

**Biological Assessment for the
35th Avenue SE Reconstruction Project
City of Mill Creek, Washington**

August 31, 2015



Excellence. Innovation. Service. Value.

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Submitted To:
Mr. Scott Smith
City of Mill Creek
15728 Main Street
Mill Creek, Washington 98012

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-21948-004

August 31, 2015

Mr. Scott Smith
City of Mill Creek
15728 Main Street
Mill Creek, WA 98012

**RE: BIOLOGICAL ASSESSMENT FOR THE 35TH AVENUE SE
RECONSTRUCTION PROJECT, CITY OF MILL CREEK, WASHINGTON**

Dear Mr. Smith:

Shannon & Wilson, Inc. was contracted by KPFF on behalf of the City of Mill Creek (City) to provide a biological assessment of the 35th Avenue SE Reconstruction project. The project is located between SE 141st Street and SE 144th Street in Mill Creek, Washington (Figures 1 and 2), in the SW ¼ of Section 33, Township 28N, Range 5E of the Willamette Meridian.

The proposed project includes raising approximately 1,000 linear feet of the 35th Avenue SE roadway to reduce flooding and associated road closures. This biological assessment letter evaluates potential project impacts to listed species and critical habitat protected under the federal Endangered Species Act (ESA) and essential fish habitat (EFH) protected under the Magnuson-Stevens Fishery Conservation and Management Act. The federal nexus for this project is a Section 404 permit issued by the U.S. Army Corps of Engineers for discharge of fill material that will occur within the onsite wetland (Wetland A).

PROJECT DESCRIPTION

Project Design

The project includes raising the 35th Avenue SE road elevation up to 4 feet above the existing road elevation to reduce flooding and associated road closures. The roadway bisects a wetland system, greater than 50 acres in size, located on both sides of the project corridor. Penny Creek, a perennial stream associated with Wetland A, flows through two 54-inch culverts beneath the 35th Avenue SE roadway (see Figure 3 and excerpted sheets from the 90 percent plan set). Although the OHWM of Penny Creek in the project area coincides with Wetland A's wetland

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boundary, the creek has a defined low-flow channel. During high flow events, the creek inundates and flows through Wetland A.

The project includes building atop the existing roadway embankment and constructing the roadway on a pin pile-supported concrete slab. To mitigate potential floodplain impacts associated with raising the roadway, a 24-inch culvert will be installed above the existing site culverts (and above the ordinary high water mark [OHWM] of Penny Creek) to increase conveyance under the roadway during rainfall events (Figure 3).

The two culverts were surveyed in 2014 and appeared to be in good condition; therefore, the culverts will not be replaced as part of this project. However, the project is designed to facilitate removal of the culverts at a future date to daylight the creek. The length of the future bridge span was calculated using the stream simulation method to meet Washington Department of Fish and Wildlife Water Crossing Design Guidelines. Based on this analysis, and adding a 1.23 factor of safety, the project will allow for a 44-foot-long bridge span to be constructed in the future.

Stormwater runoff is currently collected in 21 catch basins within the 35th Avenue SE roadway and conveyed through two pipe outfalls to discharge into Wetland A without treatment. The project will include replacing the existing storm drains with 14 new catch basins to collect stormwater, which will be conveyed to modular wetland units on the north and south ends of the project alignment. Stormwater will be treated in the modular wetland units before being discharged through flow dispersal pipes in Wetland A (Figures 4 and 5).

Project Construction

Primary roadway excavation will be limited to sidewalk removal and limited overexcavation to a maximum depth of approximately 3 feet at both the north and south approaches. The Contractor will utilize silt fences, catch basin inserts, plastic sheeting, straw mulch, fiber rolls, and/or other erosion control Best Management Practices (BMPs) to reduce the potential for erosion and sediment-laden water from entering Wetland A and Penny Creek.

Temporary, localized dewatering may be required during construction. Groundwater, if encountered during construction, will be discharged to an upland area or pumped into an aboveground tank and treated to meet state water quality standards.

Approximately 239 square feet of wetland vegetation will be damaged or removed during excavation of the trenches to place the storm drain lines. A limited amount (approximately 250 square feet) of vegetation will be cut/mowed to allow placement of the flow dispersal pipes

(see Figures 4 and 5). This vegetation is primarily cattails at the south stormwater outflow location and spirea and willow at the north stormwater outflow location.

Project construction is expected to occur in the following sequence:

1. Project temporary traffic control will be established by placing temporary construction signing and portable changeable message signs as required in the Plans.
2. Prior to earth disturbing activities, BMPs will be installed, including silt fences, catch basin inserts, plastic sheeting, straw mulch, fiber rolls, and/or other erosion control to reduce the potential for erosion and sediment-laden water from entering Wetland A and Penny Creek.
3. Demolition work will remove portions of the existing roadway surface, sidewalk, curb, stormwater structures, and other utilities. Demolition will be conducted using typical construction equipment (e.g., excavator, backhoe, and/or concrete saw) operating from the existing roadway, outside of Wetland A and Penny Creek. All demolition debris will be removed from the site and disposed of at an appropriate facility.
4. The components of the storm drain system will be installed including storm drain inlets with frames and grates, storm drain pipes, and treatment structures (“modular wetland units”).
 - The installation will involve excavation for the inlets and the piping, temporary stockpile and removal of the excavated material, installation of the inlets and piping, and backfilling with select backfill.
 - Two outfalls (12- and 18-inch-diameter) will be installed for the storm drain system, discharging to Wetland A at the north and south ends of the project.
 - Temporary, localized dewatering will likely be required to install the storm drain lines in Wetland A. The water will be discharged to an upland area or pumped into an above-ground tank and treated to meet state water quality standards.
 - Each stormwater outfall will be fitted by a tee connection to a flow dispersal pipe (8-inch-diameter) comprised of a length of perforated pipe capped at either end and placed in Wetland A at the toe of the existing embankment at a consistent elevation. Limited cutting/mowing (approximately 250 square feet) of vegetation will occur to place the flow dispersal pipes on the ground surface. The dispersal pipe will be anchored in place with rebar and vinyl-coated wire.
 - After the trenches have been backfilled with pipe bedding and then native soil placed where feasible, exposed soils and disturbed areas will be treated with native seed mix and willow stakes.
5. In preparation of the pin piles, the existing pavement will be cored out at the pile locations. Piles will be driven by impact hammer.

6. A 24-inch-diameter culvert will be placed above the existing 54-inch-diameter culverts to provide additional capacity and maintain water levels at higher recurrence intervals. Forms will be placed for the pile caps and concrete slab road section that will span the existing and new culvert, and the slab will be poured. Two cranes will be mobilized on-site. Culvert bridge precast girders will be installed. The cranes will be demobilized.
7. The remaining upland roadway construction will be completed, including the travel lanes, sidewalks, roadway embankments and walls, barriers, and other signage.
8. After construction is complete and the area is permanently stabilized, the project BMPs will be removed.

The time period in which the above listed items are performed may overlap with the time periods of other items. Construction is planned to occur between the months of April and November and will take approximately eight months to complete.

Equipment is anticipated to run during normal working hours of operation (7 a.m. to 5 p.m.) for the majority of the project. Typical construction equipment will be used, such as a front-end loader, excavator, backhoe, compactor, concrete mixer truck, concrete saw, crane, drum mixer, flatbed truck, pickup truck, generator, paving machine, roller, pumps, vacuum street sweeper, and dump trucks. In addition, an impact hammer will likely be used for driving pin piles.

ACTION AREA

The proposed project impacts include: (1) ground disturbance and water quality impacts and (2) construction noise impacts. The outer perimeters of these impact areas define the limits of the action area, as illustrated in Figure 6.

Ground Disturbance and Water Quality Impact Area

As identified in the Wetland and Stream Delineation Report (Shannon & Wilson, Inc., 2014), the OHWM of Penny Creek in the project area coincides with Wetland A's wetland boundary. The project includes constructing a 24-inch flow-through pipe above the Penny Creek OHWM that will be accessible to fish during flood events (see construction sequence above, Figure 3, and the enclosed plan set for more detail). The impact area associated with ground disturbance includes sidewalk removal, limited overexcavation at both the north and south approaches, and minor excavation and grading in Wetland A (outside of the low-flow channel of Penny Creek) to install the two stormwater outfalls (Figures 4 and 5).

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The Contractor will utilize silt fences, catch basin inserts, plastic sheeting, straw mulch, fiber rolls, de-watering, and/or other erosion control BMPs to reduce the potential for erosion and sediment-laden stormwater from entering Wetland A and Penny Creek. BMPs will also be used to contain and treat high pH water that may be present associated with the concrete components of the project. Ground- or surface-waters encountered in the construction area will be discharged to an upland location or pumped to an aboveground tank and treated to meet state water quality standards. Therefore, potential water quality impacts are limited to surface water (Wetland A) and groundwater in the immediate work areas.

Noise Impact Area

The extent of the terrestrial noise impacts includes noise generated by construction equipment that are elevated above ambient (background) noise levels (Figure 6). In-air noise levels were calculated using the Washington State Department of Transportation's (WSDOT's) Noise Analysis guidance (WSDOT, 2015). The calculations performed to assess the in-air noise levels for this project are enclosed.

Temporary construction noise at the construction site is anticipated to reach ambient in-air noise levels 7,925 feet from the site. This estimate is based on:

- Background noise of 55 A-weighted decibels (dBA) assumes a population density within the City of approximately 3,907 people per square mile (U.S. Census Bureau, 2015).
- A construction in-air noise level of 110 dBA based on proposed construction equipment noise using WSDOT's Noise Analysis guidance (WSDOT, 2015).
- A noise transmission loss of 7.5 dBA per doubling distance since the project is a "point source" and the area around the project site is made up of vegetated wetlands with a few residential areas and is considered a "soft site."

SPECIES INFORMATION

The following resources were reviewed for endangered species in the project area:

- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPaC) Trust Resource Report (USFWS, 2015).
- National Oceanic and Atmospheric Administration (NOAA) Fisheries West Coast Region website protected species list (NOAA, 2015).
- Washington Department of Natural Resources (WDNR) (2015) Natural Heritage Program's rare plant list (WDNR, 2015)

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- Washington Department of Fish and Wildlife (WDFW) SalmonScape online tool (WDFW, 2015a).
- WDFW Priority Habitat and Species (PHS) on the Web online tool (WDFW, 2015b).

Marine ESA-listed species were precluded from this assessment because no marine habitat is located in the action area. The following non-marine ESA-listed species were identified by USFWS in Snohomish County, but exist in habitats not found in the vicinity of the project site. Therefore, these species are not discussed further in this assessment:

- Northern spotted owl (*Strix occidentalis caurina*)
- Grizzly bear (*Ursus arctos*)
- Canada lynx (*Lynx canadensis*)
- Gray wolf (*Canis lupus*)

Although one USFWS source identifies Oregon spotted frog (*Rana pretiosa*) as potentially occurring in Snohomish County (<http://www.fws.gov/wafwo/species/Fact%20sheets/ORspottedfrogfinal.pdf>), it was not included in USFWS's list of species potentially found in Snohomish County (USFWS, 2015). Further, a February 17, 2015, screening model for the Oregon spotted frog indicates that projects located outside of certain watersheds can be considered to have *no effect* on the frog. The action area is not located in one of the listed watersheds.

The following ESA-listed species were identified by USFWS and/or WDNR, but are not known to occur in Snohomish County. Therefore, these species will not be discussed further in this assessment:

- Marsh sandwort (*Arenaria paludicola*)
- Streaked horned lark (*Eremophila alpestris strigata*)
- Golden paintbrush (*Castilleja levisecta*)

Based on the above sources and information, the USFWS and National Marine Fisheries Service (NMFS) ESA-listed species and associated critical habitats that may be present in the project area vicinity are shown below in Table 1.

TABLE 1
USFWS- AND NMFS-LISTED SPECIES AND CRITICAL HABITATS
POTENTIALLY PRESENT IN THE PROJECT VICINITY

Species	Evolutionarily Significant Unit (ESU)/ Distinct Population Segments (DPS)	Federal Jurisdiction and Status	Site Use and Designated Critical Habitat
<i>Oncorhynchus tshawytscha</i>	Puget Sound (PS) Chinook ESU	NMFS Threatened	The closest documented Chinook and steelhead habitat is more than 4 miles downstream of the project area. Penny Creek is modeled as fall Chinook and winter steelhead habitat through the project area. A total fish blockage is documented approximately 1 mile downstream of the project area. However, coho salmon are documented in the project area, so Chinook and steelhead could potentially be present.
<i>Oncorhynchus mykiss</i>	PS steelhead DPS	NMFS Threatened	The closest downstream designated critical habitat of Chinook salmon is the Sammamish River, located at least 7 miles south of the project area. No proposed critical habitat for steelhead is mapped downstream of the project area.
<i>Salvelinus confluentus</i>	Bull trout	USFWS Threatened	No bull trout have been documented or modeled in the action area. The closest downstream presence of bull trout is the Sammamish River, located at least 7 miles south of the project area. The closest designated bull trout critical habitat is Lake Washington, located at least 7 miles south of the action area.
<i>Brachyramphus marmoratus</i>	Marbled murrelet	USFWS Threatened	There is no known marbled murrelet occurrence or suitable nest tree in the project action area. No designated critical habitat is mapped in the action area; the closest designated critical habitat is approximately 15 miles to the east in Snoqualmie National Forest.
<i>Coccyzus americanus</i>	Yellow-billed cuckoo	USFWS Threatened	No critical habitat is proposed for Washington

Notes:
 NMFS = National Marine Fisheries Service
 USFWS = U.S. Fish and Wildlife Service

EXISTING ENVIRONMENTAL CONDITIONS

The action area consists of predominantly residential and commercial development, with fragmented natural spaces associated with wetland systems and stream corridors. The 35th Avenue SE roadway is bound to the east and west by a palustrine/riverine wetland system

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(Wetland A) that is over 50 acres in size. The wetland vegetation consists of a mixture of aquatic bed, emergent, scrub-shrub, and forested plant communities. The dominant wetland vegetation includes red alder (*Alnus rubra*, FAC), willow (*Salix* spp.), salmonberry (*Rubus spectabilis*, FAC), spirea (*Spiraea douglasii*, FACW), reed canarygrass (*Phalaris arundinacea*, FACW), and cattail (*Typha latifolia*, OBL).

Uplands in the project area include the 35th Avenue SE roadbed and lawn and landscaped areas around residential developments to the north and south. Vegetation observed along the roadbed consisted of reed canarygrass (*Phalaris arundinacea*, FACW), Bohemian knotweed (*Polygonum bohemicum*, NL), Robert's geranium (*Geranium robertianum*, FACU), cleaver bedstraw (*Galium aparine*, FACU), and bentgrass (*Agrostis* spp.).

An upland island was also observed west of 35th Avenue SE. The island was dominated by native species, including shore pine (*Pinus contorta*, FAC), western hemlock (*Tsuga heterophylla*, FAC), salal (*Gaultheria shallon*, FACU), and bracken fern (*Pteridium aquilinum*, FACU).

Penny Creek, a perennial, fish-bearing stream, flows beneath 35th Avenue SE via two 54-inch culverts. The creek has a defined low-flow channel. During high flow events, the creek inundates and flows through Wetland A.

EFFECTS ANALYSIS AND DETERMINATIONS

Direct Impacts

Noise

Temporary direct effects that will occur as a result of the project include terrestrial construction noise, which is anticipated to reach 110 dBA due to impact pile driving of pin piles. Temporary construction noise is anticipated to reach background in-air noise levels in 7,925 feet (1.5 mile) from the project corridor (Figure 6). The calculations completed to estimate noise levels are enclosed.

The USFWS Biological Opinion (BO) for the Olympic National Forest program of activities (USFWS, 2013) provides distance thresholds for different categories of noise to have varying degrees of potential impact (disturbance or injury) on marbled murrelets during the nesting season (April 1 to September 23). The category of noise identified in the BO, which is comparable to noise generated by the 35th Avenue SE Reconstruction Project is, "Pile-driving

(steel H piles, pipe piles).” No known or likely suitable habitat, or designated critical habitat, for marbled murrelet is present within the quarter-mile threshold area. A quarter-mile radius around the site intersects residential development, deciduous wetland complexes, and narrow mixed-forest corridors.

There is no known marbled murrelet occurrence or suitable habitat in the project action area, and the nearest mapped critical habitat is located approximately 15 miles to the east.

Water Quality/Fish Habitat

The proposed roadway improvements will occur primarily within the existing road fill prism, with minor excavation and fill in Wetland A, outside of the low-flow channel of Penny Creek. No new impervious surfaces are proposed.

The new 24-inch flow-through pipe will be located above the Penny Creek OHWM and only accessible to fish during flooding events. Although no presence has been documented, there is a potential that Puget Sound (PS) Chinook and/or PS steelhead are present in Penny Creek in the immediate project area. Therefore, it is possible, although unlikely, that these fish species may pass through the pipe during flood events.

The implementation of BMPs will prevent construction stormwater from leaving the construction area and impacting Wetland A or Penny Creek water quality. If groundwater or surface water is encountered during excavation, a sump pump will be installed and the pumped water will be discharged to an upland area or pumped into an aboveground tank and treated to meet State water quality standards.

The project will treat stormwater from a pollution-generating source (35th Avenue SE roadway) that is currently untreated. This is considered an overall positive effect to the water quality of Wetland A and Penny Creek.

Vegetation/Terrestrial Habitat

Approximately 239 square feet of wetland vegetation will be damaged or removed during excavation of the trenches to place the storm drain lines. In addition, a limited amount (approximately 250 square feet) of wetland vegetation will be cut/mowed to install the project flow dispersal pipes. Vegetation that will be cut/mowed includes cattails at the south stormwater outflow location, and spirea and willow at the north stormwater outflow location. After the

trenches have been backfilled with pipe bedding and then native soil placed where feasible, exposed soils and disturbed areas will be treated with native seed mix and willow stakes.

Coniferous trees were observed on the upland island west of 35th Avenue SE. Marbled murrelet are known to nest in coniferous trees with platform branches; however, the few coniferous trees observed onsite did not contain suitable marbled murrelet habitat. Marbled murrelets nest in conifer-dominated stands (minimum size of 5 acres) with old-growth characteristics (WSDOT, 2015). According to a U.S. Forest Service Fact Sheet, “the most common type of old-growth ecosystem is forest dominated by Douglas-firs and western hemlocks, generally 350 to 750 years old. The youngest old-growth forests are 200 years old, and the oldest are about 1,000 years old” (U.S. Forest Service, 2013). The lands 0.25 mile from the site and beyond are either dense residential and commercial development, or undeveloped sensitive lands that lack old-growth forest characteristics and conifer dominance in 5-acre patches.

Yellow-billed cuckoos’ nest in riparian woodlands greater than 200 acres in extent. Wetland A is large, but is less than 200 acres in extent. In addition, the vegetation clearing is limited in size, as indicated above, and will be located adjacent to an existing roadway. Therefore, it is unlikely that the project would impact the yellow-billed cuckoo or its habitat.

Indirect Impacts

Indirect effects associated with the proposed project include those impacts that can be reasonably certain to occur or are contingent on the completion of the project. No future projects are contingent on the completion of the proposed project. No indirect impacts are known.

Conservation Measures

The project has been designed to avoid and minimize adverse impacts to Wetland A and Penny Creek in the following ways:

1. Excavation and grading work in Wetland A / Penny Creek has been minimized.
2. The proposed stormwater outflows and dispersal pipes are located to minimize impacts to the extent possible. The dispersal pipes will slow stormwater flows to reduce the potential for erosion at the outflow locations.
3. The project includes providing water quality treatment of stormwater runoff from the improved road section, which will be an improvement relative to the current untreated condition.

4. Source control and runoff control BMPs such as silt fence, sand bag barriers, and/or straw wattles will be employed to prevent turbid stormwater from leaving the project area during construction.
5. Exposed soils and disturbed areas will be treated with native seed mix and/or willow stakes.
6. The project is designed to facilitate replacement of the two existing 54-inch culverts and proposed new 24-inch pipe below the roadway with a bridge in the future, thereby allowing better fish passage through the project area in the future.

Determinations

The project will have **no effect** on bull trout or their designated critical habitat because no bull trout have been documented in the action area, and no bull trout designated critical habitat is mapped in the action area.

The project **may affect, but is not likely to adversely affect** PS Chinook and PS steelhead because:

- The project construction will occur outside of the low-flow channel of Penny Creek, and will be isolated to two small areas in Wetland A adjacent to improved road embankments.
- Although unlikely, there is a potential that PS Chinook and/or PS steelhead may pass through the proposed flow-through pipe during flood events.

The project will have **no effect** on PS Chinook designated critical habitat because no critical habitat is designated in the action area. The project will **not destroy or adversely modify** proposed PS steelhead critical habitat because no proposed critical habitat is located within the project's action area.

If PS steelhead critical habitat is designated prior to completion of this project, a provisional effect determination for critical habitat is the following: the project will have **no effect** on PS steelhead critical habitat.

The USFWS BO for the Olympic National Forest program of activities (USFWS, 2013) provides distance thresholds for different categories of noise to have varying degrees of potential impact (disturbance or injury) on marbled murrelets during the nesting season (April 1 to September 23). The category of noise identified in the BO which is comparable to noise generated by the 35th Avenue SE Reconstruction Project is, "Pile-driving (steel H piles, pipe piles)." No known or likely suitable habitat, or designated critical habitat, for marbled murrelet is present within the

quarter-mile threshold area. A quarter-mile radius around the site intersects residential development, deciduous wetland complexes, and narrow mixed-forest corridors. As indicated in the BO (USFWS, 2013), a **no effect** determination is therefore appropriate for this project.

The project **may affect, but is not likely to adversely affect** yellow-billed cuckoos because although the yellow-billed cuckoo could potentially be present in the action area, proposed vegetation clearing is minimal and is located adjacent to an existing roadway.

The project will **not destroy or adversely modify** proposed yellow-billed cuckoo critical habitat because no yellow-billed cuckoo critical habitat is proposed in Washington. If yellow-billed cuckoo critical habitat is designated prior to completion of this project, a provisional effect determination for critical habitat is the following: the project will have **no effect** on yellow-billed cuckoo critical habitat.

ESSENTIAL FISH HABITAT (EFH) ANALYSIS

The Magnuson-Stevens Act mandates that the NMFS must identify EFH for federally managed marine fish. Federal agencies are required to consult with NMFS on all activities, or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect EFH. The Pacific Fishery Management Council (PFMC) has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fisheries (PFMC, 2012).

We have determined that this project will have no adverse effect on groundfish or coastal pelagic EFH, as no marine habitat exists within the project area.

Chinook, coho, and pink salmon are part of the Pacific salmon fishery. The action area is mapped as Chinook and coho salmon EFH. Fish presence in Penny Creek has been documented for coho salmon and modeled for Chinook. However, the project will occur outside of the low-flow channel of Penny Creek, and is not expected to have any effect on salmon habitat. Therefore, we have determined that this project will have no adverse effect on Pacific salmon EFH.

CLOSURE

The findings and conclusions documented in this letter have been prepared for specific application to this project, and have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area, and in accordance with the terms and conditions

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set forth in our agreement. The conclusions and recommendations presented in this letter are professional opinions based on interpretation of information currently available to us, and are made within the operational scope, budget, and schedule constraints of this project. No warranty, express or implied, is made.

Shannon & Wilson, Inc. has prepared “Important Information About Your Biological Assessment (BA)/Biological Evaluation (BE) Report,” to assist you and others in understanding the use and limitations of our reports.

If you have any questions about these recommendations, please contact me at (206) 695-6685.

Sincerely,

SHANNON & WILSON, INC.

Amy J. Summe
Senior Biologist/Permit Specialist

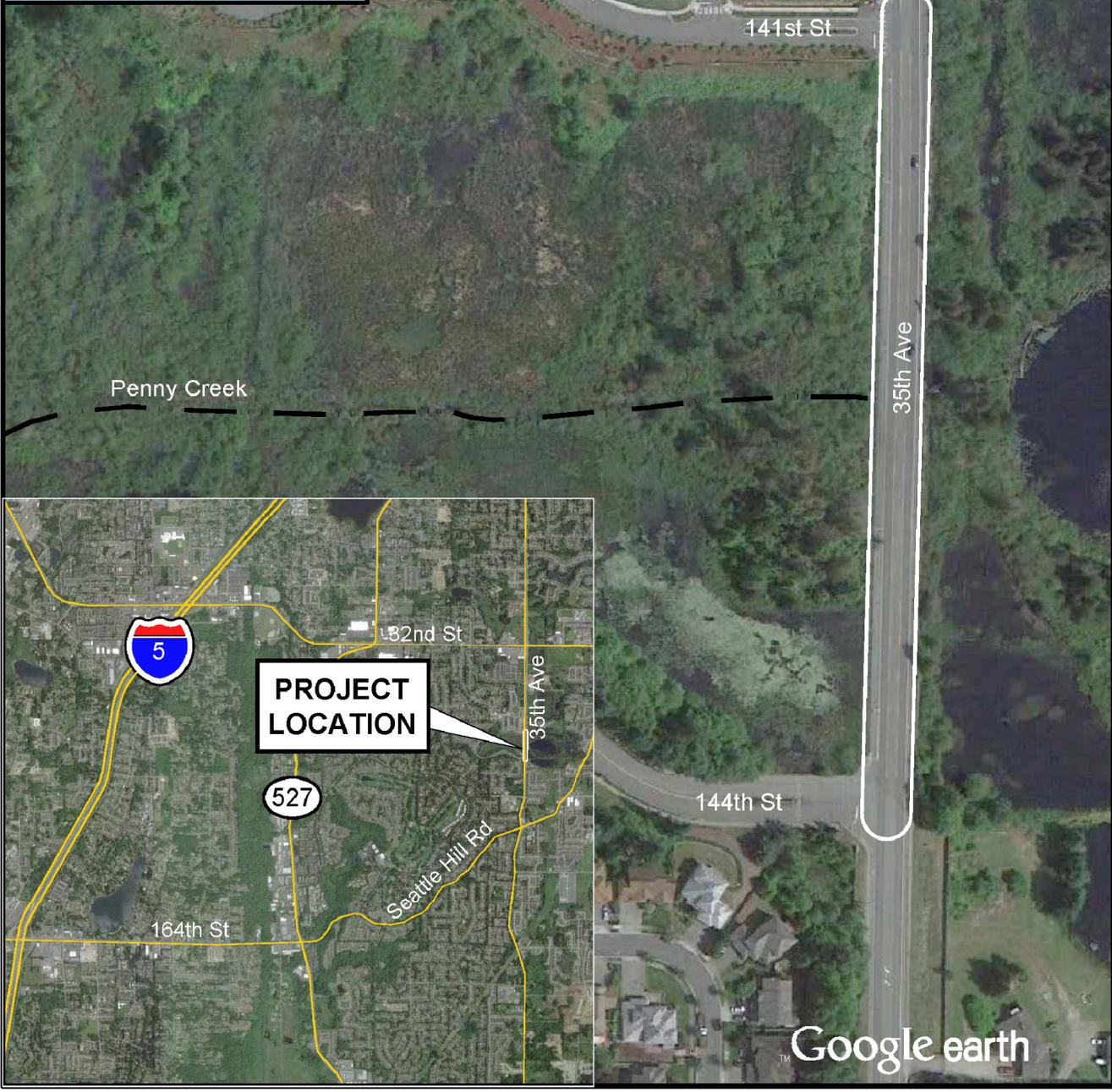
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Enc: References
Figure 1 – Vicinity Map
Figure 2 – Site Overview
Figure 3 – Proposed Culvert
Figure 4 – North Outfall
Figure 5 – South Outfall
Figure 6 – Action Area
Selected Sheets from 90 Percent Plan Set (7 pages)
Noise Analysis Calculations (2 pages)
Important Information About Your Biological Assessment (BA)/Biological Evaluation (BE) Report

REFERENCES

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available: http://www.wsdot.wa.gov/NR/rdonlyres/448B609A-A84E-4670-811B-9BC68AAD3000/0/BA_ManualChapter7.pdf.



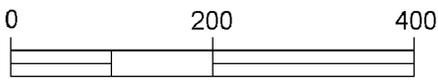
Filename: T:\Project\21-1\21948_35th_Avenue\AV_mxd\JARPA_FIG1_VICINITY.mxd Date: 8/27/2015 beo

Reference #:
Applicant: City of Mill Creek
Adjacent Property Owners:
 Multiple - see JARPA Appendix C

Lat/Long:
 47.868488 N / -122.185339 W
Date: August 2015

Proposed Project: 35th Avenue SE Reconstruction Project
In: "Wetland A" / Penny Creek
City: Mill Creek
County: Snohomish
State: Washington
SW Project No: 21-1-21948-004

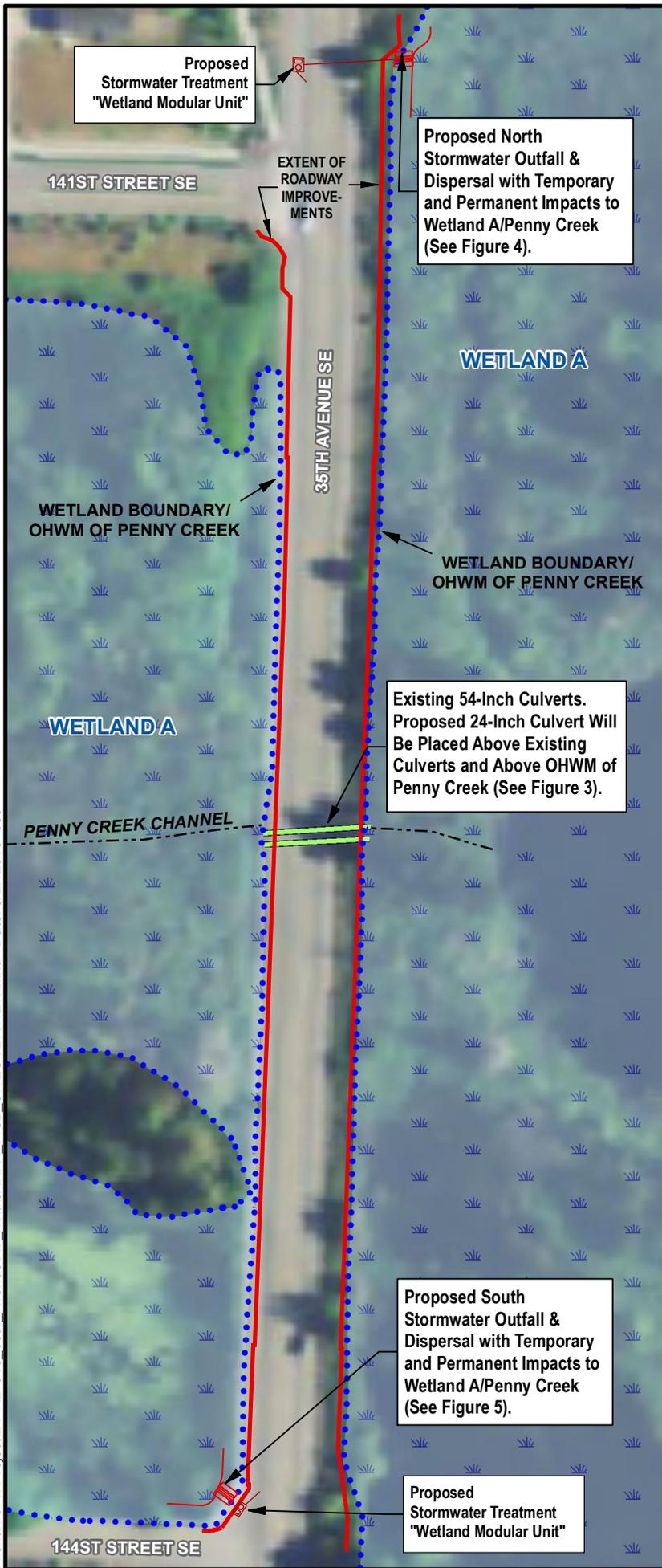
Map adapted from aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth TM Mapping Service.



Approximate Scale in Feet

VICINITY MAP	
SHANNON & WILSON, INC. <small>GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS</small>	FIG 1

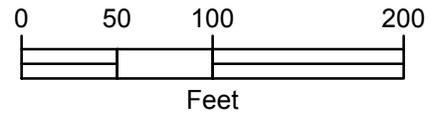
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LEGEND

- Extent of Roadway Improvements
- Wetland A and OHWM Boundary
- - - - - Penny Creek Channel Centerline

Wetland boundary and OHWM of Penny Creek were delineated along the roadway by Shannon & Wilson, Inc. on March 7, 2014. Proposed features and limits of construction are based on CAD file received from KPFF August 20 and 24, 2015.



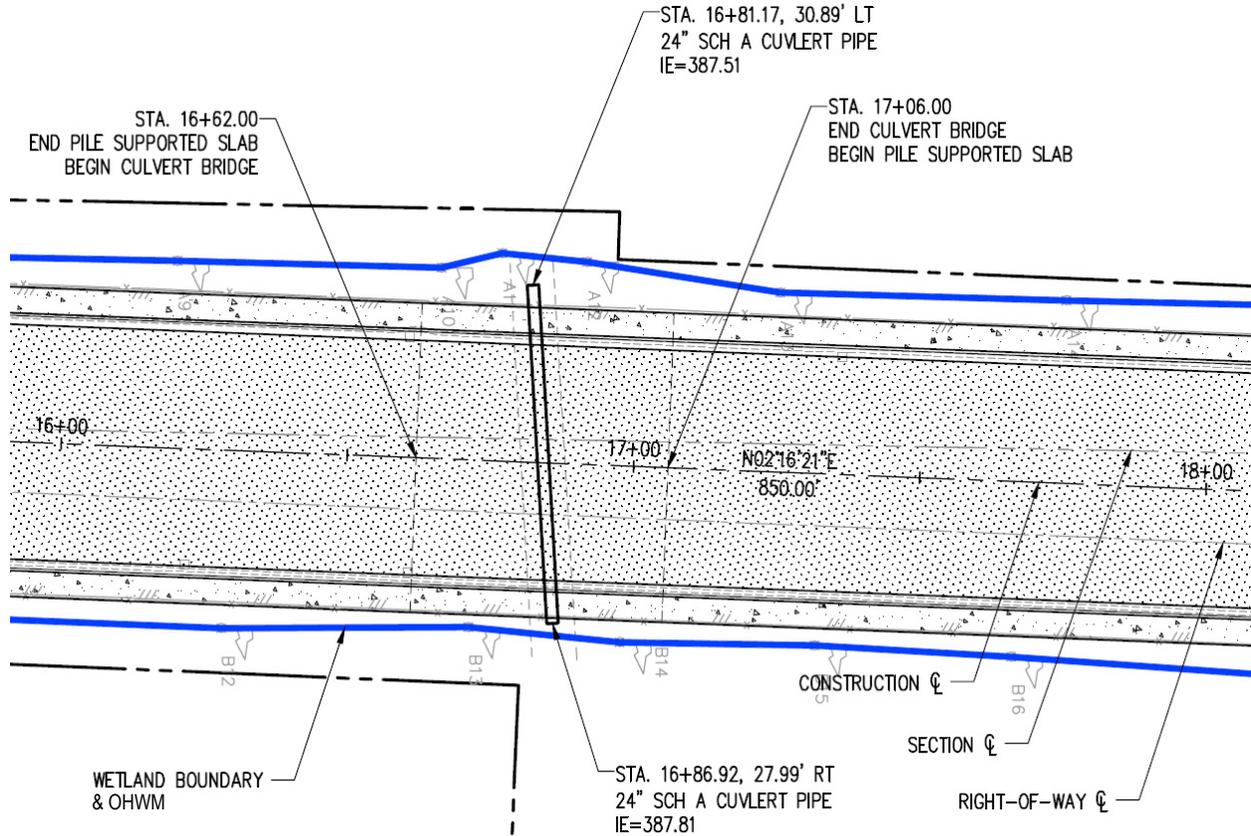
Reference #:
Applicant: City of Mill Creek
Proposed Project: 35th Avenue SE Reconstruction
In: "Wetland A" / Penny Creek
Location: Mill Creek, Washington
Date: August 2015
SW Project No: 21-1-21948-004

SITE OVERVIEW

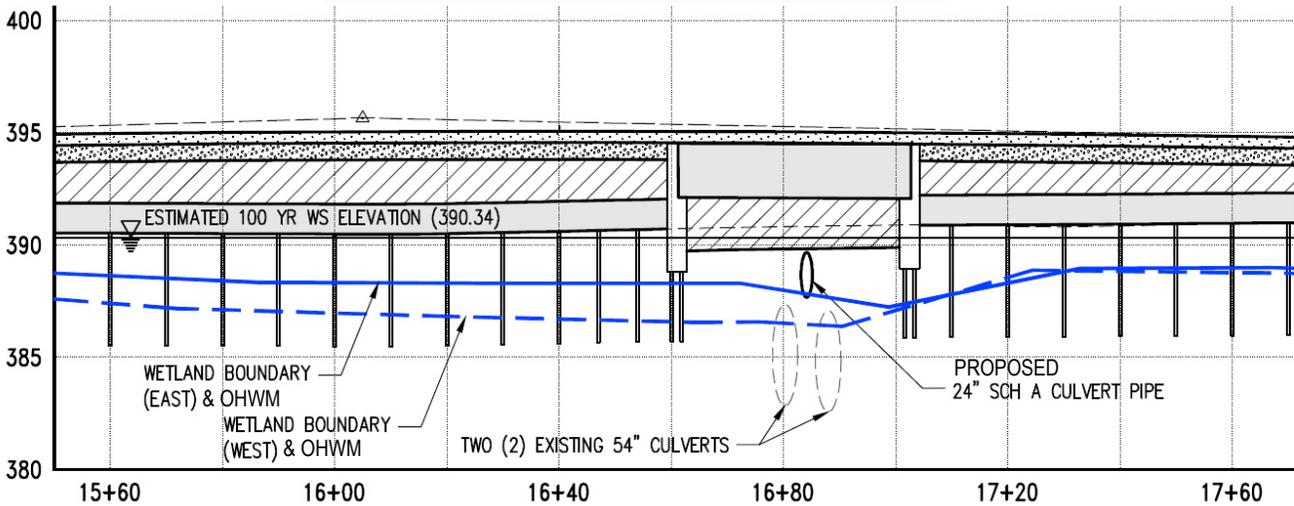
SHANNON & WILSON, INC.
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG 2

PROPOSED CULVERT OVER PENNY CREEK – PLAN VIEW



PROPOSED CULVERT OVER PENNY CREEK – PROFILE



-  FULL DEPTH HMA PAVEMENT
-  CONCRETE CLASS 4000
-  CELLULAR CONCRETE FILL
-  CRUSHED SURFACING BASE COURSE

Culvert Plan and Profile provided by KPFF on 8/24/2015.

Reference #:

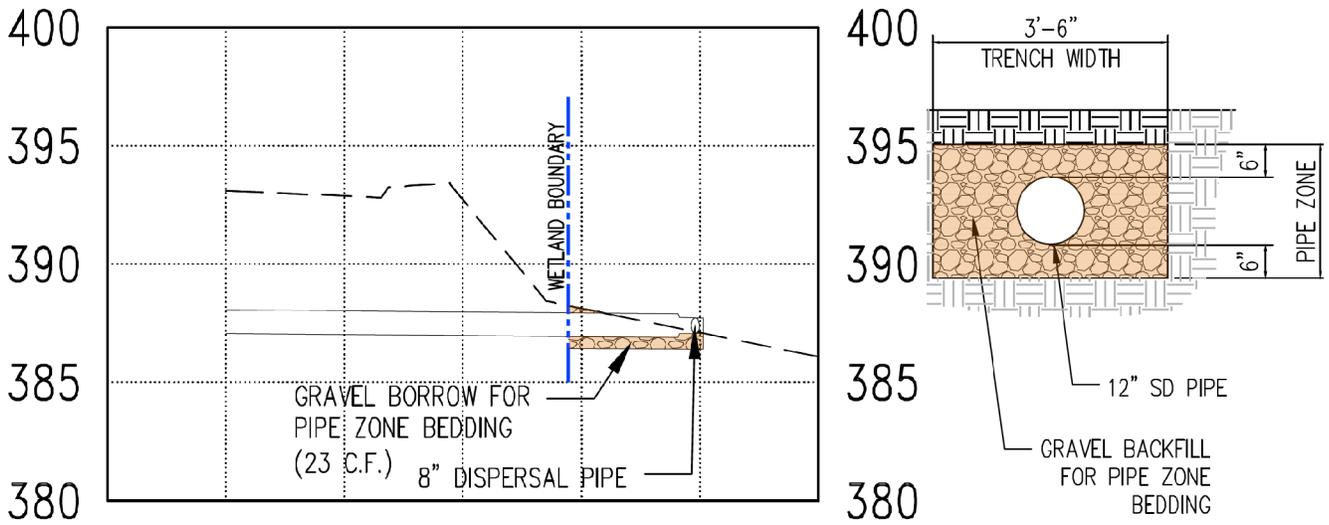
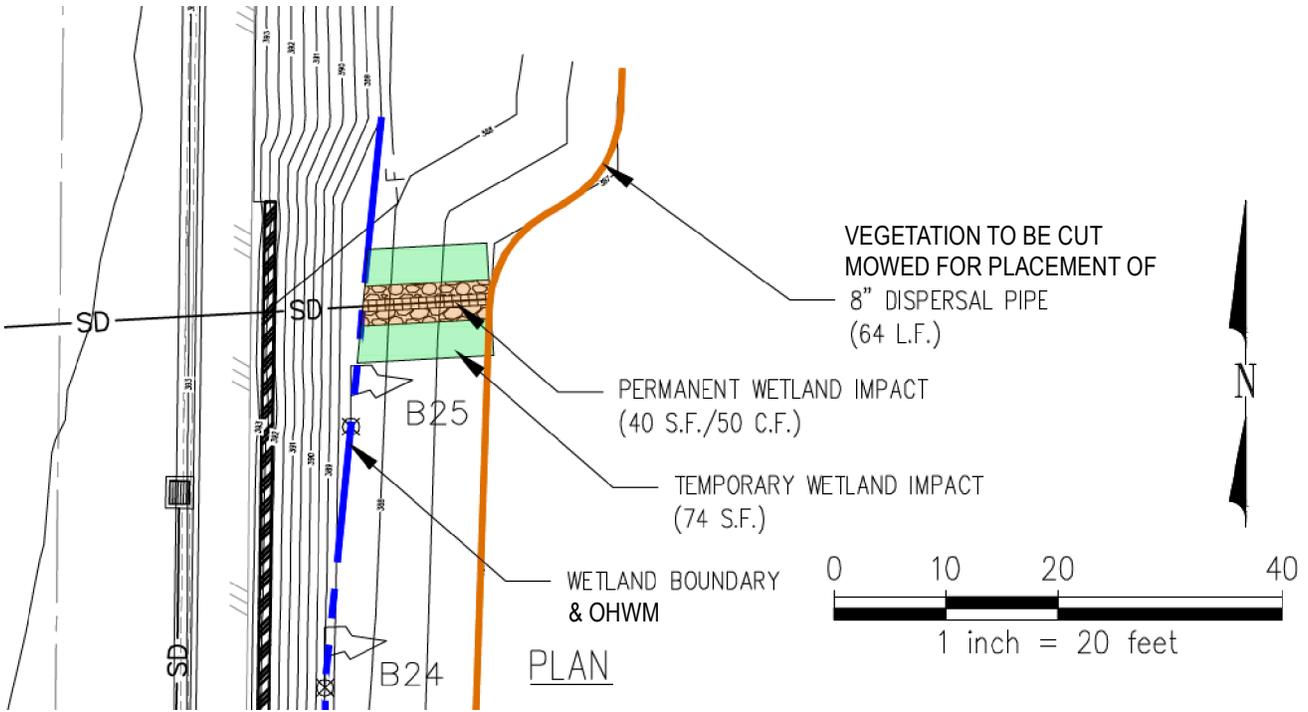
Applicant: City of Mill Creek
Proposed Project: 35th Avenue SE Reconstruction
In: "Wetland A" / Penny Creek
Location: Mill Creek, Washington
Date: August 2015
SW Project No: 21-1-21948-004

PROPOSED CULVERT

SHANNON & WILSON, INC.
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG 3

Filename: T:\Project\21-121948_35th_Avenue\AV_mxd\JARPA_FIG4_NorthOutfall.mxd Date: 8/27/2015 beo



Based on drawing provided by KPFF, dated August 4, 2015.

Reference #:

Applicant: City of Mill Creek

Proposed Project: 35th Avenue SE Reconstruction

In: "Wetland A" / Penny Creek

Location: Mill Creek, Washington

Date: August 2015

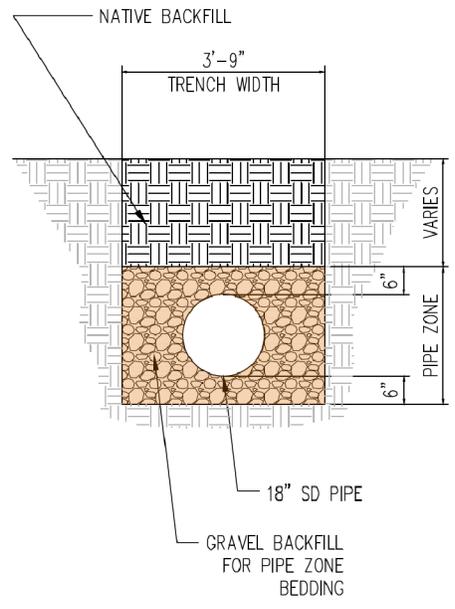
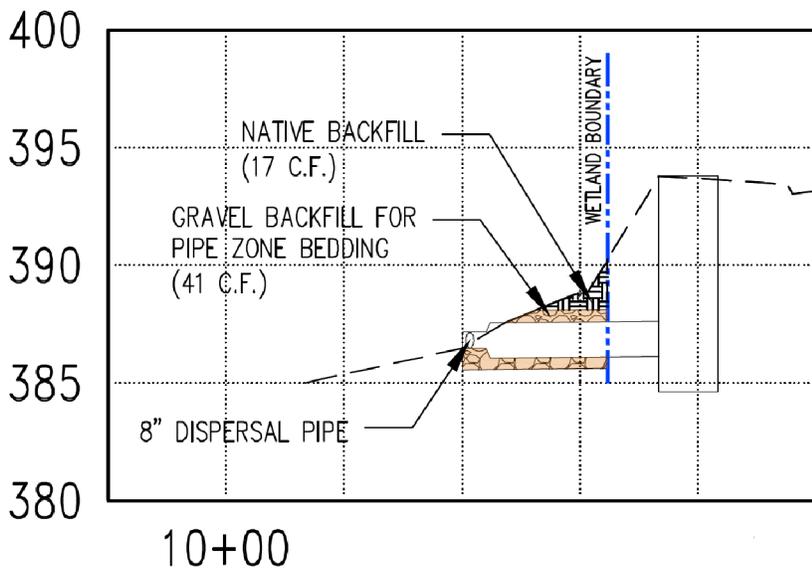
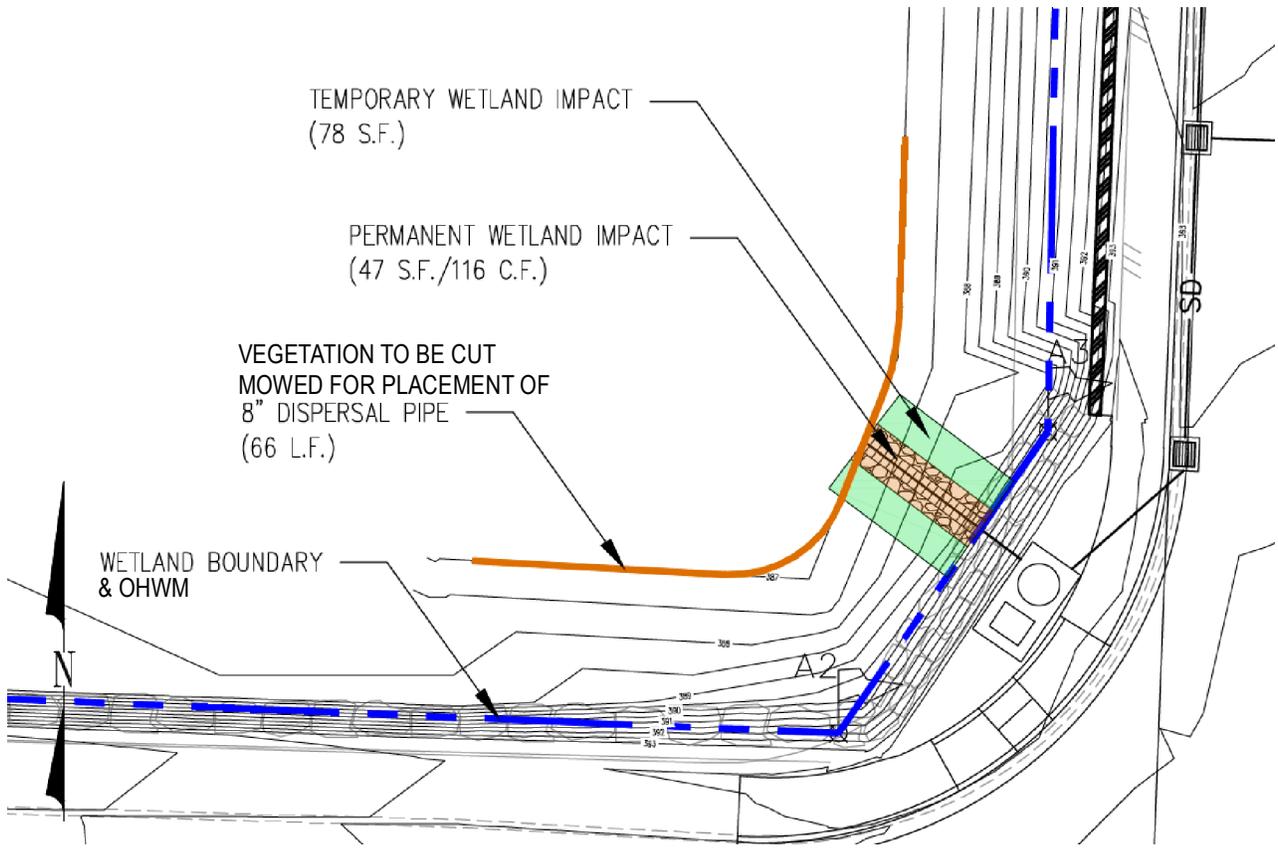
SW Project No: 21-1-21948-004

NORTH OUTFALL

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG 4

Filename: T:\Project\21-121948_35th_Avenue\AV_mxd\JARPA_FIG5_SouthOutfall.mxd Date: 8/27/2015 beo



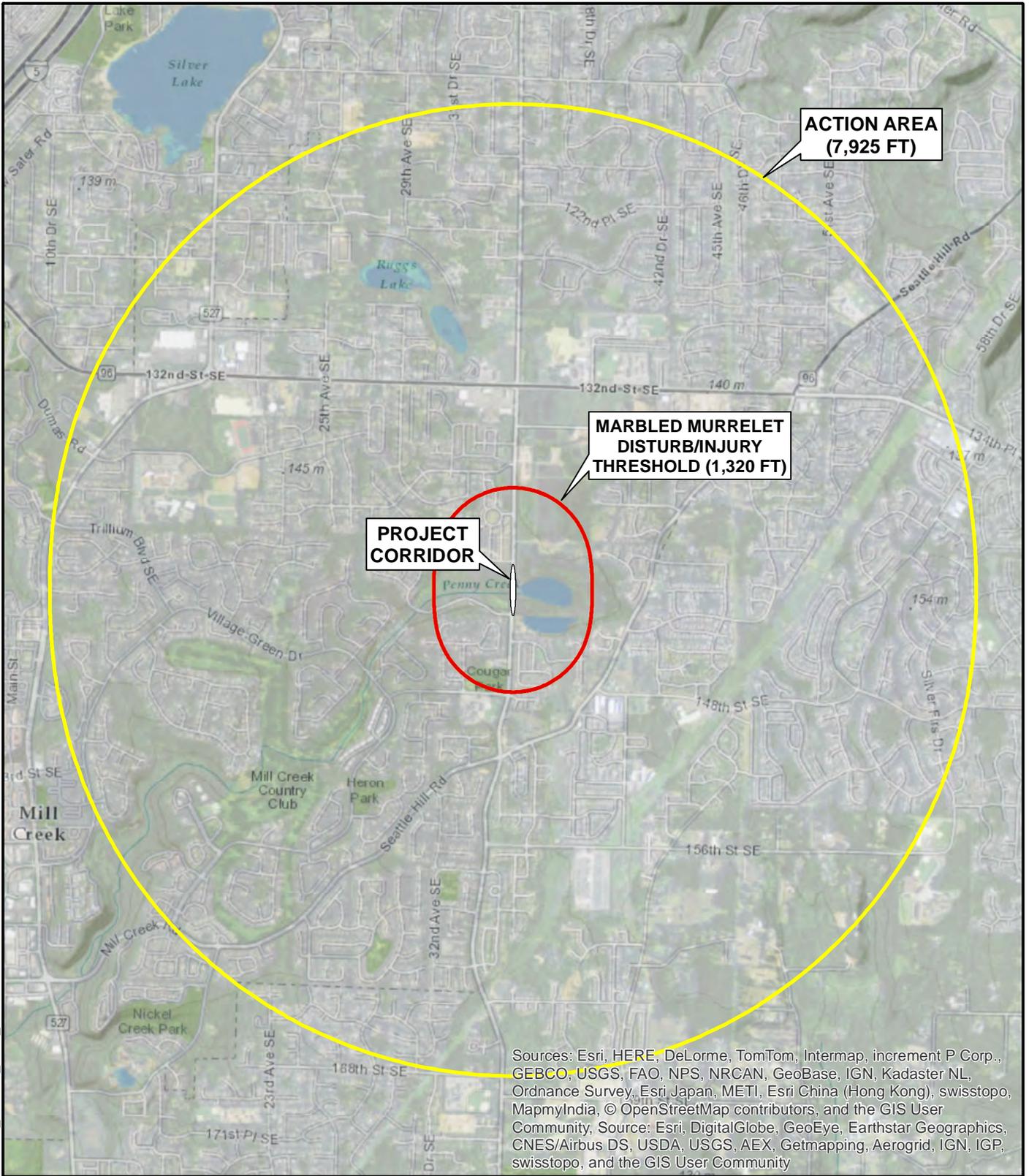
Based on drawing provided by KPFF, dated August 4, 2015.

Reference #:
Applicant: City of Mill Creek
Proposed Project: 35th Avenue SE Reconstruction
In: "Wetland A" / Penny Creek
Location: Mill Creek, Washington
Date: August 2015
SW Project No: 21-1-21948-004

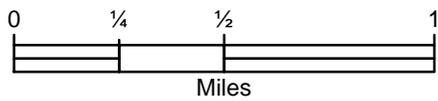
SOUTH OUTFALL

SHANNON & WILSON, INC.
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG 5



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Reference #:
Applicant: City of Mill Creek
Proposed Project: 35th Avenue SE Reconstruction
In: "Wetland A" / Penny Creek
Location: Mill Creek, Washington
Date: August 2015
SW Project No: 21-1-21948-004

ACTION AREA	
SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS	FIG 6

CITY OF MILL CREEK

35TH AVENUE SE RECONSTRUCTION

144TH STREET SE TO 141ST STREET SE

SE-S32-T28N-R5E/SW-S33-T28N-R5E
MILL CREEK, WASHINGTON

SHEET INDEX



VICINITY MAP
NTS

SHEET	DWG	DRAWING TITLE
1	CV01	COVER SHEET
2	GN01	SURVEY LEGEND, NOTES, & ALIGNMENT CONTROL
3	SP01	SITE PREPARATION PLAN
4	SP02	SITE PREPARATION PLAN
5	SP03	SITE PREPARATION PLAN
6	TE01	TEMPORARY EROSION & SEDIMENT CONTROL PLAN
7	TE02	TEMPORARY EROSION & SEDIMENT CONTROL PLAN
8	TE03	TEMPORARY EROSION & SEDIMENT CONTROL PLAN
9	RS01	ROADWAY TYPICAL SECTIONS
10	RP01	ROADWAY PLAN & PROFILE
11	RP02	ROADWAY PLAN & PROFILE
12	RP03	ROADWAY PLAN & PROFILE
13	GD01	INTERSECTION GRADING
14	CH01	CHANNELIZATION, PAVEMENT MARKING, & SIGNING PLAN
15	CH02	CHANNELIZATION, PAVEMENT MARKING, & SIGNING PLAN
16	CH03	CHANNELIZATION, PAVEMENT MARKING, & SIGNING PLAN
17	DR01	DRAINAGE PLAN
18	DR02	DRAINAGE PROFILES
19	DD01	DRAINAGE DETAILS
20	WP01	WALL ELEVATIONS
21	WP02	WALL ELEVATIONS
22	WD01	WALL DETAILS
23	DT01	DETOUR PLAN & SIGN DETAILS
24	ST01	STRUCTURAL LAYOUT & GENERAL NOTES
25	ST02	STRUCTURAL PLAN
26	ST03	STRUCTURAL PLAN
27	ST04	STRUCTURAL PLAN
28	ST05	TYPICAL STRUCTURAL SECTIONS
29	ST06	STRUCTURAL SECTIONS AND DETAILS
30	ST07	STRUCTURAL SECTIONS AND DETAILS
31	ST08	STRUCTURAL SECTIONS AND DETAILS
32	ST09	CULVERT BRIDGE FRAMING PLAN
33	ST10	26" SLAB DETAILS
34	ST11	26" SLAB SCHEDULE
35	ST12	26" SLAB TRANSVERSE TENDONS AND SHEAR KEY DETAILS
36	ST13	26" SLAB BEARING AND JOINT DETAILS
37	ST14	PEDESTRIAN BARRIER DETAILS
38	ST15	BRIDGE RAILING DETAILS
39	ST16	BRIDGE RAILING DETAILS

PRELIMINARY PLANS - 90% SUBMITTAL



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Seattle, WA 98101
206.622.5822
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APPROVED FOR CONSTRUCTION

CITY ENGINEER

DATE: 5/18/2015

SHEET

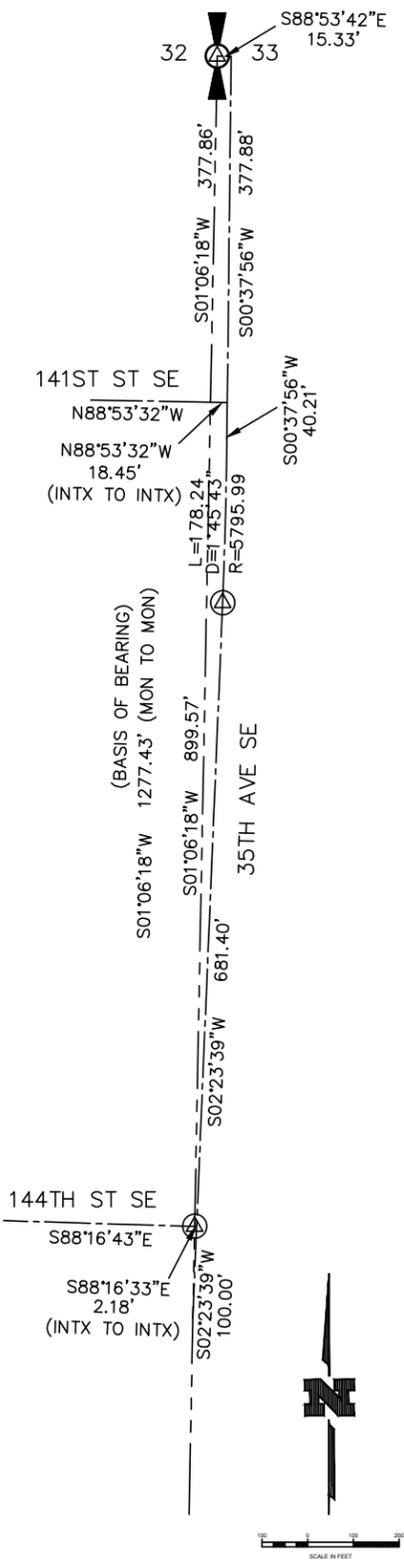
CV01

1 OF 39

Path: X:\113501-113750\113521 (35th Ave SE)\CADD\Design\35TH_CN.dwg Plot date: May 20, 2015-05:03:50pm CAD User: KenW.

SURVEY LEGEND AND ABBREVIATIONS

	PUNCH IN BRASS DISK IN CONC MONUMENT (QTR COR)	AR	ALDER
	PUNCH IN BRASS DISK IN CONC MONUMENT	AP	APPLE
	REBAR/CAP AS NOTED HEREON	AH	ASH
	MAG NAIL	AS	ASPEN
	EDGE OF GRAVEL	BI	BIRCH
	EDGE OF PAVEMENT	CY	CHESTNUT
	CONCRETE EXTRUDED CURB (UNLESS OTHERWISE NOTED)	CW	COTTONWOOD
	FENCE (AS NOTED)	DW	DOGWOOD
	TOPOGRAPHY BREAKLINE	EM	ELM
	SANITARY SEWER	HN	HAWTHORN
	STORM DRAIN	HZ	HAZELNUT
	TELECOM	LT	LOCUST
	OVERHEAD UTILITY	MP	MAPLE
	ROCKERY	OK	OAK
	HEDGE	PE	PEAR
	POWER UTILITY BOX	PM	PLUM
	CONCRETE VAULT	PR	POPLAR
	COMMUNICATION UTILITY BOX	WT	WALNUT
	UTILITY BOX	WW	WILLOW
	IRRIGATION CONTROL BOX	CE	CEDAR
	TELE-COMMUNICATION MANHOLE	CP	CYPRESS
	POWER METER	FR	DOUGLAS FIR
	TRAFFIC LIGHT UTILITY BOX	HK	HEMLOCK
	TRAFFIC SIGNAL BOX	HY	HOLLY
	TV UTILITY BOX	MD	MADRONA
	POWER TRANSFORMER	PI	PINE
	WATER METER	RW	REDWOOD
	GAS METER	SP	SPRUCE
	GAS VALVE	SQ	SEQUOIA
	UTILITY POLE	SY	SYCAMORE
	GUY ANCHOR		
	POST		
	ROAD SIGN		
	SIGN		
	PHONE BOX		
	LIGHT STANDARD		
	MAILBOX		
	CATCH BASIN		
	STORM MANHOLE		
	STORM INVERT		
	SANITARY MANHOLE		
	WATER VALVE		
	SANITARY SEWER CLEAN OUT		
	WATER WELL		
	FIRE HYDRANT		
	DECIDUOUS		
	CONIFEROUS		



CONTROL DIAGRAM

TBM TEMPORARY BENCHMARKS SET

TBM1 - CS #11112 SURVEY SPIKE IN EAST ASPHALT SIDEWALK, 100' SOUTH OF ENTRANCE TO PACIFIC TOPSOIL, 220' NORTH OF CENTERLINE 141ST ST SE. ELEV.= 393.40' NGVD '29

TBM2 - CS # 10015 SURVEY SPIKE SET IN SEAM OF CONC WALK NE QUAD INTX OF SE 35TH ST AND 146TH AVE SE 12' NORTH OF GAS VALVE. ELEV.=408.50 NGVD '29

EQUIPMENT USED

THIS SURVEY WAS PERFORMED USING A LEICA 1250 SERIES RTK-GPS ROVER AND A 1203 SERIES ROBOTIC TOTAL STATION WITH A CARLSON SURVCE ALLEGRO DATA COLLECTOR MAINTAINED IN ADJUSTMENT TO MANUFACTURERS SPECIFICATIONS AS REQUIRED BY WAC 332-130-100.

NOTES:

- 1) THIS SURVEY WAS CONDUCTED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND THEREFORE DOES NOT PURPORT TO SHOW ALL EASEMENTS OR RESTRICTIONS OF RECORD, IF ANY. RIGHT OF WAY SHOWN HEREON HAS BEEN CALCULATED FROM BEST AVAILABLE RECORD INFORMATION FIT TO FOUND LOCAL MONUMENTATION FOR DESIGN PURPOSES AND IS NOT THE RESULT OF A FULL BOUNDARY SURVEY.
- 2) WETLAND AREAS DEPICTED ON THIS TOPOGRAPHIC SURVEY WERE DELINEATED BY SHANNON AND WILSON, INC. ON MARCH 7, 2014.
- 3) UTILITY INFORMATION SHOWN HEREON REPRESENTS UTILITIES FIELD OBSERVED FROM THE SURFACE AND SURFACE PAINT MARKS DENOTING UNDERGROUND UTILITIES AS MARKED BY APS, INC. ON MARCH 13, 2014. SURVEYOR MAKES NO GUARANTEE AND DOES NOT WARRANT THAT UTILITIES SHOWN HEREON COMPRISE ALL UTILITIES THAT MAY EXIST OR THAT UTILITIES EXIST IN THE EXACT LOCATIONS SHOWN.
- 4) FIELD SURVEY WAS CONDUCTED BETWEEN MARCH 12 AND MARCH 26, 2014, WITH A FINAL FIELD VISIT ON APRIL 14, 2014.
- 5) PORTIONS OF THIS SURVEY INCORPORATING FIELD RUN TRAVERSE HAVE FINAL RESULTS MEETING OR EXCEEDING THE CURRENT TRAVERSE STANDARDS CONTAINED IN W.A.C. 332-130. THE PRECISION RATIO FOR THIS SURVEY MEETS OR EXCEEDS 1: 5,000 MINIMUM FOR RESIDENTIAL CLASSIFICATION PER WAC 332-130-090-1 (B).

REFERENCES:

- (R1) RECORD OF SURVEY, RECORDING NO. 9110255002
 - (R2) PLAT OF "ESTATES AT THOMAS LAKE", RECORDING NO. 200707115112
 - (R3) MILL CREEK SHORT PLAT SP 11-12
 - (R4) THE MEADOWS, A CONDOMINIUM, RECORDING NO. 200503115213
 - (R5) PLAT OF RHOD-A-ZALEA GARDENS DIV. 1, RECORDING NO. 9407135002
 - (R6) PLAT OF MILL CREEK EAST DIV. 1, RECORDING NO. 200609015004
 - (R7) PLAT OF MILL CREEK EAST DIV. 2, RECORDING NO. 200612145190
 - (R8) AGREEMENT, RECORDING NO. 20020425087
 - (R9) STATUTORY WARRANTY DEED, RECORDING NO. 200012280181
- ALL RECORDS OF SNOHOMISH COUNTY, WASHINGTON



DATUM

VERTICAL: NGVD '29 PER BENCHMARK INFORMATION PROVIDED BY CITY OF MILL CREEK, AND CONVERSION OF SNOHOMISH COUNTY AND WSDOT NAVD '88 BENCHMARKS DERIVED VIA DIFFERENTIAL LEVELING, TRIG LEVELING AND GPS OBSERVATIONS.

HORIZONTAL: NAD 83/91, WASHINGTON NORTH ZONE PER WSDOT, GSOW, AND COUNTY CONTROL DATA SHEETS. SEE CONTROL DIAGRAM HEREON

BASIS OF BEARING:

THE BEARING OF NORTH 01°06'18" EAST ALONG THE EAST LINE OF THE SOUTHWEST QUARTER OF SECTION 32 BETWEEN MONUMENTS FOUND AS SHOWN HEREON.

PRELIMINARY PLANS - 90% SUBMITTAL

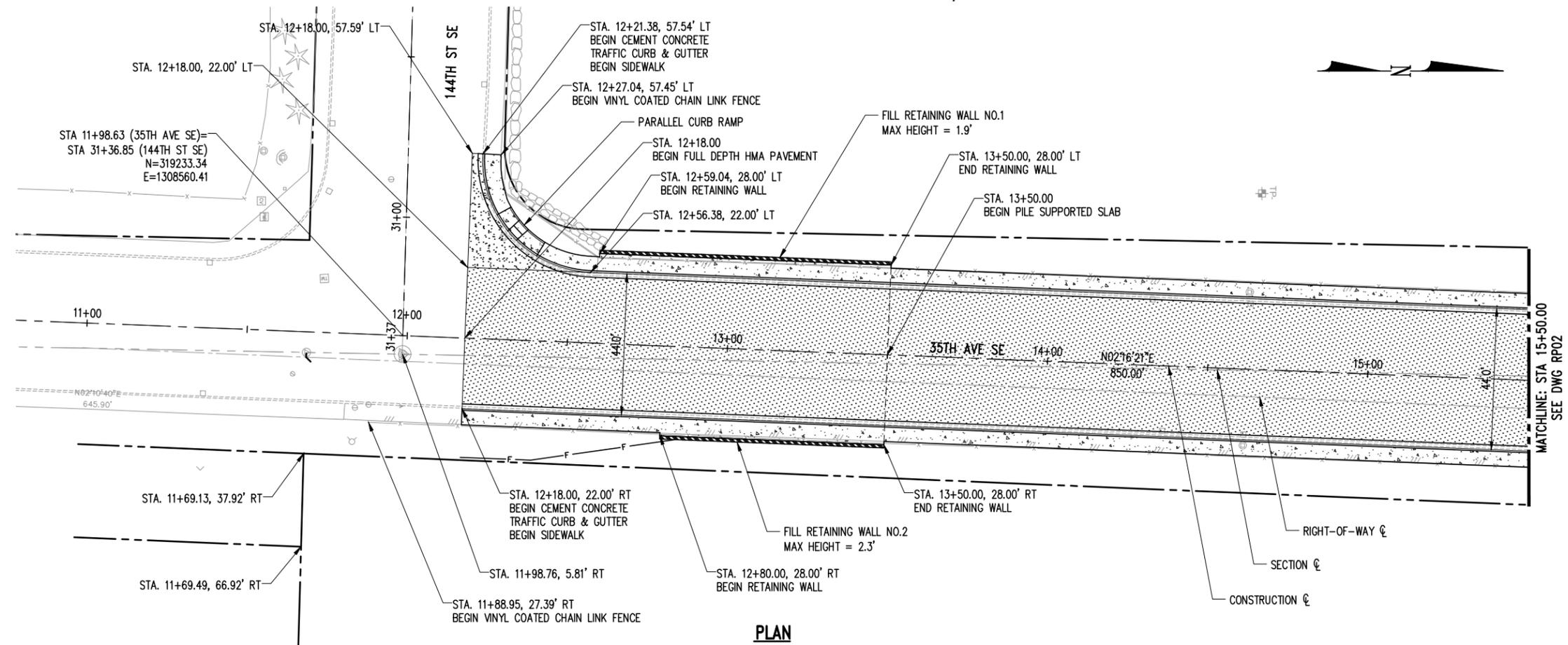
NO.	DATE	BY	CHD.	APPR.	REVISION

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CHECKED BY P. SLOAN	APPROVED BY R. LEIMKUEHLER
DATE 5/18/2015	
J O B No. :113521	

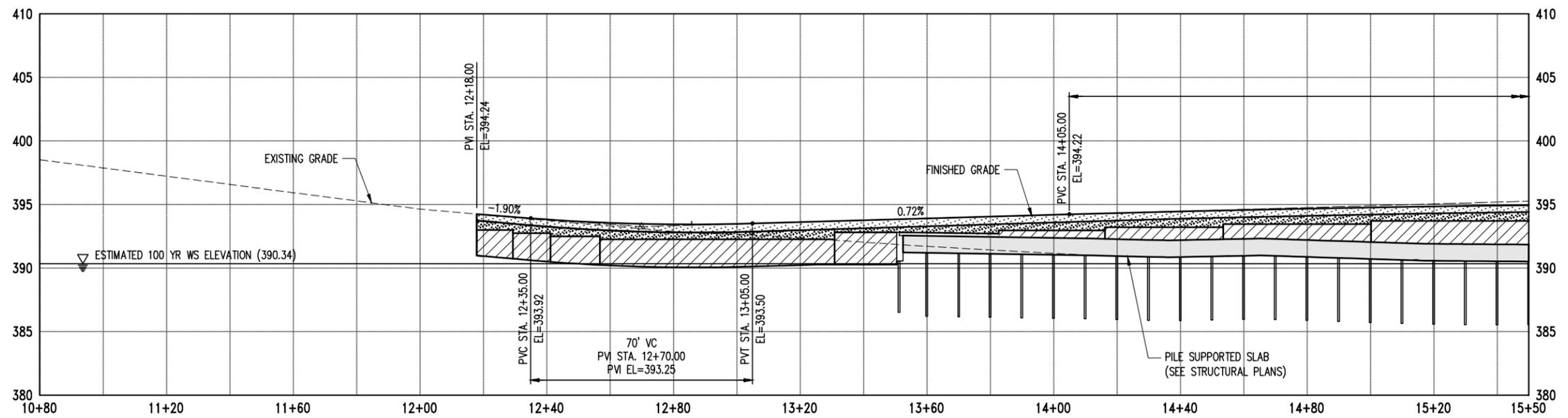
SCALE: NTS

CITY OF
MillCreek
WASHINGTON

35TH AVENUE SE RECONSTRUCTION / CITY OF MILL CREEK MILL CREEK, WASHINGTON		SHEET
SURVEY LEGEND, NOTES, & ALIGNMENT CONTROL		GN01
		2 OF 39



PLAN



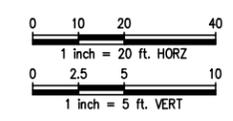
PROFILE

LEGEND:

- CONCRETE SIDEWALK
- HMA PLANING AND OVERLAY
- FULL DEPTH HMA PAVEMENT
- CONCRETE CLASS 4000
- CELLULAR CONCRETE FILL
- CRUSHED SURFACING BASE COURSE
- RIGHT-OF-WAY
- CEMENT CONCRETE CURB & GUTTER
- RETAINING WALL

ABBREVIATIONS

- EL ELEVATION
- HMA HOT MIX ASPHALT
- PI POINT OF INTERSECTION
- PVC POINT OF VERTICAL CURVE
- PVI POINT OF VERTICAL INTERSECTION
- PVT POINT OF VERTICAL TANGENCY
- VC VERTICAL CURVE
- WS WATER SURFACE



Path: X:\113501-113750\113521 (35th Ave SE)\CADD\Design\35TH_RP.dwg Plot date: May 20, 2015-05:04:27pm CAD User: KenW.

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K. WEBBER

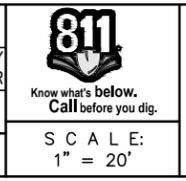
DESIGNED BY
J. GOODMAN

CHECKED BY
P. SLOAN

APPROVED BY
R. LEIMKUHNER

DATE
5/18/2015

J O B No. :113521



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MILL CREEK, WASHINGTON

ROADWAY PLAN & PROFILE
STA 11+00 TO STA 15+50

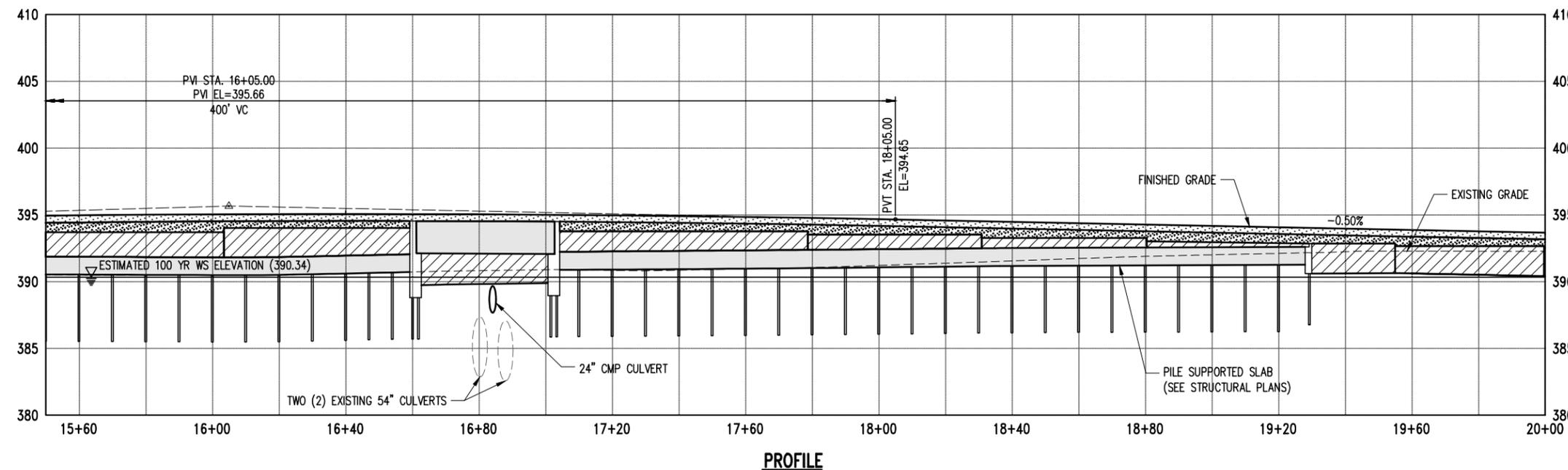
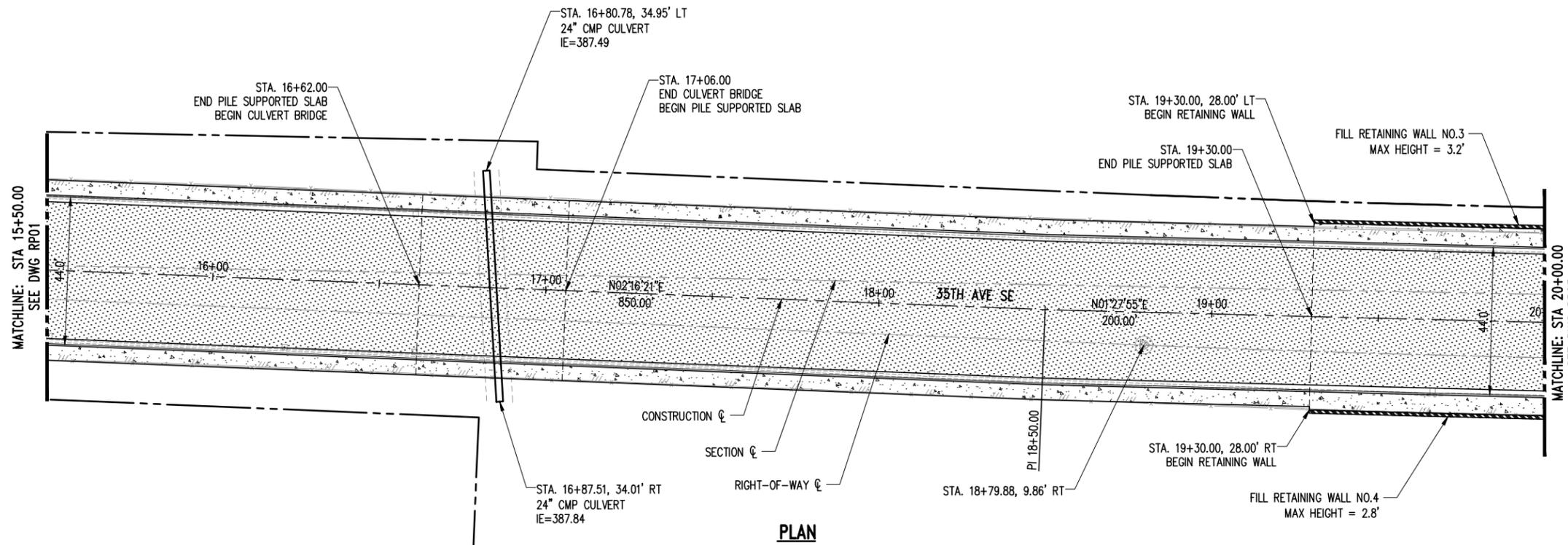
SHEET
RP01
10 OF 39

PRELIMINARY PLANS - 90% SUBMITTAL



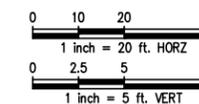
LEGEND:

-  CONCRETE SIDEWALK
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-  FULL DEPTH HMA PAVEMENT
-  CONCRETE CLASS 4000
-  CELLULAR CONCRETE FILL
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PRELIMINARY PLANS - 90% SUBMITTAL

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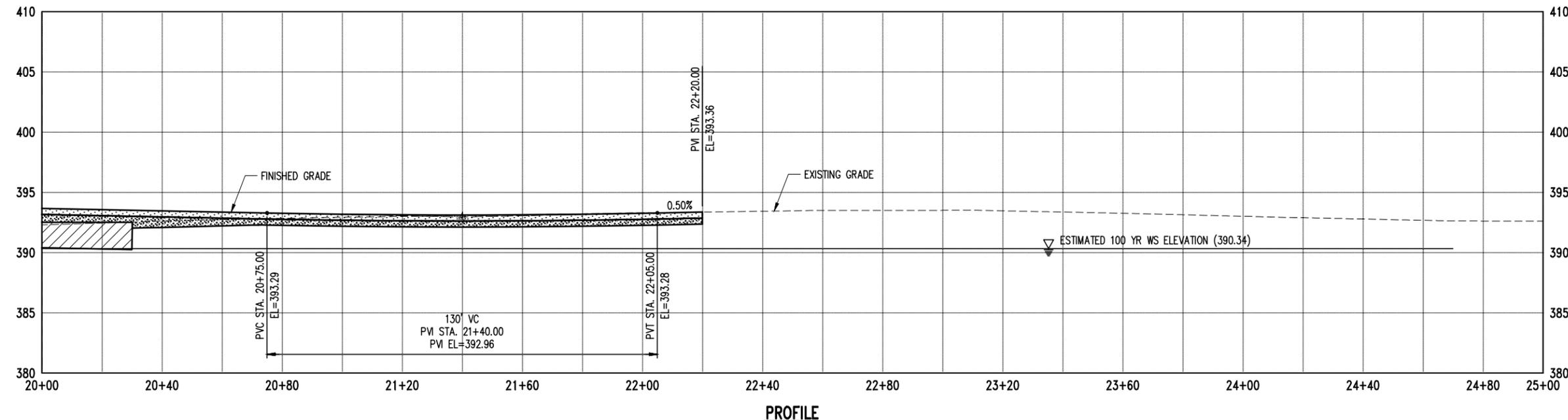
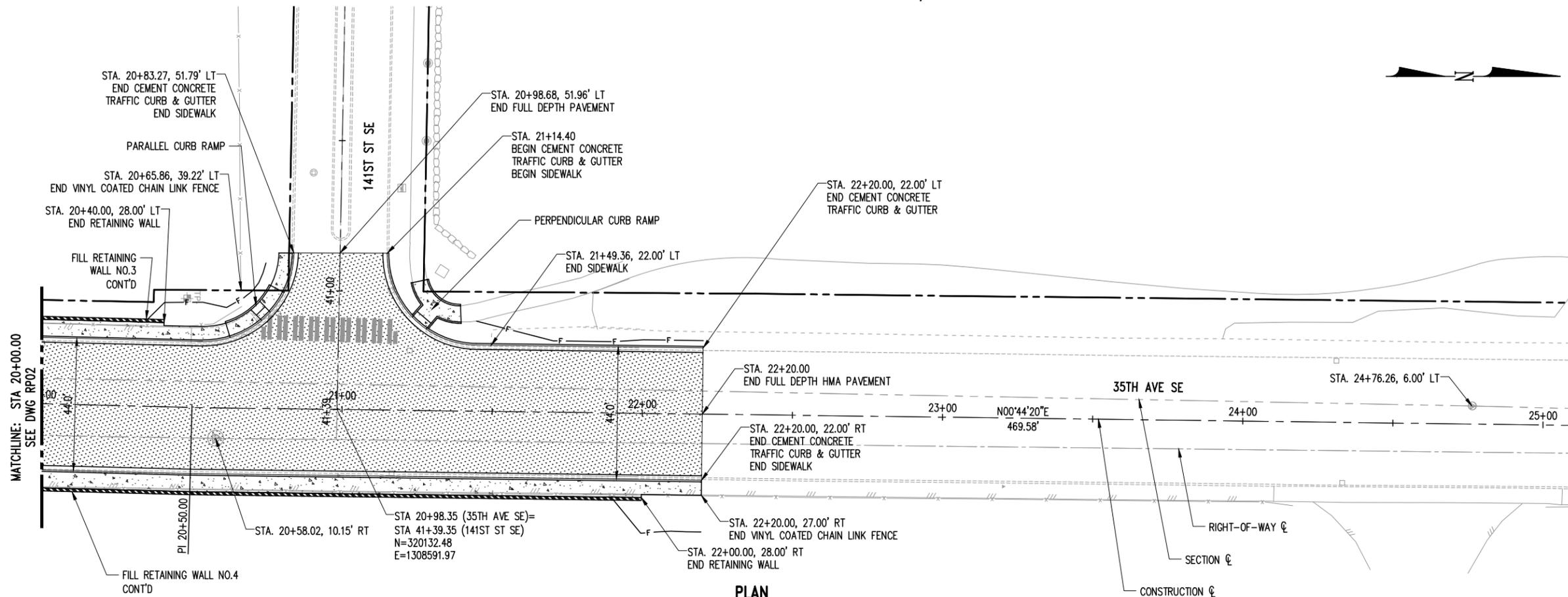
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35TH AVENUE SE RECONSTRUCTION / CITY OF MILL CREEK
MILL CREEK, WASHINGTON

ROADWAY PLAN & PROFILE
STA 15+50 TO STA 20+00

SHEET
RP02
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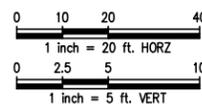


LEGEND:

- CONCRETE SIDEWALK
- HMA PLANING AND OVERLAY
- FULL DEPTH HMA PAVEMENT
- CONCRETE CLASS 4000
- CELLULAR CONCRETE FILL
- CRUSHED SURFACING BASE COURSE
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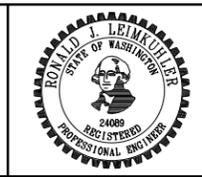
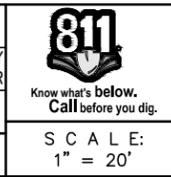


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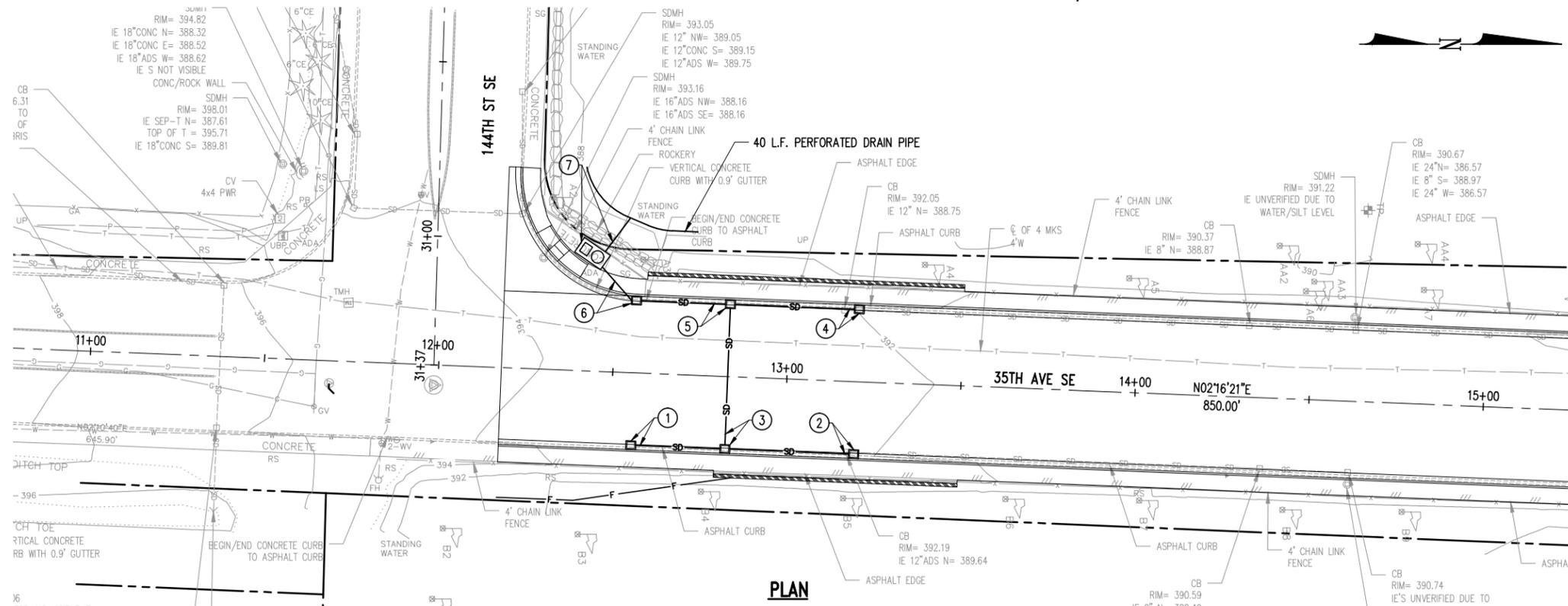
DRAWN BY K. WEBBER
 DESIGNED BY J. GOODMAN
 CHECKED BY P. SLOAN
 APPROVED BY R. LEIMKUEHLER
 DATE 5/18/2015
 J O B No. :113521



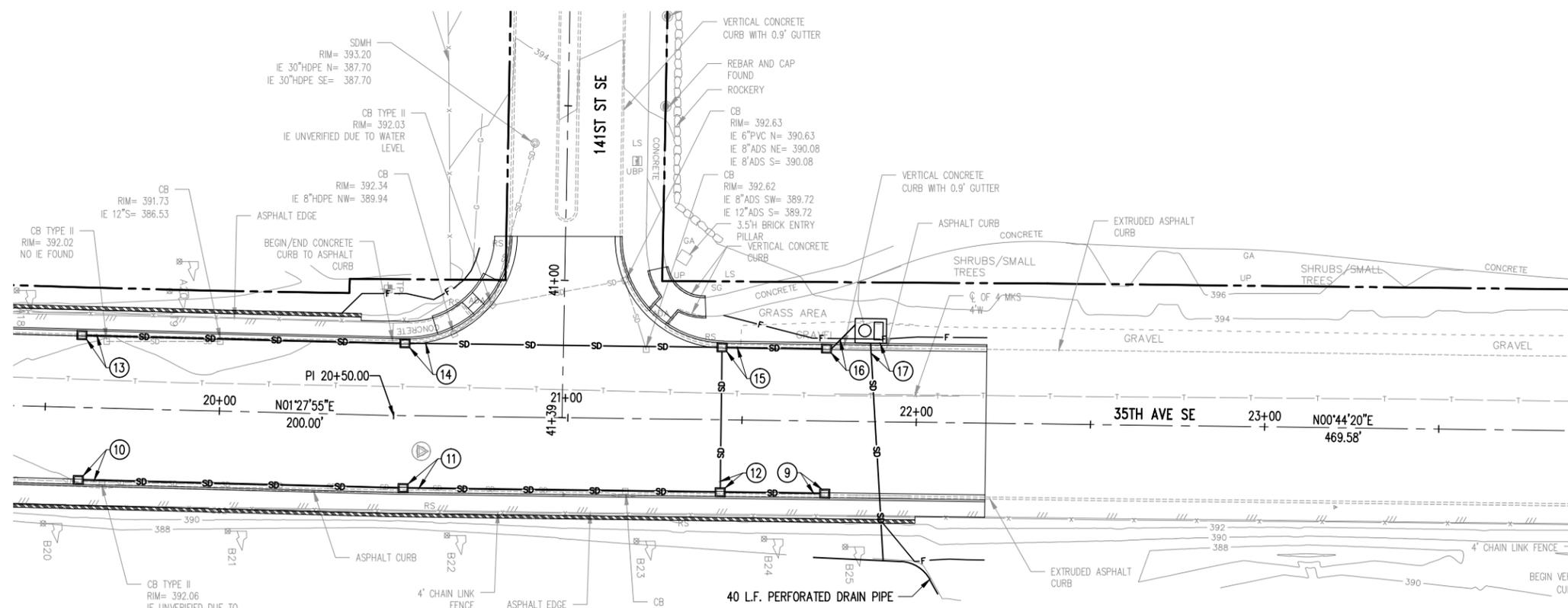
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 MILL CREEK, WASHINGTON
ROADWAY PLAN & PROFILE
 STA 20+00 TO STA 25+00

SHEET
RP03
 12 OF 39

- LEGEND:**
- RIGHT-OF-WAY
 - SD STORM DRAIN
 - CATCH BASIN TYPE I
 - MODULAR WETLAND UNIT

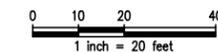


PLAN



PLAN

- ABBREVIATIONS**
- CB CATCH BASIN
 - IE INVERT ELEVATION
 - SCH SCHEDULE
 - SSP STORM SEWER PIPE
 - LF LINEAR FEET



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J. GOODMAN

CHECKED BY
P. SLOAN

APPROVED BY
R. LEIMKUHNER

DATE
5/18/2015

J O B No. :113521

SCALE:
1" = 20'

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35TH AVENUE SE RECONSTRUCTION / CITY OF MILL CREEK
MILL CREEK, WASHINGTON

DRAINAGE PLAN

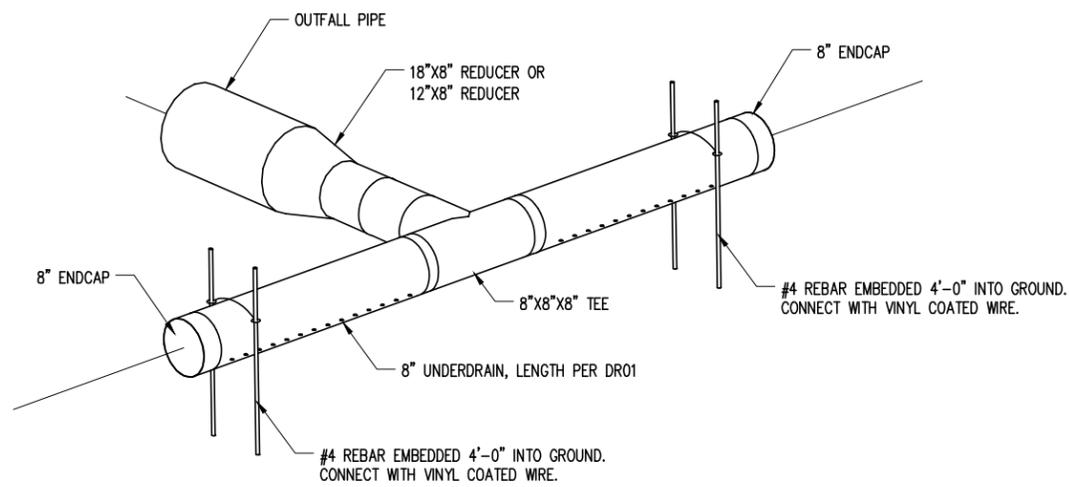
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DR01

17 OF 39

PRELIMINARY PLANS - 90% SUBMITTAL

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FLOW DISPERSION PIPE
NTS

PRELIMINARY PLANS - 90% SUBMITTAL

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STATE OF WASHINGTON
24089
REGISTERED PROFESSIONAL ENGINEER

35TH AVENUE SE RECONSTRUCTION / CITY OF MILL CREEK
MILL CREEK, WASHINGTON

DRAINAGE DETAILS

SHEET
DD01
19 OF 39

Noise Analysis Calculations

Biological Assessment for the 35th Avenue SE Reconstruction Project, Mill Creek, Washington

Construction In-Air Noise

Equipment	Average Lmax at 50 ft
Impact Pile Driver	110
Concrete Saw	90
Compactor (ground)	83
Vacuum Street Sweeper	82
Crane	81
Excavator	81
Pumps	81
Drum Mixer	80
Roller	80
Concrete Mixer Truck	79
Front End Loader	79
Backhoe	78
Paver	77
Dump Truck	76
Pickup Truck	75
Flat Bed Truck	74
Generator	73
Welder / Torch	74
Combined Lmax:	110

Baseline Noise

Background Environment	dBA
U.S. Census Bureau	55

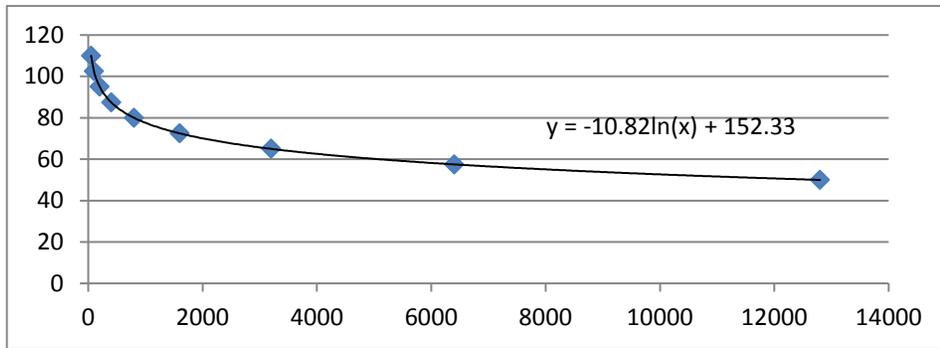
Attenuation rate for soft site (farmland and forest) 7.5 dBA

Distance from Construction	Construction Noise	Background Noise
50	110	55
100	102.5	55
200	95	55
400	87.5	55
800	80	55
1600	72.5	55
3200	65	55
6400	57.5	55
12800	50	55

Trendline equation: $y = -10.82 \ln(x) + 152.33$

Noise Analysis Calculations

Biological Assessment for the 35th Avenue SE Reconstruction Project, Mill Creek, Washington



Distance at which construction noise equals 55 dBA: 7,925

Note: Noise calculations were completed based on information provided within WSDOT's Biological Assessment Preparation for Transportation Projects, Advanced Training Manual Version 02-2015, Part 2, Section 7, Noise Impact Assessment (WSDOT, 2015). Background noise assumes City of Mill Creek population density of 3,907 people per square mile based on the 2010 U.S. census (U.S. Census Bureau, 2015).



Date: August 31, 2015
To: Mr. Scott Smith
City of Mill Creek

IMPORTANT INFORMATION ABOUT YOUR BIOLOGICAL ASSESSMENT (BA)/BIOLOGICAL EVALUATION (BE) REPORT

A BA OR BE IS BASED ON PROJECT-SPECIFIC FACTORS.

BA's and BE's are based on a unique set of project-specific factors. These typically include the specific location of the project, the general nature of the project, and the property involved, its size, and its configuration; historical use and practice; the location of the project on the site and its orientation; and the level of additional risk the client assumed by virtue of limitations imposed upon the study. The jurisdiction over Threatened and Endangered (T&E) species is shared between the National Marine Fisheries Service (NMFS) and the U.S. Department of Fish and Wildlife Service (USFWS). As a result, one or more agencies will have jurisdiction over a particular aspect of your project with sometimes confusing regulations. It is necessary to involve a consultant who understands which agency(s) has jurisdiction over each species and what the agency(s) requirements are for that species. To help reduce or avoid potential costly problems, have the consultant determine how any factors or regulations (which can change subsequent to the report) may affect the recommendations.

Unless your consultant indicates otherwise, your report should not be used:

- ▶ If the size or configuration of the proposed project is altered.
- ▶ If the location or orientation of the proposed project is modified.
- ▶ If there is a change of ownership.
- ▶ For application to an adjacent site.
- ▶ For construction at an adjacent site or on site.
- ▶ Following floods, earthquakes, or other acts of nature.

Fisheries consultants cannot accept responsibility for problems that may develop if they are not consulted after factors considered in their reports have changed. Therefore, it is incumbent upon you to notify your consultant of any factors that may have changed prior to submission of our final report.

Determining the effects of projects on T&E species (called "determinations of effect") made by Shannon & Wilson are considered preliminary until determinations are agreed to by the appropriate agencies. Written concurrence with the determination of effect must be received from either NMFS or the USFWS. Only these agencies can provide this concurrence.

"DETERMINATIONS OF EFFECT" ARE PROFESSIONAL OPINIONS.

Site investigations identify habitat conditions at only those points where investigations are performed and when they are performed, but the physical means of obtaining data preclude the determination of precise conditions. Consequently, the information obtained is intended to be sufficiently accurate for determining project impacts, but is subject to interpretation. Additionally, data derived through sampling are extrapolated by the consultant who then renders an opinion about overall conditions, the likely reaction to proposed construction activity, and/or appropriate design. Even under optimal circumstances, actual conditions may differ from those thought to exist because no consultant, no matter how qualified, and no investigative program, no matter how comprehensive, can reveal what is hidden by earth, rock, and time. Nothing can be done to prevent the unanticipated, but steps can be taken to help reduce their impacts. For this reason, most experienced owners retain their consultants through the construction stage to identify variances, to conduct additional evaluations that may be needed, and to recommend solutions to problems encountered on site.

NATURAL CONDITIONS CAN CHANGE.

Since natural systems are dynamic systems affected by both natural processes and human activities, changes in conditions may be expected. Therefore, BA's and BE's cannot remain valid for an indefinite period of time. For example, a U.S. Army Corps of Engineers' permit is valid for only two years. If a period of years have passed since the BA or BE was completed, the owner is advised to have the consultant reexamine the conditions to assess if the determinations are still accurate.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or water fluctuations may also affect conditions and, thus, the continuing adequacy of the BA or BE. The consultant should be kept apprised of any such events and should be consulted to determine if additional evaluation is necessary.

THE BA OR BE IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when plans are developed based on misinterpretation of a BA or BE. To help avoid these problems, the consultant should be retained to work with other appropriate professionals to explain relevant ecological, geological, and other findings, and to review the adequacy of plans and specifications relative to these issues.

DATA FORMS SHOULD NOT BE SEPARATED FROM THE BA OR BE.

If data forms are part of the assessment or evaluation, then the final data forms are developed by the consultant based on interpretation of field sheets (assembled by site personnel); only final data forms customarily are included. These data forms should not, under any circumstances, be drawn for inclusion in other drawings because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to reduce the possibility of misinterpreting the forms. When this occurs, delays, disputes, and unanticipated costs are frequently the result.

To reduce the likelihood of data form misinterpretation, contractors, engineers, and planners should be given ready access to the complete BA or BE. Those who do not provide such access may proceed under the mistaken impression that simply disclaiming responsibility for the accuracy of information always insulates them from attendant liability. Providing the best available information to contractors, engineers, and planners helps prevent costly problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because a BA or BE 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 written transmittals. These are not exculpatory clauses designed to foist the consultant's liabilities onto someone else; 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 BA or BE, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

THERE MAY BE OTHER STEPS YOU CAN TAKE TO REDUCE RISK.

Your consultant will be pleased to discuss other techniques or designs that can be employed to mitigate the risk of delays and to provide a variety of alternatives that may be beneficial to your project.

Contact your consultant for further information.