ACI 506.2 Sec. 3 "Execution" for Examination, Batching and Mixing, Surface Preparation, Joints, Alignment Control, Application, Finishing, Hot Weather, Cold Weather, Protection, Curing, and Tolerances. The contractor shall adhere to the following weather related precautions':
- Ensure materials and surrounding air temperature maintained at minimum 40 degrees Fahrenheit prior to, during and 7 days after completion of work.
- During freezing or near freezing weather, provide equipment and cover to maintain minimum 40 degrees Fahrenheit to protect work completed or work in progress.
- Suspend operations during high winds, rainy weather, or near freezing temperatures when work cannot be protected

INSPECTIONS & ACCEPTANCE: Conform to IBC Sec. 1913.10.3 "Acceptance Criteria." Provide "Special Inspections" during construction and "Visual Examination" when work is complete. Conform to ACI 506.2 Sec. 1.9 "Acceptance."

STRUCTURAL STEEL

REFERENCE STANDARDS: Steel construction shall conform to the AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", 9th Edition, and the AISC "Code of Standard Practice for Steel Buildings and Bridges".

STEEL MATERIALS
- Structural Pipe, (PIPE) 12" dia. and less .... ASTM A53, Grade B — Fy = 35 ksi
- Connection plate material — ASTM A-36
- Welding Electrodes — E70XX

WELDING: Structural steel welding shall conform to A.W.S. codes for arc and gas welding and all welding shall be performed by A.W.S. certified welders. Welding electrodes shall be E70XX electrodes for manual shielded metal arc welding.

FABRICATION: Conform to AISC Specification Sec. M2 "Fabrication" and AISC Code Sec. 6 "Fabrication and Delivery" and AISC Sec. 8 "Quality Control." The fabricator and erector shall maintain a quality control program to the extent deemed necessary so that all of the work is performed in accordance with this Code, the AISC Specification and the contract documents.

TOLERANCES: The steel piles shall be placed true and plumb within the limits defined in the AISC Code Sec. 7.11.

HEADED SHEAR STUDS: All shear studs shall be 1/2" diameter headed studs. Stud lengths after weld shall be as shown on the drawings. Weld shall be sufficient to develop the capacity of the stud.

DRAWING LEGEND

MARK	DESCRIPTION	MARK	DESCRIPTION
F2.0	FOOTING SYMBOL (REFER TO SPREAD FOOTING SCHEDULE)	I	INDICATES WIDE FLANGE COLUMN
P1	PILE CAP SYMBOL (REFER TO PILE CAP SCHEDULE)	□	INDICATES HOLLOW STRUCTURAL SECTION (HSS) COLUMN OR TUBE STEEL (TS) COLUMN
A	TILT-UP/PRECAST CONCRETE WALL CONNECTION SYMBOL (REFER TO CONNECTION DETAIL)	○	INDICATES HOLLOW STRUCTURAL SECTION (HSS) COLUMN OR STEEL PIPE COLUMN
W6	SHEAR WALL SYMBOL (REFER TO SHEAR WALL SCHEDULE)	⊠	INDICATES WOOD POST
1 (triangle)	REVISION TRIANGLE	■	INDICATES BUNDLED STUDS
1 (box)	TILT-UP/PRECAST CONCRETE WALL PANEL NUMBER (REFER TO TILT-UP/ PRECAST CONCRETE WALL ELEVATIONS)		INDICATES WOOD OR STEEL STUD WALL
T/SLAB X'-X"	ELEVATION SYMBOL (T/ REFERS TO COMPONENT THAT THE ELEVATION REFERENCES)		INDICATES MASONRY/CMU WALL
3	STUD BUBBLE (INDICATES NUMBER OF STUDS REQUIRED IF EXCEEDS NUMBER SPECIFIED IN PLAN NOTE)		INDICATES CONCRETE/TILT-UP CONCRETE WALL
S	INDICATES STEP IN FOOTING (REFER TO TYPICAL STEP IN FOOTING DETAIL)		INDICATES WOOD OR STEEL STUD SHEAR WALL
X/SX.X	DETAILS OR SECTION CUT (DETAIL NUMBER/SHEET NUMBER)		INDICATES BEARING WALL BELOW
X / SX.X	DETAILS OR SECTION CUT IN PLAN VIEW (DETAIL NUMBER/SHEET NUMBER)		INDICATES EXISTING WALL

ABBREVIATIONS

∠	Angle
AB	Anchor Bolt
ADDL	Additional
ALT	Alternate
ARCH	Architectural
B or BOT	Bottom
B/	Bottom Of
BLDG	Building
BLKG	Blocking
BMU	Brick Masonry Unit
BP	Baseplate
BRB	Buckling Resisting Braced
BRG	Bearing
BTWN	Between
℄	Centerline
C	Camber
CB	Castellated Beam
CIP	Cast in Place
CJ	Construction or Control Joint
CJP	Complete Joint Penetration
CLR	Clear
CMU	Concrete Masonry Unit
COL	Column
CONC	Concrete
CONN	Connection
CONST	Construction
CONT	Continuous
C'SINK	Countersink
CTRD	Centered
ø	Diameter
DB	Drop Beam
DBA	Deformed Bar Anchor
DBL	Double
DEMO	Demolish
DEV	Development
DF	Douglas Fir
DIAG	Diagonal
DIST	Distributed
DL	Dead Load
DN	Down
DO	Ditto
DP	Depth/Deep
DWG	Drawing
(E)	Existing
EA	Each
EF	Each Face
EL	Elevation
ELEC	Electrical
ELEV	Elevator
EMBED	Embedment
EQ	Equal
EQUIP	Equipment
EW	Each Way
EXP	Expansion
EXP JT	Expansion Joint
EXT	Exterior
FD	Floor Drain
FDN	Foundation
FIN	Finish
FLR	Floor
FRP	Fiberglass Reinforced Plastic
FTG	Footing
F/	Face of
GA	Gage
GALV	Galvanized
GEOTECH	Geotechnical
GL	Glue Laminated Timber
GWB	Gypsum Wall Board
HDR	Header
HF	Hem-Fir
HGR	Hanger
HD	Hold-down
HORIZ	Horizontal
HP	High Point
HSS	= TS (Hollow Structural Section)
IBC	International Building Code
ID	Inside Diameter
IE	Invert Elevation
IF	Inside Face
INT	Interior
k	Kips
KSF	Kips Per Square Foot
LF	Lineal Foot
LL	Live Load
LLH	Long Leg Horizontal
LLV	Long Leg Vertical
LP	Low Point
LONGIT	Longitudinal
LSL	Laminated Strand Lumber
LVL	Laminated Veneer Lumber
MAS	Masonry
MAX	Maximum
MECH	Mechanical
MEZZ	Mezzanine
MFR	Manufacturer
MIN	Minimum
MISC	Miscellaneous
NIC	Not In Contract
NTS	Not To Scale
OC	On Center
OCB	Ordinary Concentric Braced
OD	Outside Diameter
OF	Outside Face
OPNG	Opening
OPP	Opposite
OWSJ	Open Web Steel Joist
OWWJ	Open Web Wood Joist
ℙ	Plate
PAF	Powder Actuated Fastener
PC	Precast
PERP	Perpendicular
PLWD	Plywood
PP	Partial Penetration
PREFAB	Prefabricated
PSF	Pounds per Square Foot
PSI	Pounds Per Square Inch
PSL	Parallel Strand Lumber
P-T	Post-Tensioned
PT	Pressure Treated
R	Radius
RD	Roof Drain
REF	Refer/Reference
REINF	Reinforcing
REQD	Required
RET	Retaining
SCB	Special Concentric Braced
SCHED	Schedule
SHTHG	Sheathing
SIM	Similar
SMF	Special Moment Frame
SOG	Slab on Grade
SPEC	Specification
SQ	Square
SR	Studrail
SF	Square Foot
SST	Stainless Steel
STAGG	Stagger/Staggered
STD	Standard
STIFF	Stiffener
STL	Steel
STRUCT	Structural
SWWJ	Solid Web Wood Joist
SYM	Symmetrical
T	Top
T/	Top Of
T&B	Top & Bottom
TC AX LD	Top Chord Axial Load
TCX	Top Chord Extension
TDS	Tie Down System
T&G	Tongue & Groove
THKND	Thickened
THRD	Threaded
THRU	Through
TRANSV	Transverse
TYP	Typical
UBC	Uniform Building Code
UNO	Unless Noted Otherwise
URM	Unreinforced Masonry Unit
VERT	Vertical
W	Wide
W/	With
W/O	Without
WHS	Welded Headed Stud
WP	Working Point
WWF	Welded Wire Fabric
±	Plus or Minus

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CIVIL / STRUCTURAL

SIGNATURE:
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 12219 OREGON JULY 15, 1983 WADE W. YOUNIE
EXPIRES: 6-30-12

REVISIONS:
1 01.25.2012 REVISIONS

APPROVALS:
Job No.: 11031-0086
Proj. Manager: WWY
Drawn: IAK
Reviewed:
Dwg. Chk. 11/01/11
Date:
Scale: AS NOTED

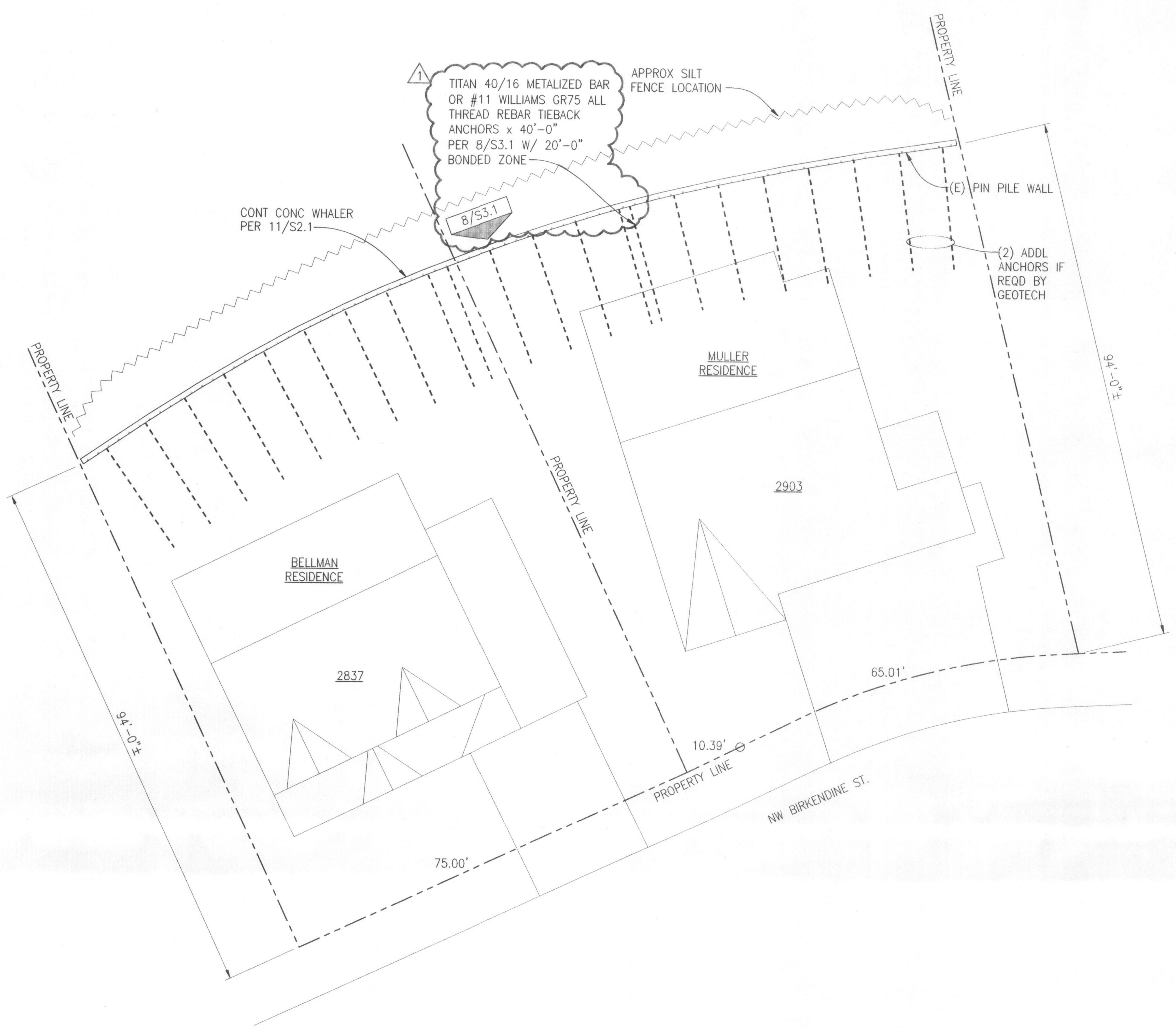
PROJECT TITLE:
RETAINING WALL REPAIR
MULLER/BELLMAN RESIDENCES
2837-2903 NW BERKENDINE ST
PORTLAND, OR 97229

SHEET TITLE:
STRUCTURAL GENERAL NOTES, LEGEND AND ABBREVIATIONS

SHEET NO.
SI.1

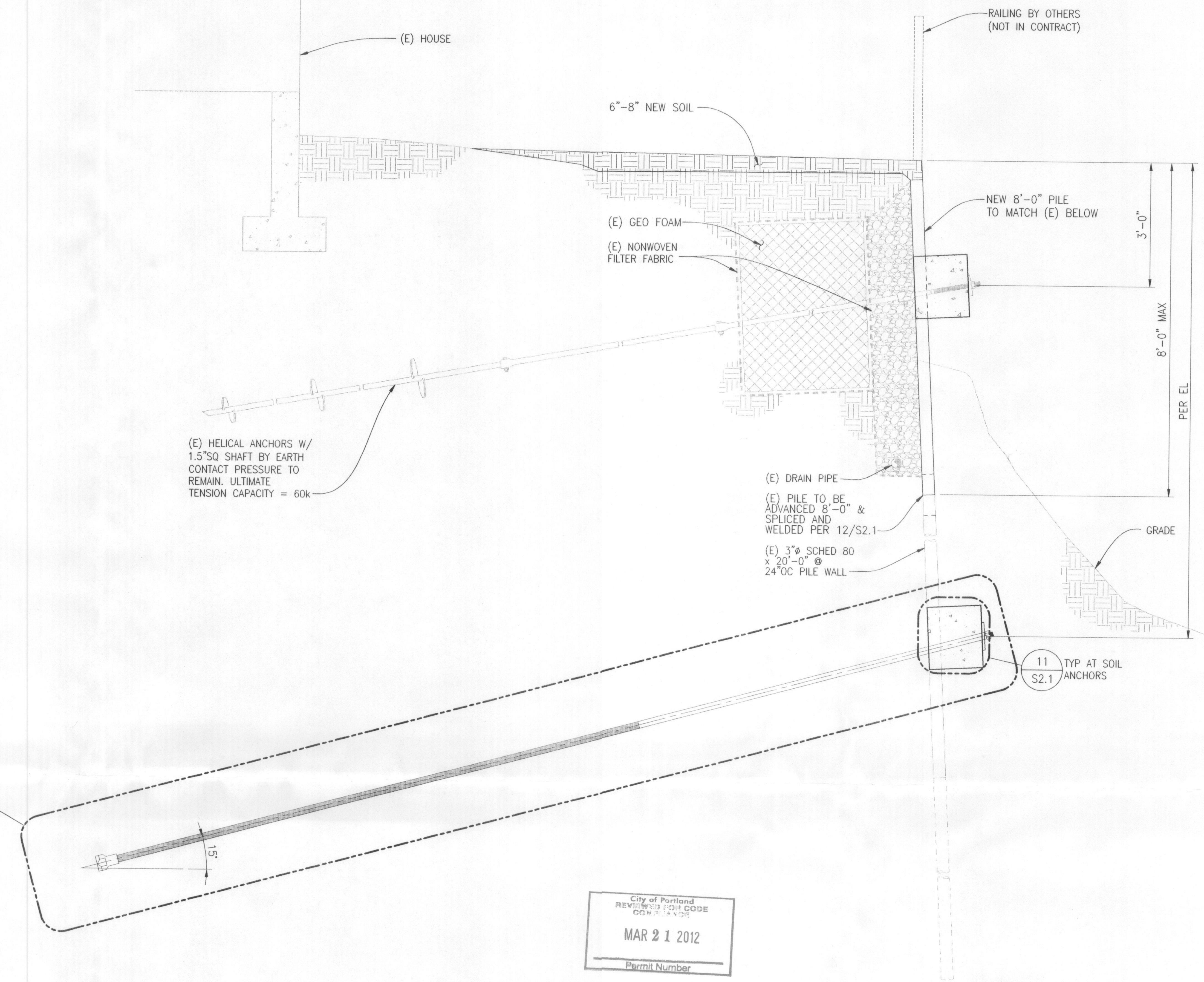
11031-0086 S11.dwg 25-Jan-12 4:26 PM adring

Plot Scale: 1 = 1



SITE PLAN

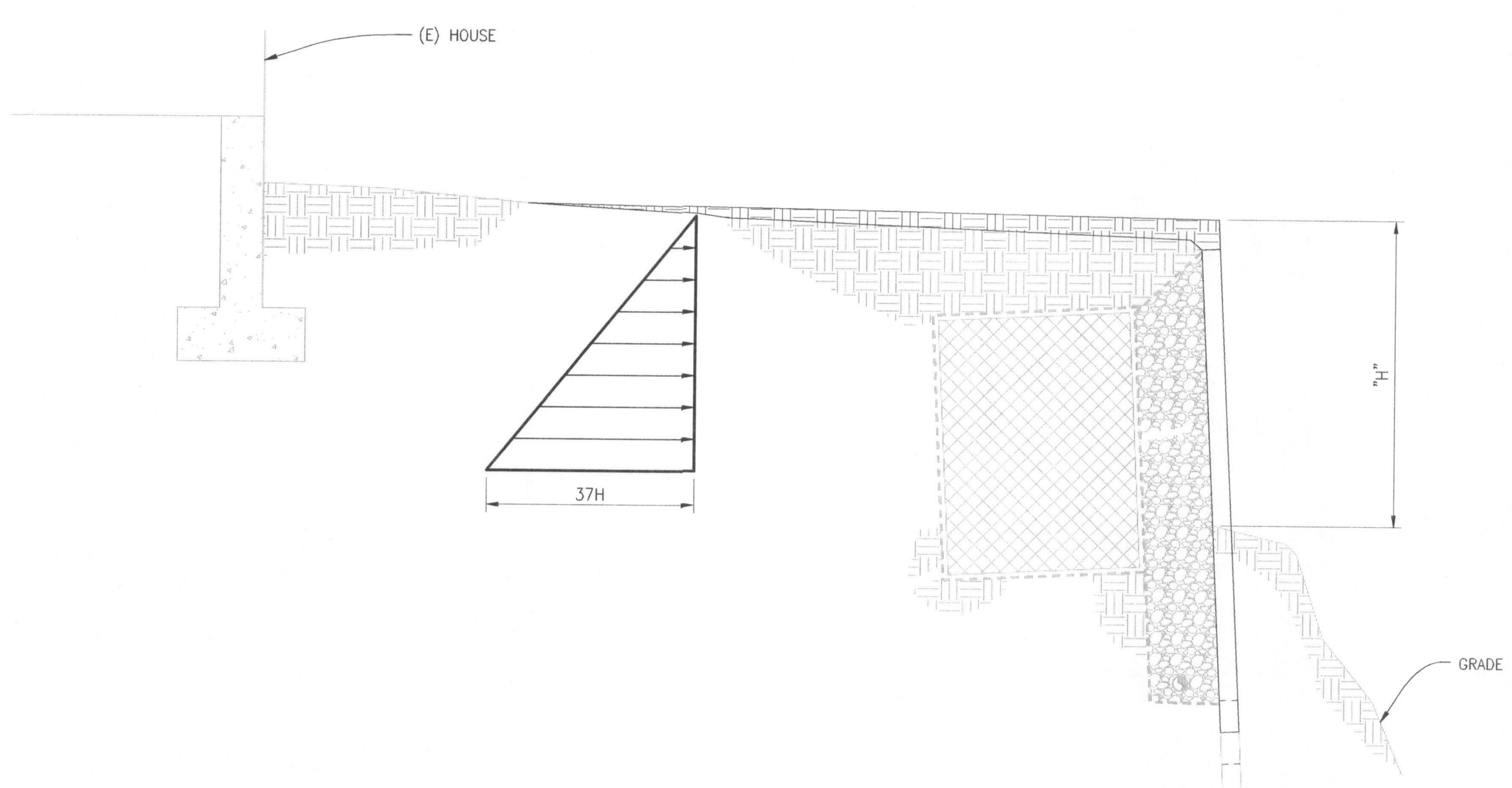
SCALE: NONE



City of Portland
REVIEWED FOR CODE COMPLIANCE
MAR 2 1 2012
Permit Number

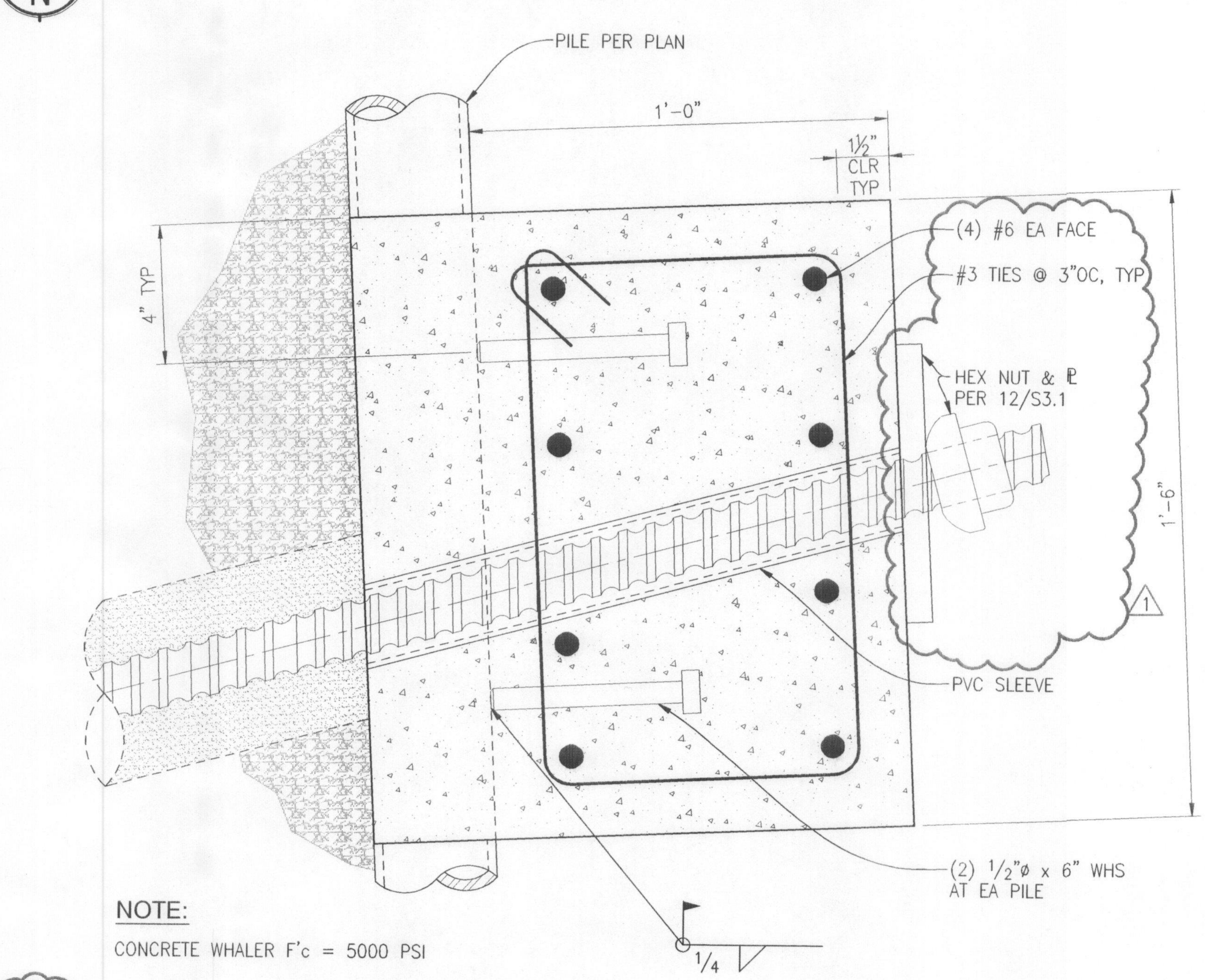
PILE WALL AND ANCHOR SECTION

SCALE: 1/2"=1'-0" — 8



ACTIVE PRESSURE DIAGRAM

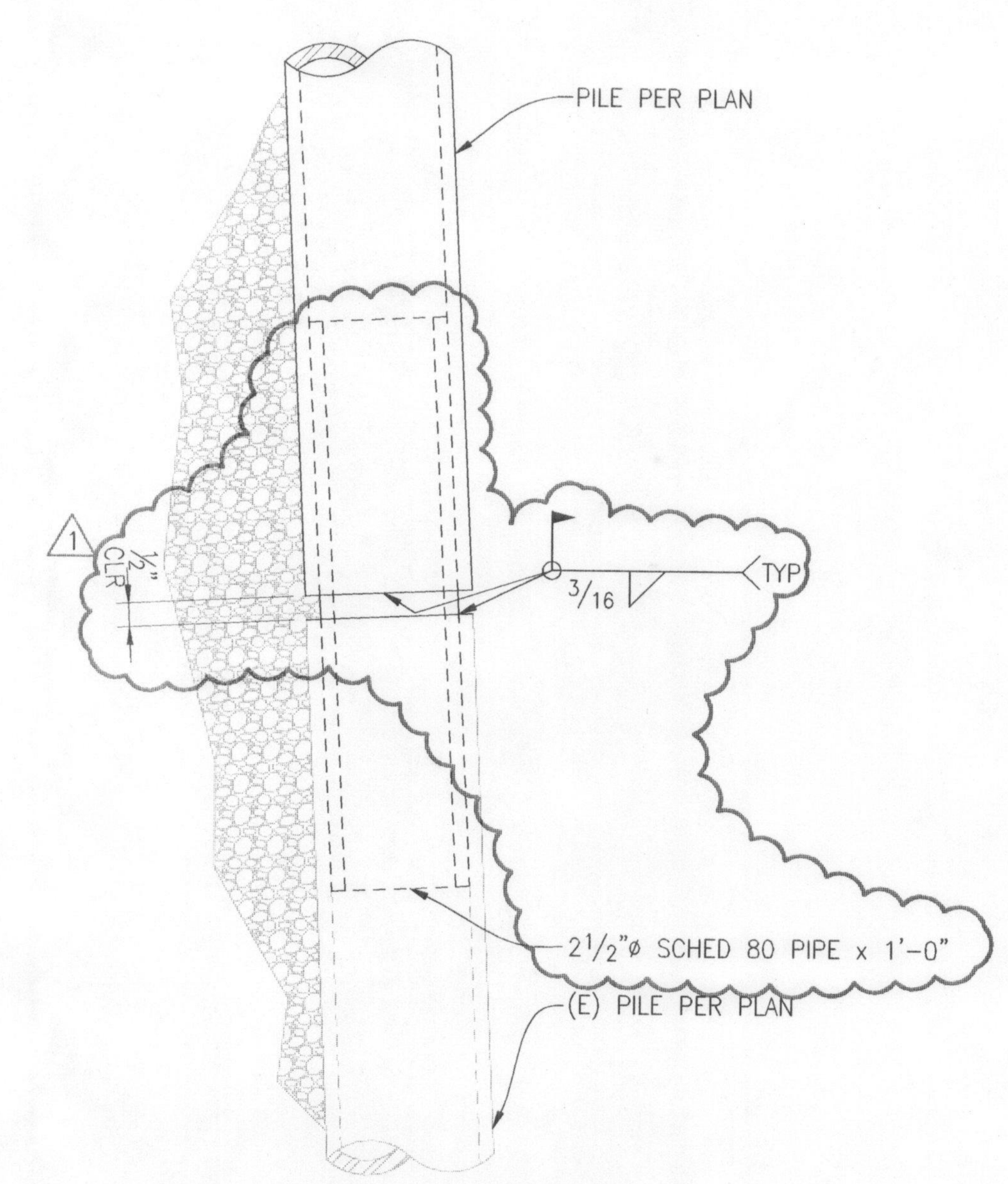
SCALE: 1/2"=1'-0" — 10



NOTE:
CONCRETE WHALER F'c = 5000 PSI

TYPICAL SOIL ANCHOR CONNECTION DETAIL

SCALE: 3"=1'-0" — 11



COUPLER CONNECTION DETAIL

SCALE: 3"=1'-0" — 12

RECEIVED FEB 22 2012

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CIVIL / STRUCTURAL

SIGNATURE:
STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 12219 OREGON JULY 15, 1983 WADE W. YOUNIE
EXPIRES: 6-30-12

REVISIONS:
01.25.2012 REVISIONS

APPROVALS:

Job No.:	11031-0086
Proj. Manager:	WWY
Drawn:	IAK
Reviewed:	
Dwg. Chk.	
Date:	11/01/11
Scale:	AS NOTED

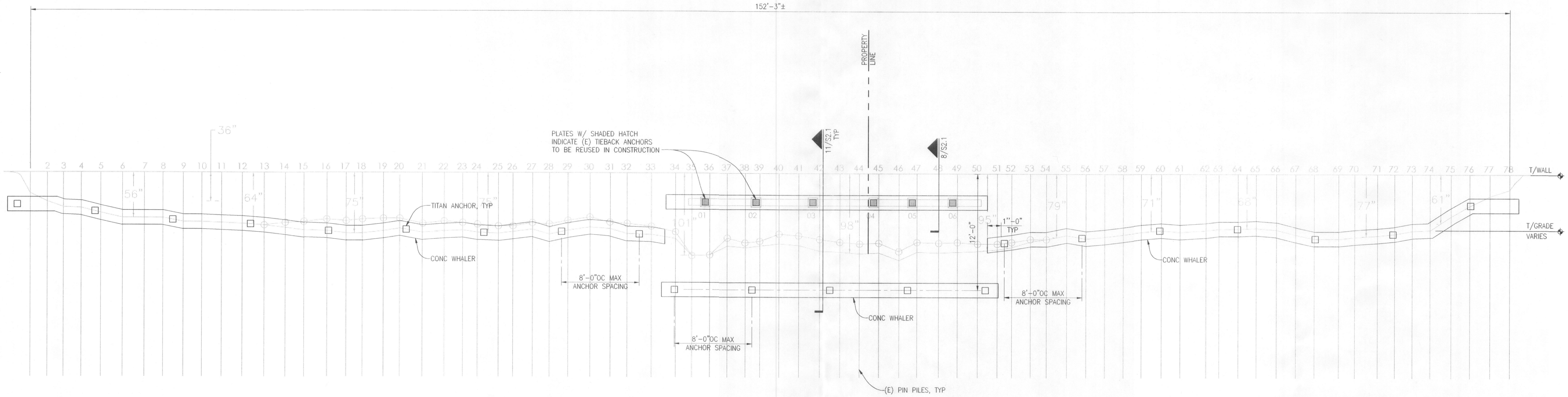
PROJECT TITLE:
RETAINING WALL REPAIR
MULLER/BELLMAN RESIDENCES
2837-2903 NW BERKENDINE ST
PORTLAND, OR 97229

SHEET TITLE:
STRUCTURAL SITE PLAN AND DETAILS

SHEET NO.
S2.1

Plot Scale: 1 = 1

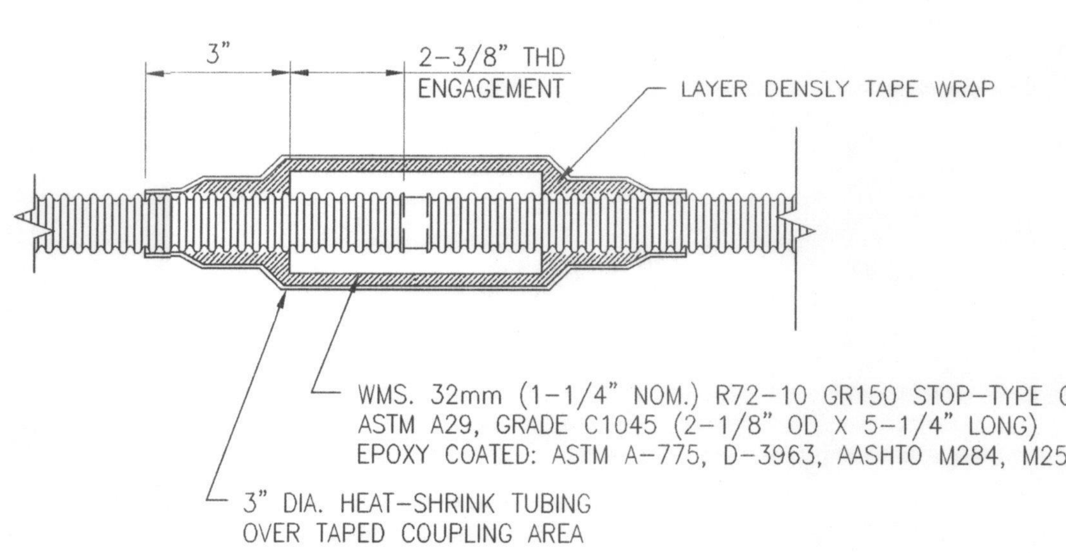
11031-0086 S21.dwg 1-Feb-12 10:49 AM jfleming



ELEVATION LOOKING SOUTH

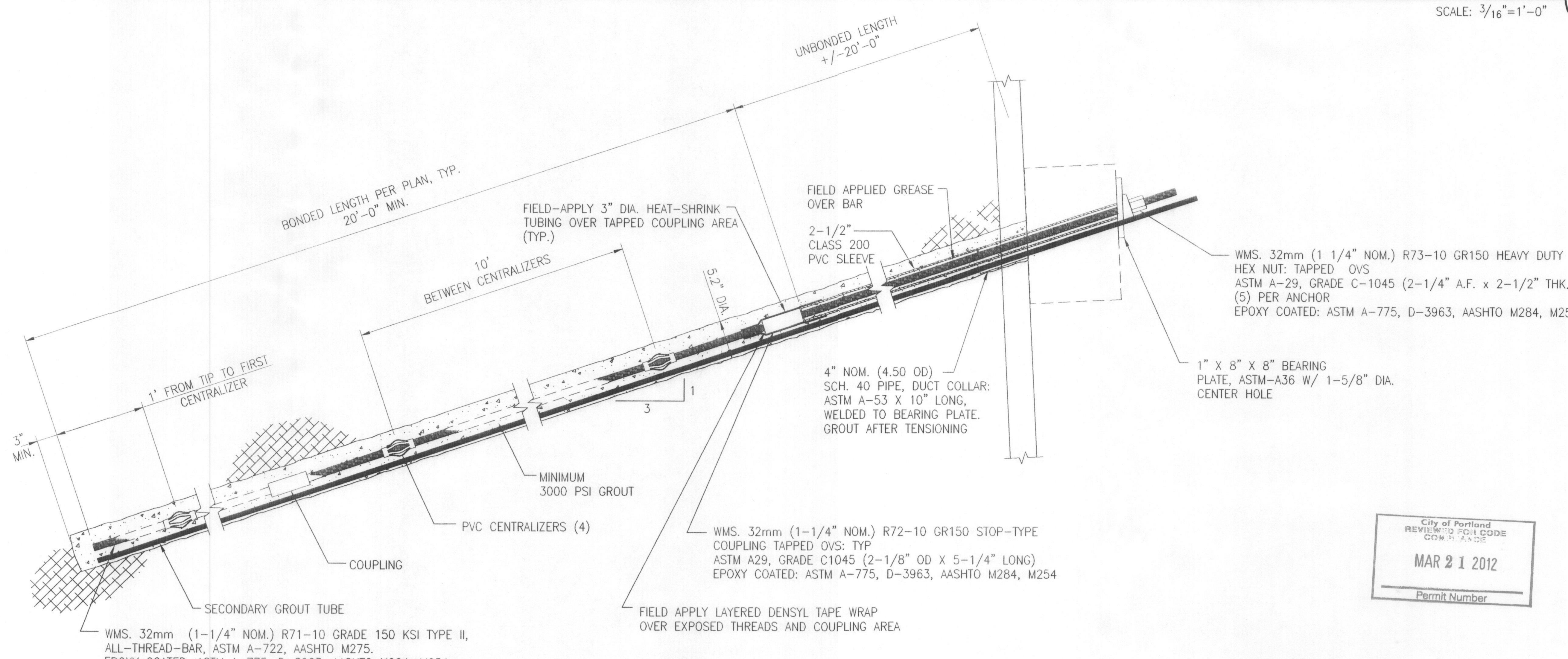
SCALE: 3/16"=1'-0" (8)

- SLIDE HEAT-SHRINK SLEEVE OVER ONE END OF CONNECTING BAR
- THREAD COUPLING ONTO BAR TO STOP IN COUPLING, ENGAGE CONNECTING BAR TO OTHER SIDE OF COUPLING ENGAGING BAR TO IN COUPLING
- LAYER DENSLY TAPE WRAP OVER LENGTH OF COUPLING, OVERLAPPING 50% ALONG COUPLING AREA
- CENTER HEAT-SHRINK SLEEVE OVER COUPLING AREA, OVERLAPPING 3" MIN. EACH SIDE
- APPLY EVEN HEAT TO HEAT-SHRINK SLEEVE USING A HEAT GUN OR SMALL PROPANE TORCH



COUPLING DETAIL

SECTION VIEW
AT PIER 1 ANCHORS



City of Portland
MAR 2 1 2012
Permit Number

#11 WILLIAMS BAR ANCHOR DETAIL

SCALE: NTS (12)

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REVISIONS:
01.25.2012 REVISIONS (1)

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Job No.:	11031-0086
Proj. Manager:	WWY
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Dwg. Chk.	
Date:	11/01/11
Scale:	AS NOTED

PROJECT TITLE:
RETAINING WALL REPAIR
MULLER/BELLMAN RESIDENCES
2837-2903 NW BERKENDINE ST
PORTLAND, OR 97229

SHEET TITLE:
STRUCTURAL SITE WALL ELEVATION

SHEET NO. S3.1 (1)

11031-0086 S31.dwg 1-Feb-12 10:50 AM jfleming

Plot Scale: 1 = 1