East Gateway Urban Village
Infrastructure Schematic Design Report

December 2012

Mill Creek
WASHINGTON

Prepared by

Reid Middleton
1953 – 2013

728 134th Street SW, Suite 200
Everett, WA 98204
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File No. 212012.005

Executive Summary

This report builds on the November 2010 Preliminary Engineering Design Study for the Mill Creek East Gateway Urban Village (EGUV). The objectives of this report are to advance infrastructure design to a point where more-reliable costs can be estimated and to update the earlier traffic study to address traffic impacts of changed conditions and provide regulatory mandates for addressing those impacts.

The extent of infrastructure considered in this report is substantially reduced from that considered in the 2010 study. For reasons more fully detailed in the introduction, all portions of the EGUV lying east of the Advent Lutheran Church have been dropped from consideration, as has the Penny Creek Partners property at the west end of the original EGUV site except for a small portion of property along the Penny Creek Partners east boundary required for a roadway connection to SR 96.

This report includes drawings in Appendix A for road, stormwater management, sanitary sewer, and water plans advanced to an approximate 30% complete design state. A schematic drawing showing the routing of a combined utility trench for power and communications is also included. Included in Appendix E is an update to the 2010 traffic study report that addresses the traffic impacts of current land use proposals and provides for regulatory mandates to address those impacts.

As mentioned, one of the primary objectives of this report is to provide an opinion of probable construction costs for the project (OPCC). An additional element of the OPCC is to determine the approximate proportioned cost to each landowner served by the infrastructure shown. The following table provides those costs and notes a number of caveats regarding how the costs are calculated.

Parcel	Pro-Rated Detention Cost	Joint Utilities	Road, Sewer, Storm, Water	Subtotal[1]
Advent Lutheran Church	$ 750,452	$ 56,100	$ 555,148	$ 1,361,700
132nd Street LLC	$ 585,572	$ 38,700	$ 459,928	$ 1,084,200
Rim/Kim	$ 722,854	$ 22,600	$ 271,846	$ 1,017,300
Mollgaard	$ 1,408,557	$ 69,800	$ 585,443	$ 2,063,800
Penny Creek	$ 70,410	$ 27,900	$ 211,490	$ 309,800

[1]Costs are subtotals before Contingencies, Contractor General Conditions and O&P, Design Fees, and Right-of-way costs.

City of Mill Creek
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The engineering material and data contained in this report were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.

Jeffrey D. Jenks, P.E.
Project Engineer

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Introduction

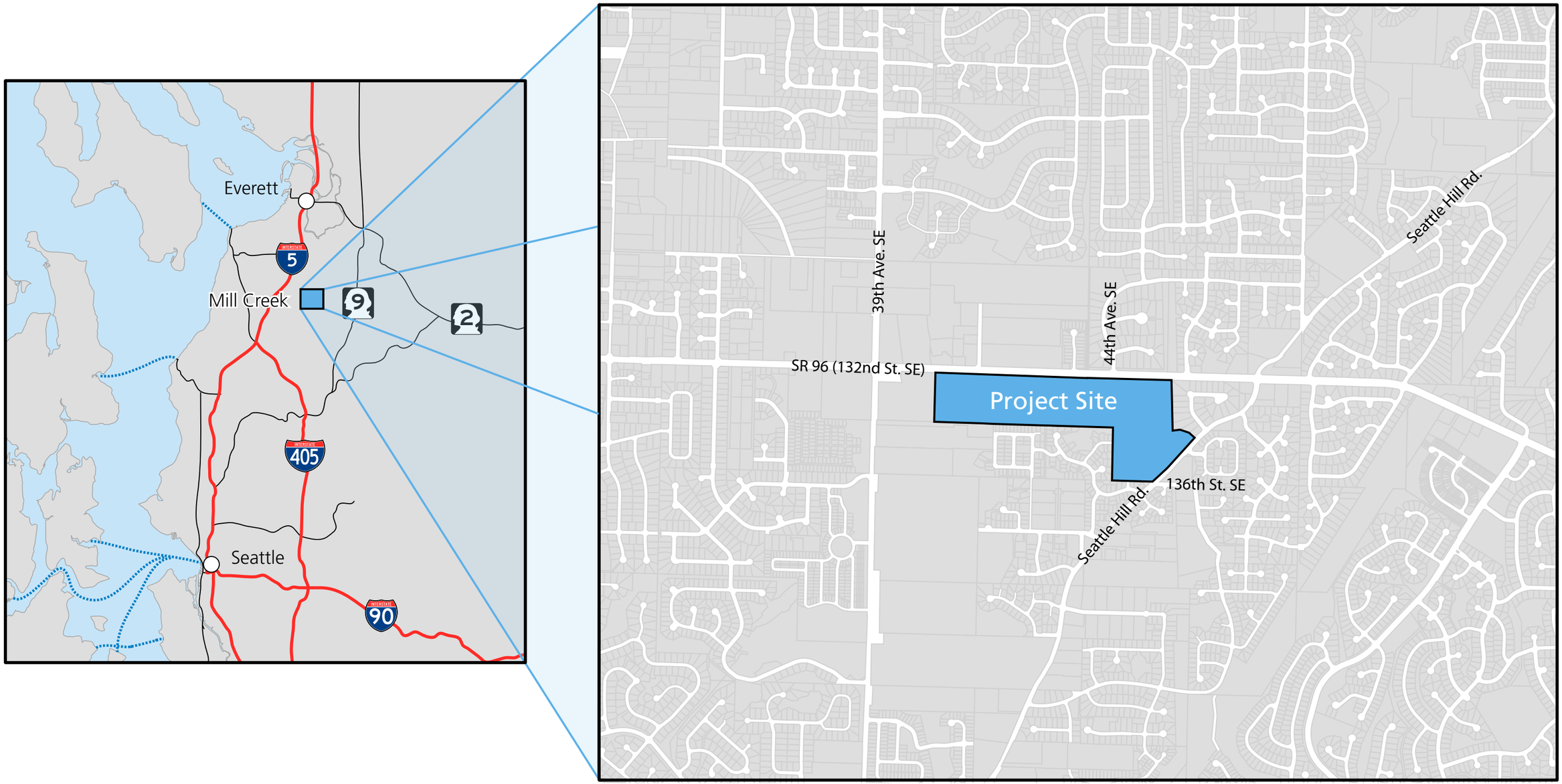
This Infrastructure Schematic Design Report for the Mill Creek East Gateway Urban Village (EGUV) builds on work completed as part of the Preliminary Engineering Design Study (PEDS) prepared by Reid Middleton, Inc., in November 2010. There are two objectives for this report. The first is to advance infrastructure design drawings to roughly a 30 percent complete stage, providing a more developed understanding on which to found an opinion of probable construction cost (OPCC). The second objective is to update the traffic study prepared as part of the PEDS to reflect an analysis of traffic impacts associated with a revised slate of both envisioned and currently proposed land uses within the original boundaries of the EGUV and to provide regulatory mandates for addressing those impacts.

Since issuance of the PEDS in 2010, events have occurred that have influenced both the nature of envisioned land uses within the EGUV and the boundaries of what is to be considered in development of schematic infrastructure plans for the EGUV.

Those events include:

- Consideration of a revised master plan for the EGUV by the Mill Creek City Council in 2011. This report is based on Option A of the revised master plan as modified by the next two events.
- Purchase of what is referred to as the Nash Property in the PEDS; a property that constitutes a substantial majority of the EGUV lying east of the Advent Lutheran Church (Church). This site will hereinafter be referred to as the Polygon East Gateway site. Because a specific land use has been proposed for the site with attendant commitments to construct the required infrastructure, the site and all properties to the east of it will not be included in the EGUV boundary for purposes of this report.
- A decision by the Penny Creek Partners, owners of the parcel at the west end of the EGUV, to opt out of cooperation with the City of Mill Creek (City) for detailed planning involving their parcel. Other than a proposal for a secondary access road straddling its east boundary, the Penny Creek Partners parcel is not considered in planning for infrastructure in this report.

The revised boundaries for the EGUV and the proposed road alignment to serve it are shown in Figure 2.



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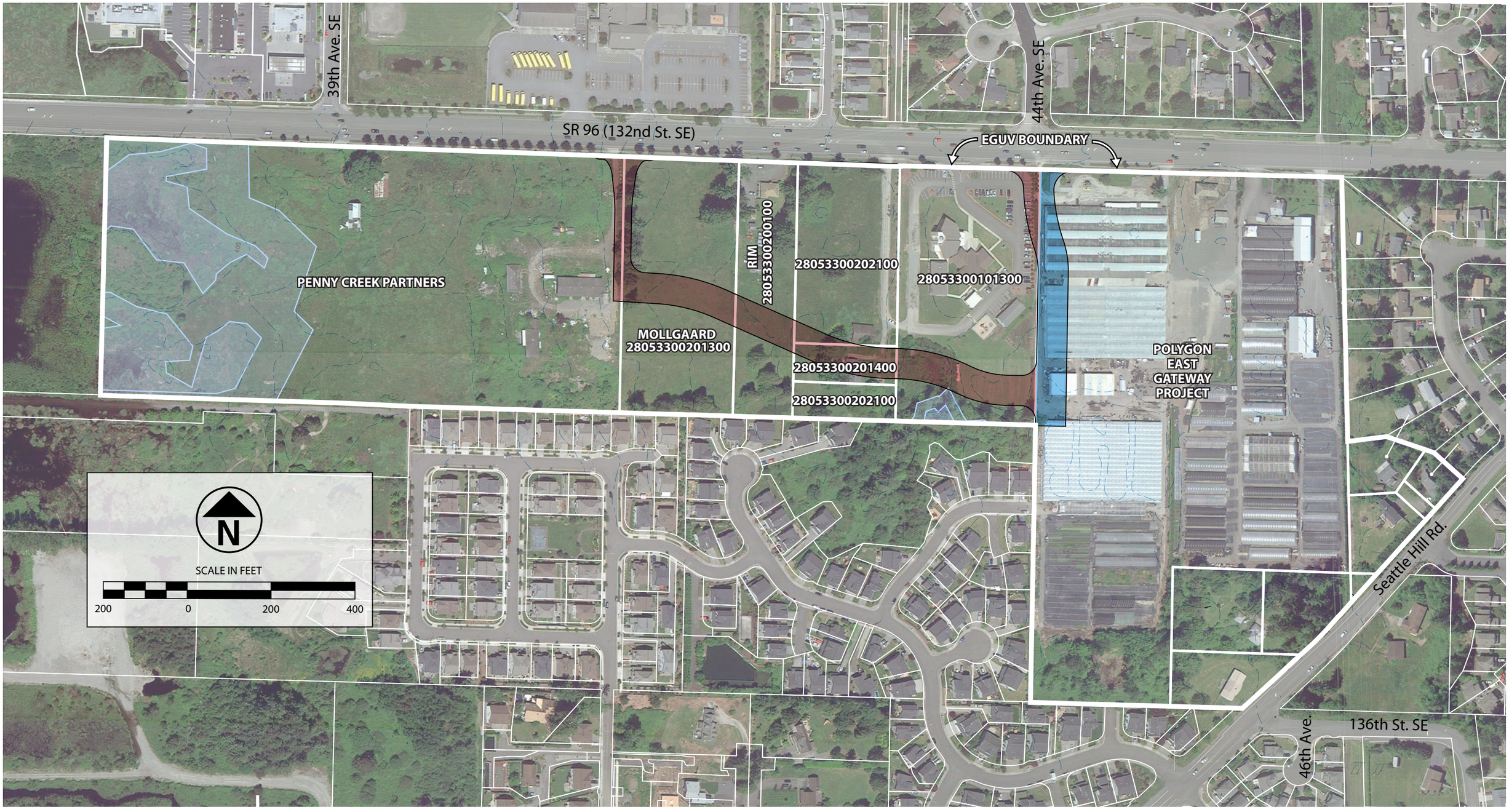
EAST GATEWAY URBAN VILLAGE MASTER PLAN
City of Mill Creek

MILL CREEK EAST GATEWAY

Vicinity Map

FIGURE 2



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MILL CREEK EAST GATEWAY

Property Owners / Road Alignment

Basis of Design

Roadway Alignment

Horizontal Alignment

As noted in the introduction, the purchase of the Nash property by Polygon eliminated all EGUV roadways lying east of the Church from consideration in this report. However, the points of external connection for the proposed project roadways remain essentially the same as those proposed in the PEDS. These include connection to SR 96 at 44th Avenue Southwest and at the common property line between the Penny Creek Partners and Mollgaard parcels (approximately 41st Avenue Southwest). The City requested that Reid Middleton design the horizontal alignment for that portion of 44th Avenue Southwest extending south from SR 96 to the intersection with the west leg of the EGUV spine road as a guide to future development of the roadway. However, the design of the vertical alignment and eventual construction of this leg of the roadway system will be the responsibility of Polygon as part of their project.

Early plans for the EGUV envisioned the use of a roundabout at the southeast corner of the Church property for the intersection of 44th Avenue Southwest (which lies along the east boundary of the church property) with the west leg of the EGUV spine road. However, the City has opted for a conventional "tee" intersection at this location in order to save money and preserve developable land. In accordance with a preference stated by the Advent Lutheran Church as part of the 2010 PEDS, the subject intersection and the west leg of the spine road have been placed as far south on the church property as possible without infringing on adjacent wetland buffers along the south boundary of the church property.

The alignment of the west leg of the spine road as it proceeds westerly from the church property is dictated by the reservation of the right-of-way on the binding site plan for the 132nd Street LLC project, the alignment of which was taken from the earlier PEDS. The northwesterly swing of the spine road across the 132nd Street LLC site allows the road to roughly bisect the Mollgaard property as it continues west to reach the west boundary of that property. A right-of-way width of 72 feet is proposed for that portion of the west leg of the spine road extending from the intersection at the

southeast corner of the church property west to the west line of the Mollgaard property.

It is anticipated that the main flow of traffic at the west end of the EGUV will be accommodated by an as-yet undetermined alignment of the spine road through the Penny Creek Partners site ending at the existing 39th Avenue/SR96 signalized intersection. However, also planned (and shown on the Reid Middleton plans in this report) is a narrower 40-foot-wide right-of-way straddling the Mollgaard/Penny Creek Partners boundary to provide a secondary access roadway out to SR 96, where only right-in/right-out turning movements will be allowed.

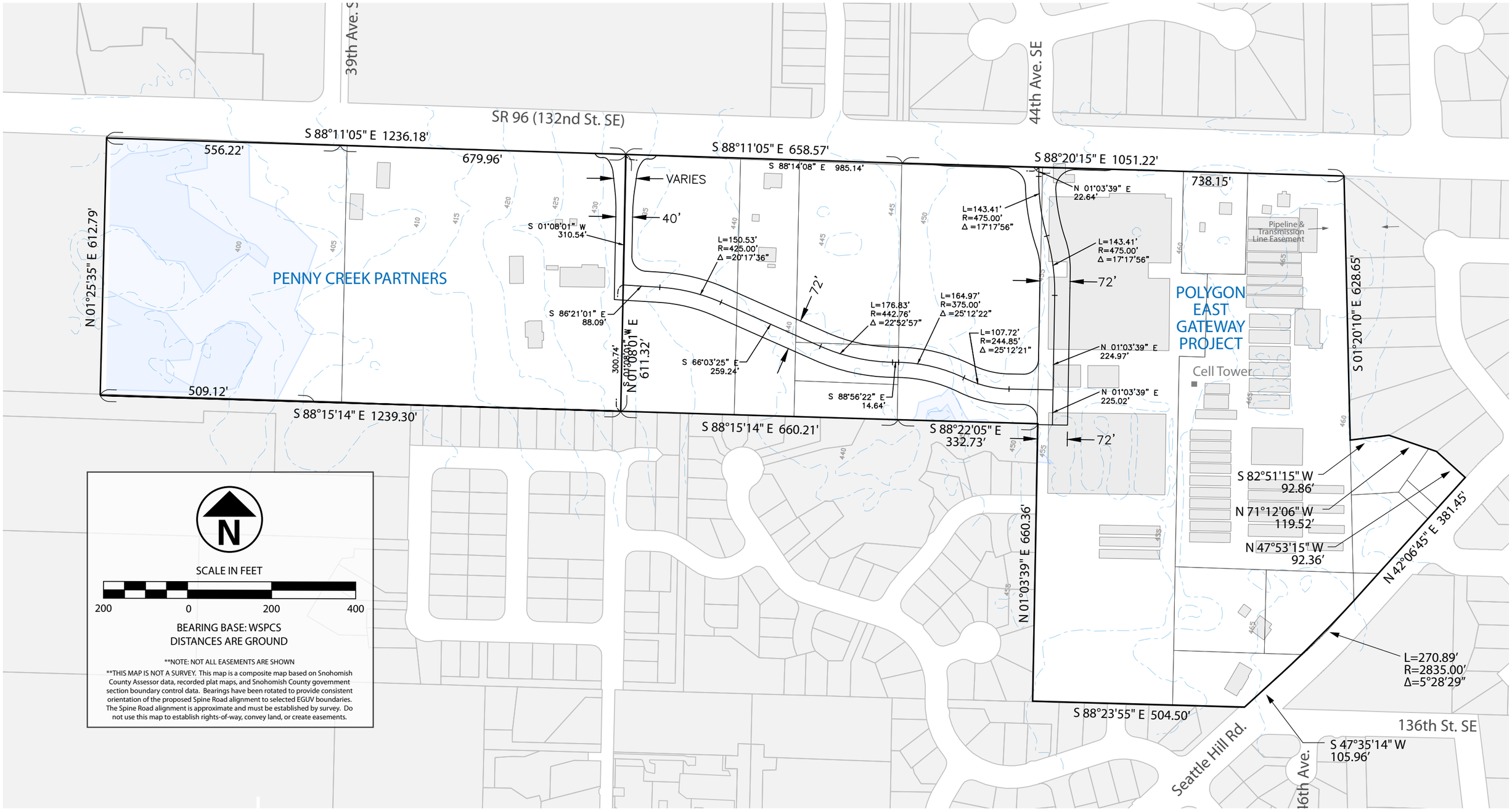
Vertical Alignment

The EGUV site drops roughly 20 feet in elevation from the east property line of the Church property to the west line of the Mollgaard property. The City would like to minimize elevation differentials between future development sites along the spine road to enhance pedestrian accessibility and maintain a cohesive building façade appearance along the street frontage. Both the Advent Lutheran Church and the 132nd Street LLC parcels have been raised by importing fill as a means of achieving required grades for the flow of gravity utilities. In doing so, they have established a "benchmark" finish grade that will heavily influence grading to meet City objectives on parcels to the west.

The vertical alignment of the west leg of the spine road is designed to allow for no more than two to three feet of elevation differential between properties along the spine road frontage. As shown on the plan and profile drawings in Appendix A, this results in a roadway vertical alignment that lies roughly five feet above existing grade at the westerly terminus of the east-west, 72-foot-wide spine road right-of-way at the Mollgaard west property line. From that point north along said Mollgaard property line, the vertical alignment drops to match existing grade at SR 96.

Preliminary discussions with engineers for the Polygon East Gateway project indicated that the elevation of 44th Avenue Southwest along the east boundary of the church property needs to remain relatively high to allow routing of stormwater for that project to appropriate drainage basin discharge points. This elevation will in turn dictate the elevation for the east terminus of the west leg of the spine road and the extent of transition required to return the west leg of the spine road to a preferred vertical alignment.

FIGURE 3



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City of Mill Creek

MILL CREEK EAST GATEWAY

Spine Road & Connector Alignments

Storm Drainage

Stormwater Management

This portion of the infrastructure schematic design is focused on locating regional stormwater detention facilities for the EGUV, determining a preliminary size for the system, identifying a general routing for stormwater conveyance from the various parcels to the detention system to demonstrate feasibility, identifying space requirements for the detention system, and identifying a strategy for addressing stormwater quality.

The EGUV is located in the Penny Creek drainage basin. Located generally near the top of a ridge, the site does not receive drainage from the surrounding properties. SR 96 intercepts drainage from the north. The Polygon East Gateway project will intercept storm drainage emanating from property to the east of the site. The plats of Bluegrass Meadows and Westfield, developed residential properties to the south, drain westerly in the developed storm drainage system for the plats. A wetland at the west end of the site currently receives much of the water flowing from the property encompassed within the area served by the roadway designed herein.

The City will be required to comply with state requirements for controlling storm runoff from the site. This can be done by either retaining the stormwater on the site or by detaining the stormwater on the site and metering it out at a rate of flow that mimics natural runoff from an undeveloped site. Stormwater retention requires that underlying soils be substantially pervious to allow for infiltration of stormwater. The soils on the EGUV site do not possess this characteristic. Thus, stormwater detention will be required. Where space is available, surface ponds are used routinely to provide stormwater detention storage. However, in keeping with the decision made as part of the 2010 PEDS, an underground stormwater detention vault will be used to address regional stormwater detention for the entire EGUV site in lieu of surface ponds, primarily due to space requirements associated with the construction of ponds.

It is anticipated that stormwater flowing to and detained at the west end of the EGUV site will be discharged to the Penny Creek Partners site. The stormwater will either be routed through the storm drain system developed as part of the Penny Creek Partners site development or intercepted and piped directly to a discharge point somewhere along the

easterly edge of existing wetlands on the Penny Creek Partners site. There is currently roughly 25 to 30 feet of elevation drop between the proposed site of the EGUV stormwater detention vault and said easterly wetland edge, negating potential elevation differential constraints for determining the depth of the EGUV stormwater detention vault.

The City has elected to provide stormwater quality treatment for the entire EGUV site in conjunction with construction of the regional stormwater detention facility described above. Various water quality treatment options that meet Washington State Department of Ecology (Ecology) requirements are available to the City. An assessment of treatment alternatives is provided in Appendix C. For purposes of design and cost estimating, this report assumes the use of a pretreatment device followed by a media filtration vault, which will then discharge to the detention vault. See Appendix C for a description of how this stormwater treatment technology works.

The detention system size for the basin is calculated using the Western Washington Hydraulic Model Version 3 (WWHM3) computer program in accordance with the *Ecology Stormwater Management Manual for Western Washington*, 2005 Edition, both of which are adopted by the City of Mill Creek Municipal Code. A summary of parcel areas and of the input parameters used in the model are presented in Table 1.

Regarding runoff from the Advent Lutheran Church site, only the proposed right-of-way is included in the tributary area for purposes of stormwater detention modeling. The City has elected to "grandfather" the stormwater detention volume calculated as part of the original design of the existing church stormwater detention system. The proposed stormwater detention vault is sized to accommodate the original design volume of the existing church stormwater detention system

Assumptions and idealizations used in the WWHM3 include:

Pre-developed Conditions

1. The soil type is Alderwood gravelly sandy loam, as indicated on the soil survey maps by the U.S. Soil Conservation Service (SCS). This equates to model input parameter Type C.

2. The ground cover complex (the ground surface covering such as lawn, landscaping, pavement, roof, etc.) is forest, as required by code.

3. The slope of the site is determined from topographic survey as performed on a majority of the site for this project and is characterized as "flat" slope for the subject basin.

Developed Conditions

1. The developed condition cover complex is established for the anticipated fully developed condition. Particulars for the various parcels are detailed below.
2. The SR 96 Right-of-Way Buffer (35 feet wide) is assumed to remain as open space.
3. The code-required, 20-foot perimeter buffer is assumed to be open space.
4. The proposed rights-of-way are modeled as impervious.
5. The net developable area of each lot is determined by subtracting mandated pervious areas, as included in Table 1 from the gross area for each parcel. Ten percent of the net developable lot area is assumed to be landscaping and the remainder as impervious surface (buildings and pavements). The ten percent landscaping is accounted for in the cover complex for the private property parcels that will be developed.
6. There is no design contingency for the detention volume. The volume constructed will be apportioned to the parcels and additional flow control, if needed, must be accommodated on each parcel by LID measures. It is anticipated that additional stormwater detention on parcels will be discouraged.
7. The design volume for the stormwater detention vault is calculated assuming no LID features for budget purposes. Strategies can be implemented at the vault, along the roadway, and by property owners to reduce the volume of stormwater to be detained.

An inventory of surface types in the project was prepared based on City of Mill Creek EGUV Design Guidelines, Comprehensive Plan requirements, zoning requirements, and anticipated patterns of development within the project. The Pervious/Impervious Surface Areas Inventory is presented in Table 1. Parcel acreages for the Mollgaard (3.96 acres) and Kim (1.97 acres) parcels were taken from Snohomish County Assessor records. The Parcel acreage for the 132nd Street LLC parcel (1.57 acres for undeveloped portion) was taken from the recorded 2012 Binding Site Plan for the property.

Table 1. Allowable Stormwater Volumes

Owner	Parcel Number	Total Ownership (AC)[1]	Minus Right-of-Way (AC)	Minus SR96 35' Buffer (AC)	Minus Peripheral 20' Buffer (AC)	Minus 10% for landscaping (AC)	Equals Potential Impervious (AC)	% of Total Impervious Development	% of Total Impervious Right-of-Way
Bob Mollgaard	28053300201300	3.96	0.65	0.18	0.12	0.31	2.70	37.59%	9.04%
Bruce S & Ye S Rim	28053300200100	1.97	0.25	0.11	0.06	0.16	1.38	19.30%	3.51%
132nd Street Development LLC (south portion)	28053300202100, 28053300201400	1.57	0.43		0.05	0.11	0.98	13.61%	6.01%
Advent Lutheran Church Right-of-Way[2]	28053300101300	0.58	0.58	0.00	0.00	0.00	0.00	0	8.06%
Penny Creek Partners Right-of-Way[3]	28053300200300	0.21	0.21	0.00	0.00	0.00	0.00	0	2.88%
Totals		**8.29**	**2.11**	**0.29**	**0.23**	**0.58**	**5.06**	**70.50%**	**29.50%**

[1] Total Ownership Tributary to Detention Vault (Source: Snohomish County Assessor and Auditor)

[2] Only proposed right-of-way on Advent Lutheran Church is included in stormwater calculations. Volume of existing detention pond added to calculated vault capacity.

[3] Only proposed right-of-way on Penny Creek Partners site is included in stormwater calculations. Property owner to provide separate detention for development.

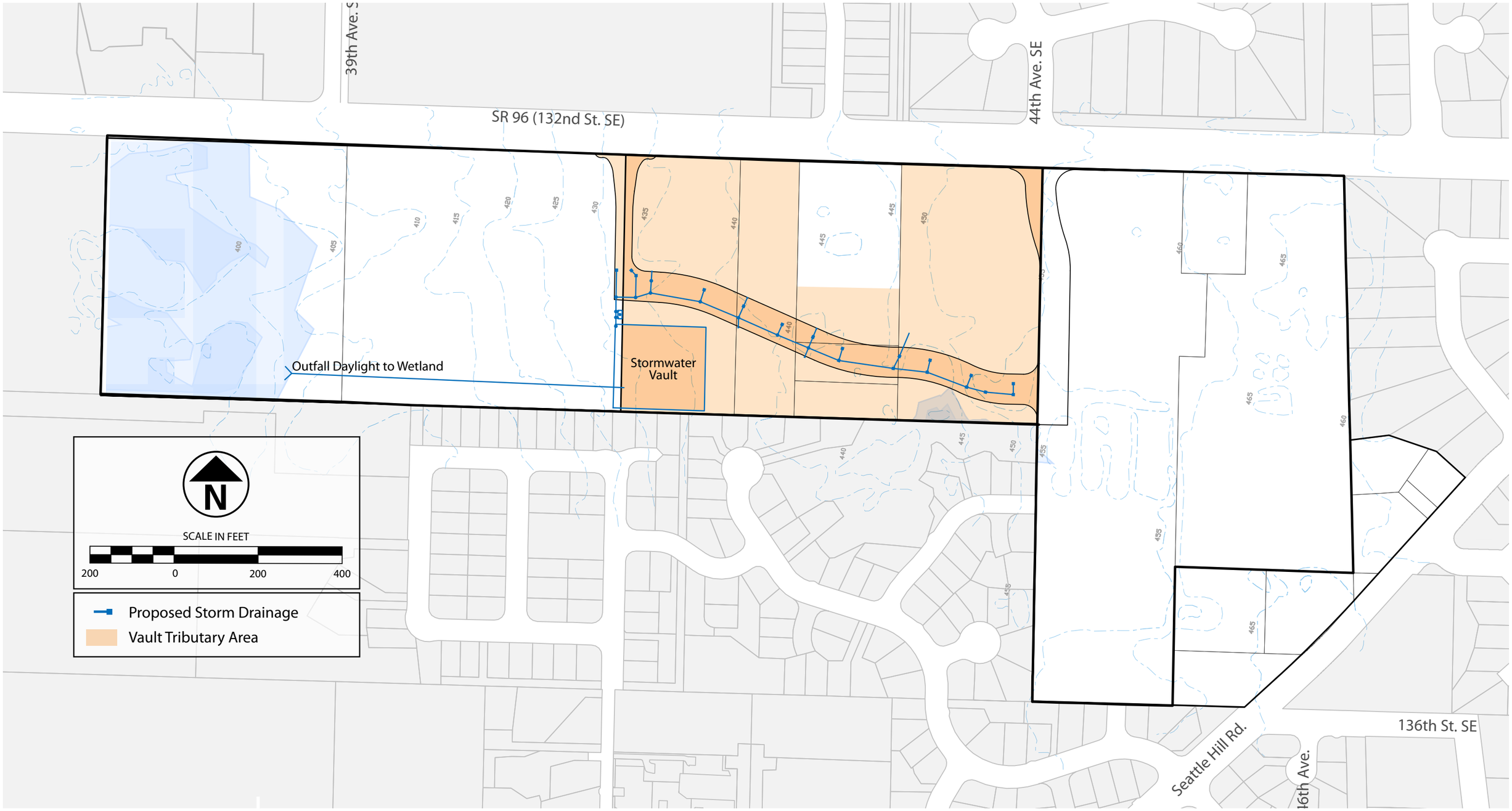
WHHM 3 Modeling Results

Detention volumes are calculated based on the parameters and assumptions listed. The vault dimensions can be adjusted to fit site conditions. The land area required for the detention system should include additional area around the vault to satisfy City design requirements, such as setbacks from property lines and to allow excavation with sloped sidewalls, which is preferable in order to minimize or eliminate the need for shoring the excavation. Table 2 presents the volumes, a possible vault length and width, and additional area around the perimeter of the vault. A depiction of a possible vault location and configuration is shown on Figure 4. See Appendix B for calculation details.

Table 2. Detention Vault Sizing Summary

Volume[1]		Depth	Vault	System Area
Acre Feet	Cubic Feet	Active Storage	Length x Width - ft (Rounded)	Square Feet
6.4	280,000	6	200 x 200	40,000

[1]Volume includes freeboard and sediment storage.



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City of Mill Creek

MILL CREEK EAST GATEWAY
Stormwater Management

Water

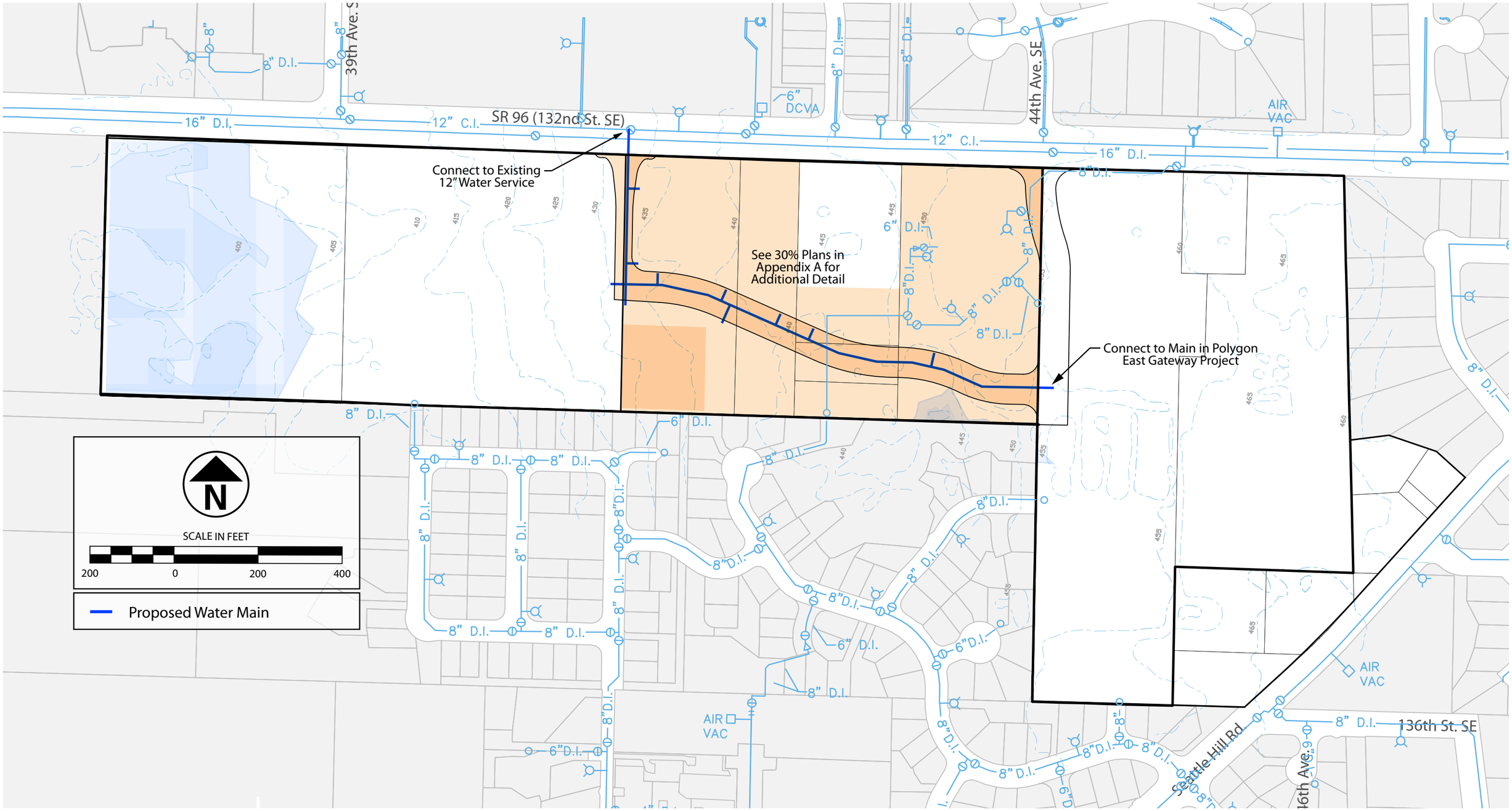
The Silverlake Water & Sewer District (SLWSD) is interested in creating looped connections of their water system through strategic routing of water mains through the full EGUV site. The Polygon East Gateway project will be creating one loop by connecting a water main under SR 96 to a water main in the Bluegrass Meadows subdivision south of the Polygon site. This will occur via construction of a new 12-inch water main under 44th Avenue Southwest and along a water main easement through the south portion of the Polygon East Gateway project. The Reid Middleton plans show connection of a 12-inch main to the proposed Polygon main in 44th Avenue Southwest and extending west along the entire length of the west leg of the spine road, eventually connecting to an existing 12-inch main in SR 96 (Figure 5).

As a condition of approval of the 132nd Street LLC office construction project, the SLWSD required the applicant to extend a main south from their building site to connect to an existing main in the Bluegrass Meadows subdivision. The Reid Middleton plans show the route of this main extension as it crosses the proposed spine road alignment and provides for connection to the main. It is anticipated that the SLWSD will require extension of looped water mains into individual EGUV development sites from existing exterior connection points as the properties in the EGUV develop.

Sanitary Sewer

The afore-mentioned, west-trending slope of the EGUV site allows for efficient layout of a sanitary sewer system to serve the project site with discharge to a sanitary sewer main under SR 96. Reid Middleton has taken a conservative approach to design of the sanitary sewer by placement of a main along the entire length of the west leg of the spine road. The main placement will allow gravity sewer service to all properties along the road alignment, including the south end of the Church property. However, the SLWSD has pointed out that other points for sanitary sewer connection exist along the EGUV boundaries that can be employed and may prove more beneficial for future development (Figure 6).

FIGURE 5



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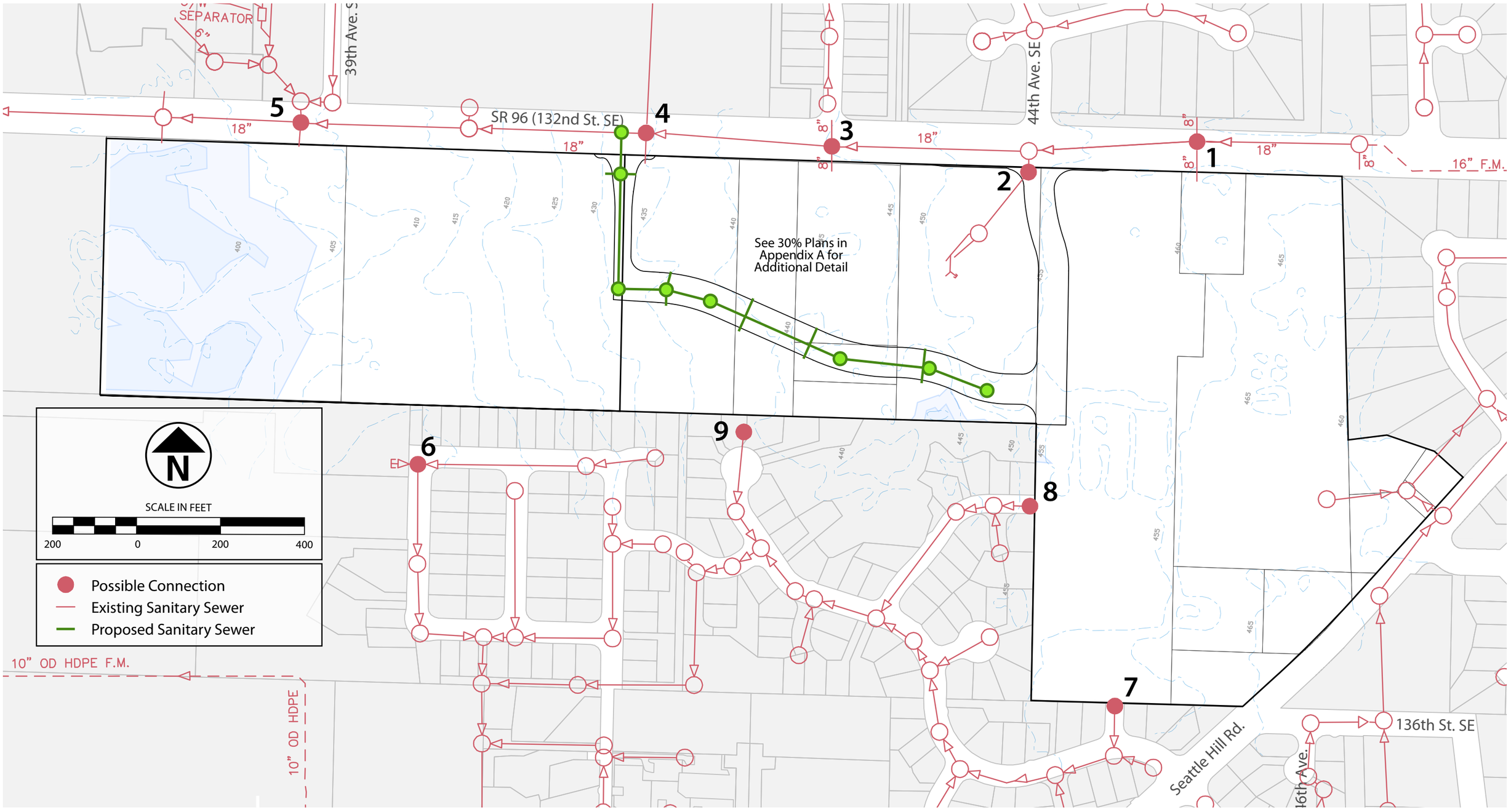
City of Mill Creek

MILL CREEK EAST GATEWAY
Water System

FIGURE 6



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City of Mill Creek

MILL CREEK EAST GATEWAY

Sanitary Sewer

Other Utilities

Snohomish County PUD (Electrical)

Electrical service to the site is provided by Public Utility District Number One of Snohomish County (PUD). The PUD has provided an estimated cost to serve the EGUV (see OPCC) based on the assumption that the City of Mill Creek would be the "developer" of the infrastructure, and as such, will provide all backbone vaults, conduits, and electrical grounding along the spine road right-of-way to allow for future line extensions to each individual development as they apply for service. The City would be required to install trench, conduits, vaults, and exterior grounding at each vault location, all to PUD's specifications and inspection prior to backfilling. The City would need to provide permits and easements in the development for PUD construction as well as provide surveyed property corners and rights-of-way lines for engineering and construction purposes. It is assumed that the final grade of the roadway would be established prior to scheduling PUD construction. All contractual agreements will be between the City and the PUD with payments made by either the City or its contractor(s). Payments for the development will be based on time and material estimates and must be paid in advance of scheduling crews for construction. In cases that require specialized equipment, material deposits may be required.

The City will be required to coordinate joint utility trench use with other utilities, the costs of which are not included in the PUD estimate. It is the customer's responsibility to coordinate with these utilities. For their part of the contract, PUD will provide the following:

- Engineering design, layout, inspections, and construction coordination.
- Materials and labor to install the electrical equipment, cables, terminations, and interior grounding at each vault location.
- Permits and easements for construction outside the development.

Communications

Communications for the EGUV are provided by both Frontier Communications and Comcast. Both utilities have indicated that there will be no cost to the City for extension of their respective facilities into the project other than coordination and provision of the joint utility trench referenced by the PUD in their above-stated assumptions.

Puget Sound Energy (natural gas)

Puget Sound Energy (PSE) provides natural gas service in the vicinity and will extend a natural gas main to serve the EGUV. Though contacted numerous times, PSE has not provided a cost estimate for provision of their services. It is, therefore, assumed that gas will be extended to the project as a commercial venture at no cost to the City, with PSE determining the use thresholds that will make extension of gas to the project viable.

Opinion of Probable Construction Cost

The opinion of probable construction cost (OPCC) can be found in Appendix D. The costs have been calculated for the entire project assuming the project will all be built at one time. Costs can be expected to be higher if the project is constructed in phases. Costs have been allocated to property owners using three methodologies that are believed to be the most accurate means of cost allocation for the particular infrastructure element under consideration.

- The OPCC for roadway, stormwater collection system, sanitary sewer, and water is allocated to each property based on the cost to construct that portion of these elements physically located on each property.
- The OPCC for common costs (mobilization, erosion control, traffic control, PUD Joint Trench, etc.) are allocated to each property by proportioning the cost based on roadway centerline length in each parcel.
- The OPCC for the regional stormwater detention and water quality system is allocated to each property by proportioning the cost based on total parcel size.

Finally, the OPCC for the regional stormwater detention and water quality facility assumes a detention vault with standard outlet control and that no low impact development strategies are used on the roadway or parcels. No costs are provided for conveyance of stormwater beyond the discharge of the stormwater detention vault since a point of discharge has not yet been identified.

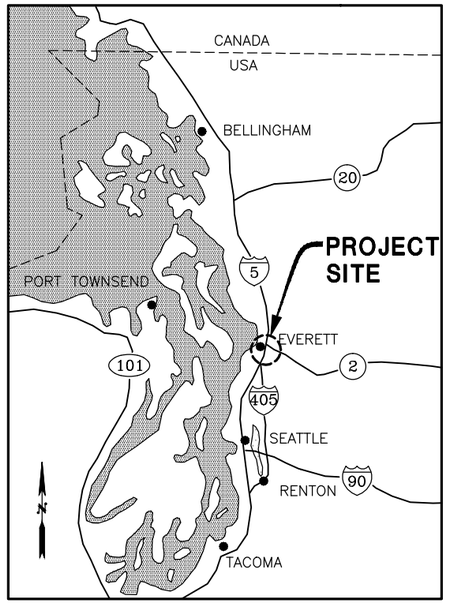
APPENDICES

APPENDIX A
INFRASTRUCTURE SCHEMATIC DRAWINGS

CITY OF MILL CREEK

EAST GATEWAY URBAN VILLAGE

MARCH 2013



LOCATION MAP
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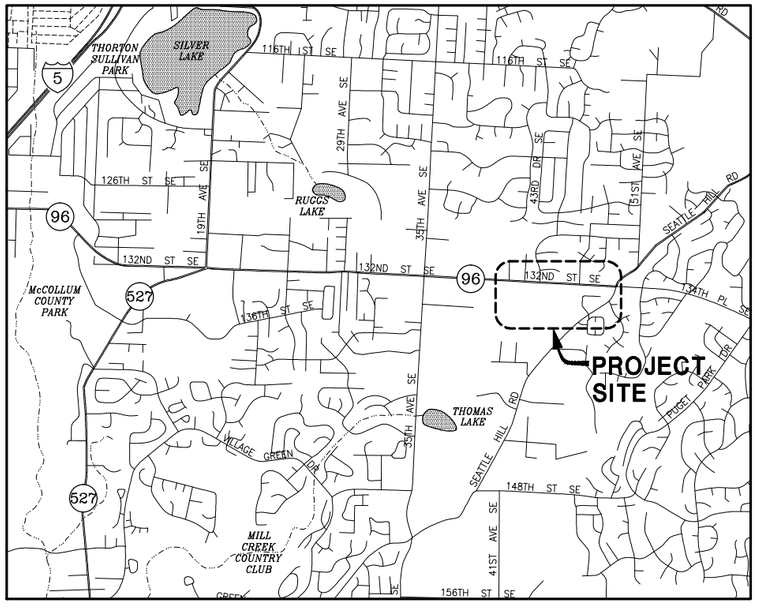

VICINITY MAP
NOT TO SCALE

Sheet Index

811 Know what's **below** **Call** before you dig

PRELIMINARY
NOT FOR CONSTRUCTION

NOTE: "L"
IF "L" DOES NOT MEASURE 1" ADJUST SCALES ACCORDINGLY.

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NO.	DATE	BY	REVISION

728 134th Street SW • Suite 200
Everett, Washington 98204
Ph: 425 741-3800

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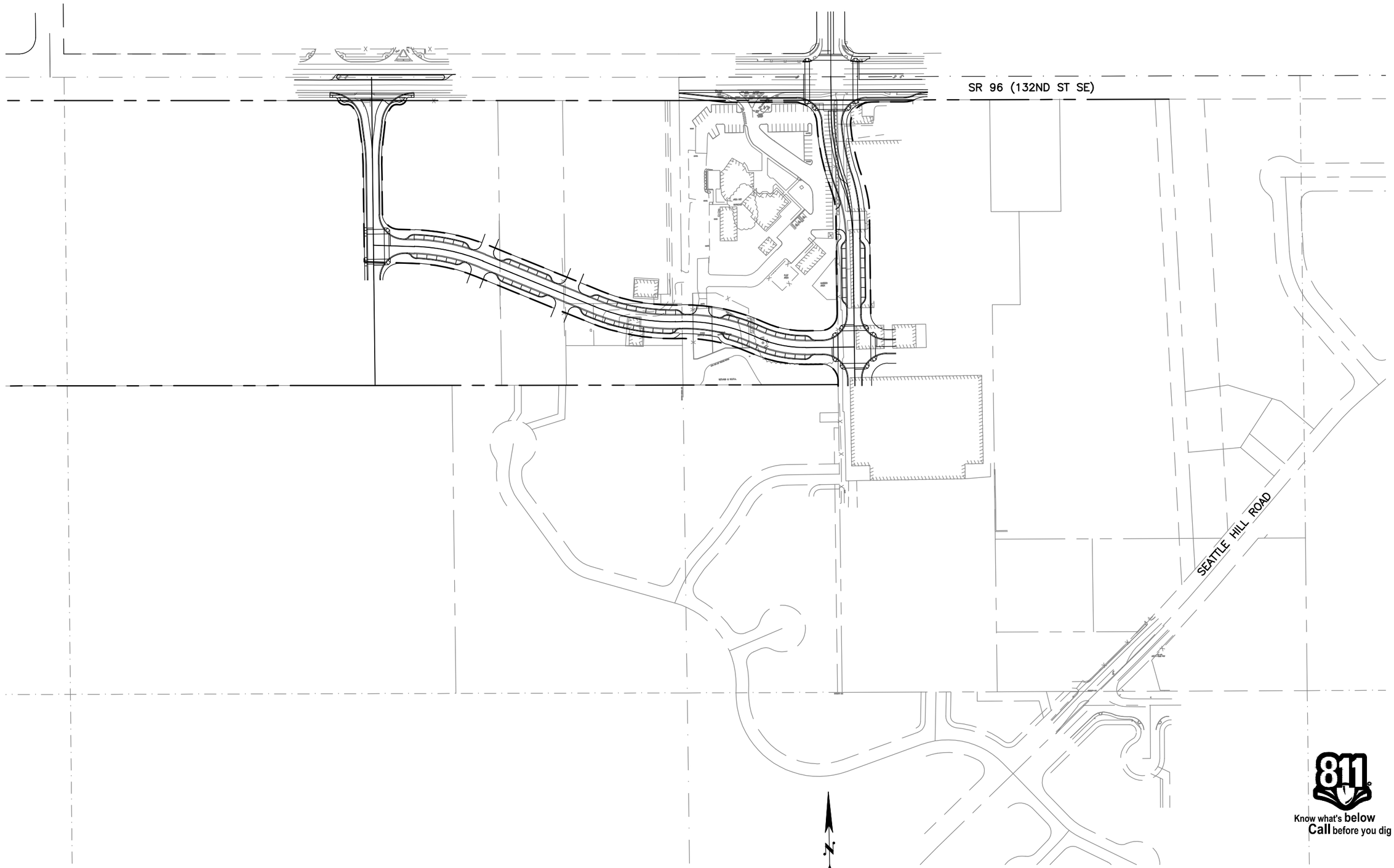
CITY OF MILL CREEK
EAST GATEWAY URBAN VILLAGE

COVER SHEET AND SHEET INDEX

SCALE	AS NOTED
DES.	WJ
DR.	CM
CH.	—
F.B.	—
SHEET NO.	G1.1
OF	— SHEETS
DATE	MARCH 2013
FILE NO.	212012.005



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EAST GATEWAY URBAN VILLAGE

PROJECT SITE MAP

SCALE	AS NOTED
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DR. CM	C1.1
CH. _	
F.B.	OF – SHEETS
DATE	MARCH 2013
FILE NO.	212012.005

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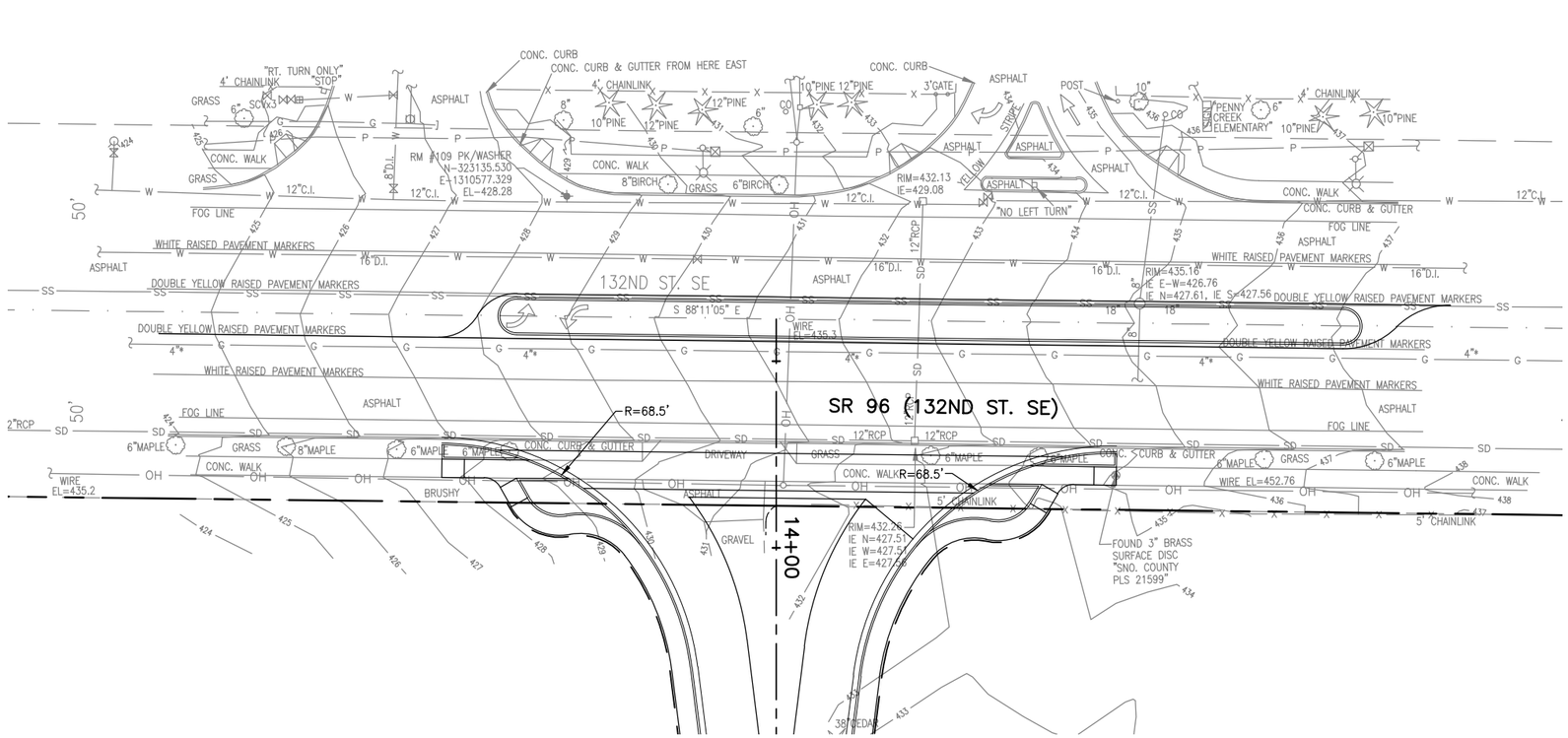

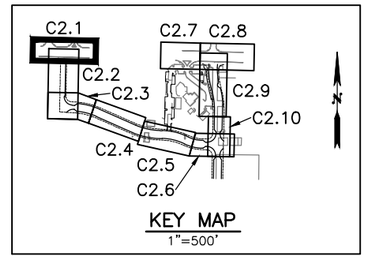

KEY MAP
1"=500'

HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10

PRELIMINARY
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CITY OF MILL CREEK
EAST GATEWAY URBAN VILLAGE

ROADWAY PLAN AND PROFILE

SCALE	AS NOTED
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DATE	MARCH 2013
FILE NO.	212012.005

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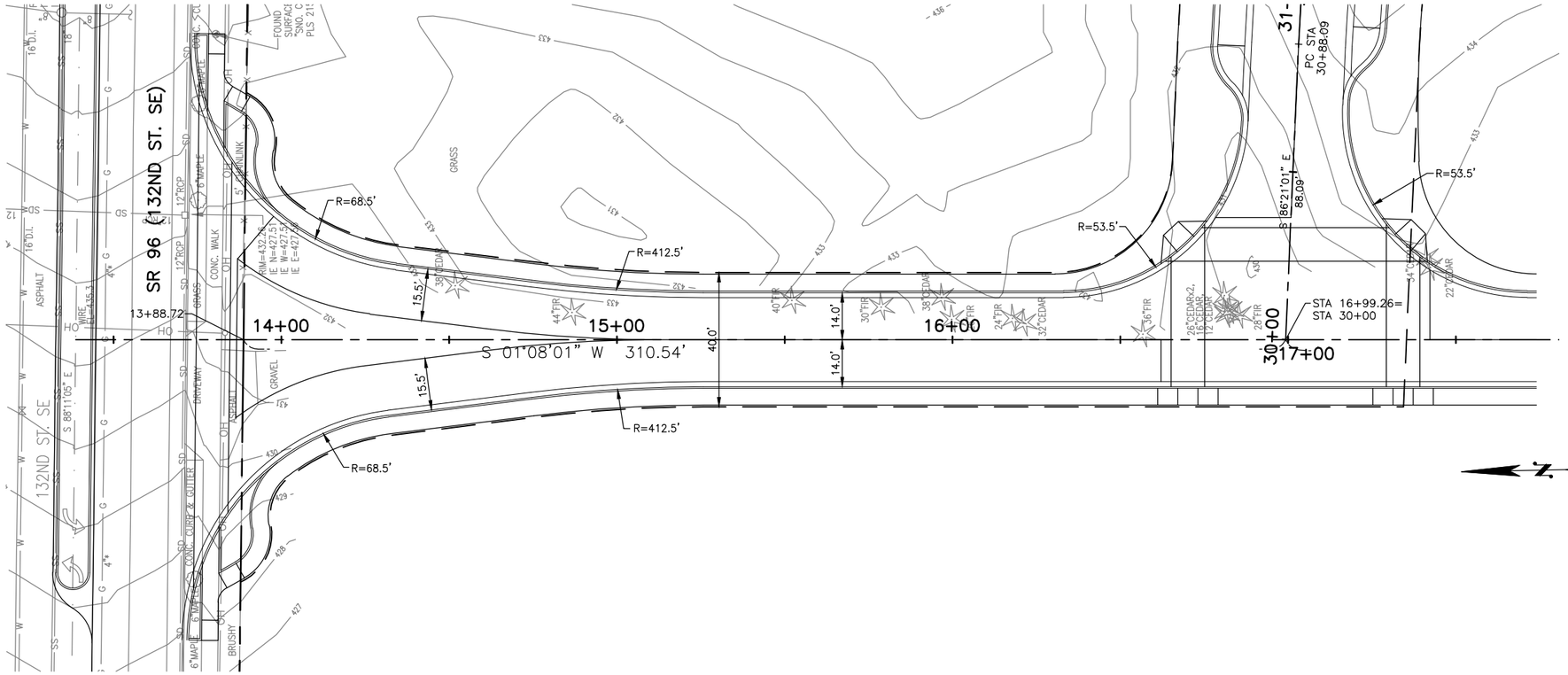

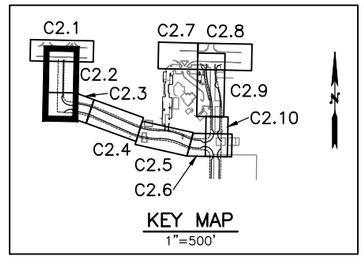

HORIZONTAL SCALE IN FEET
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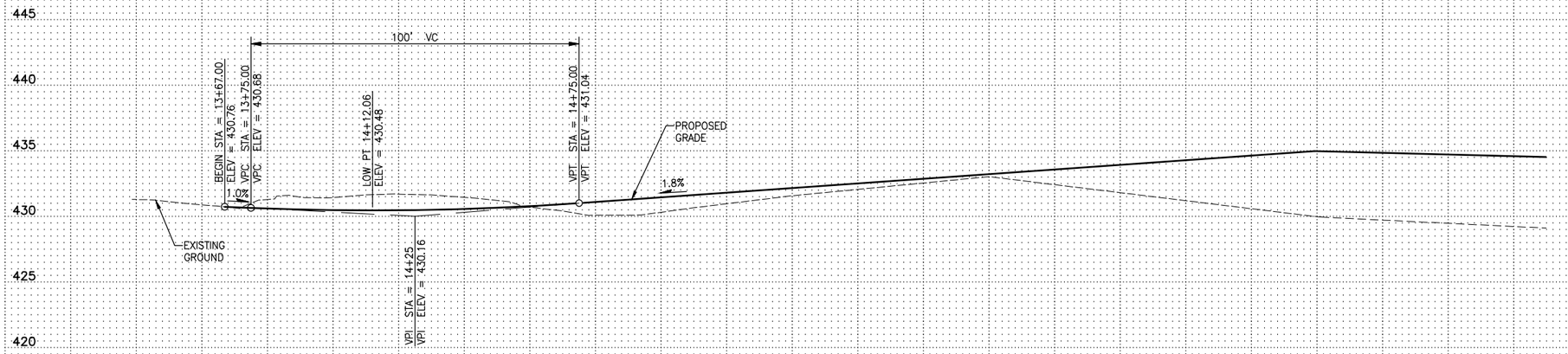
VERTICAL SCALE IN FEET
5 0 5 10



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Reid Middleton

CITY OF MILL CREEK
EAST GATEWAY URBAN VILLAGE

ROADWAY PLAN AND PROFILE

SCALE	AS NOTED
DES.	AM
DR.	CM
CH.	_
F.B.	
SHEET NO.	C2.2
OF	– SHEETS
DATE	MARCH 2013
FILE NO.	212012.005

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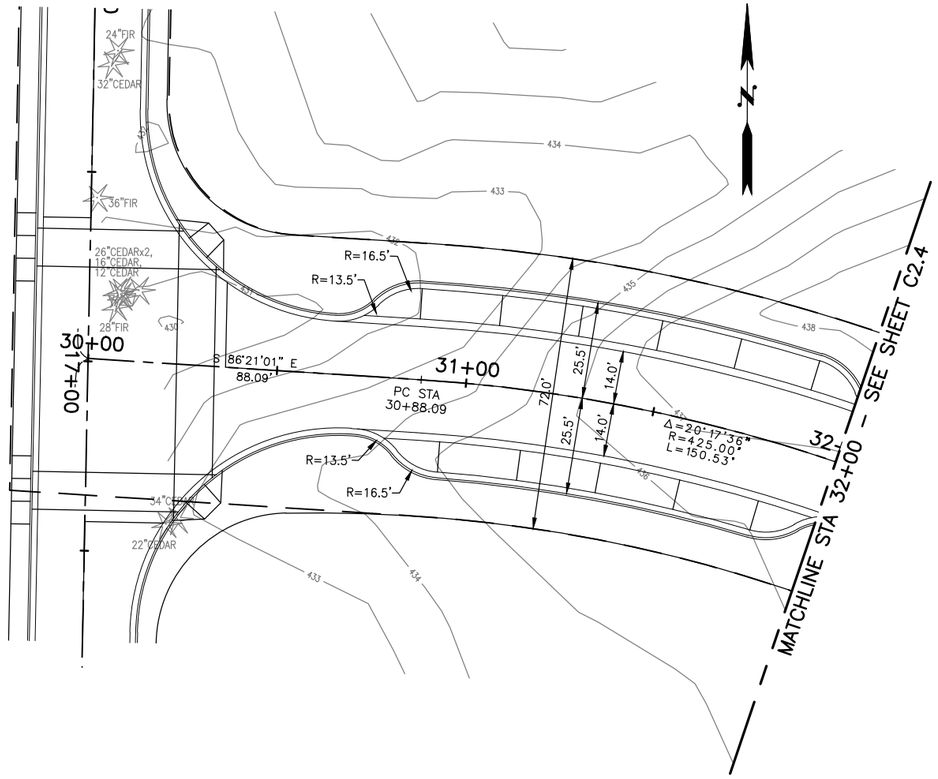

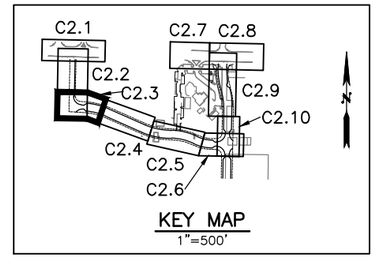

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VERTICAL SCALE IN FEET
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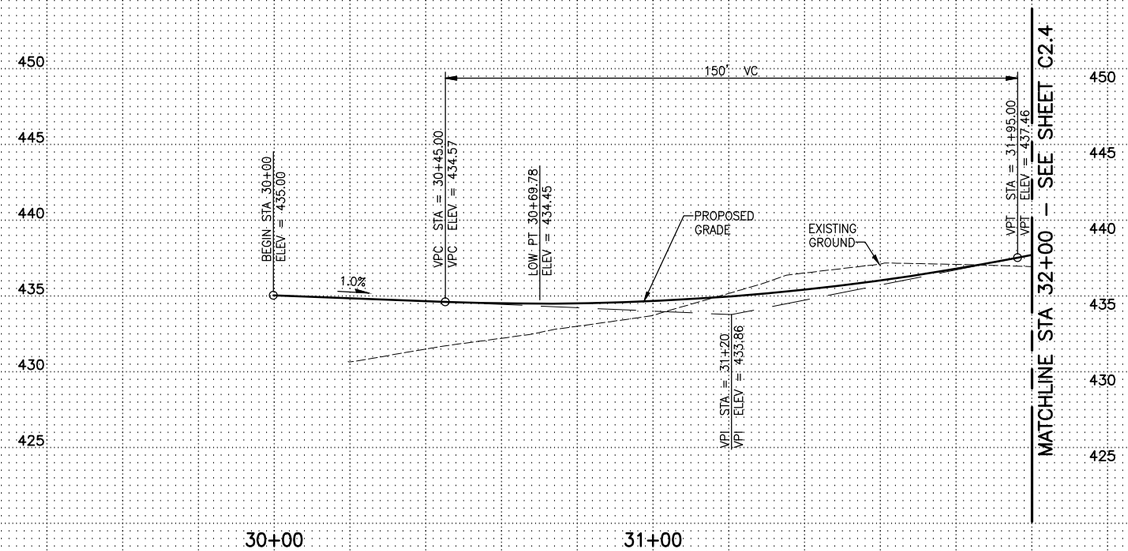

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DATE	MARCH 2013
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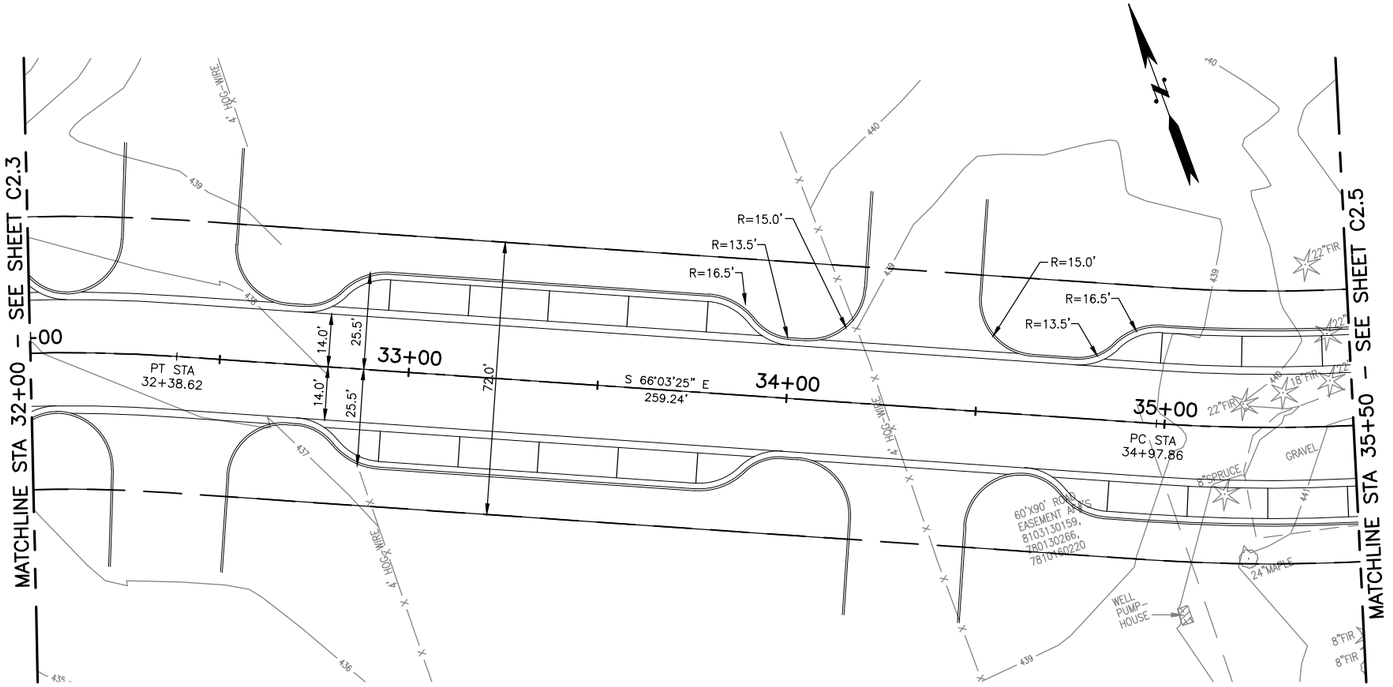

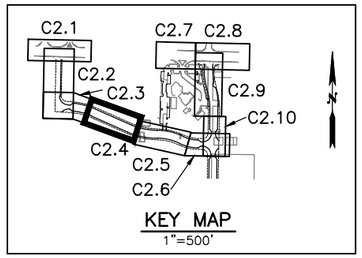

HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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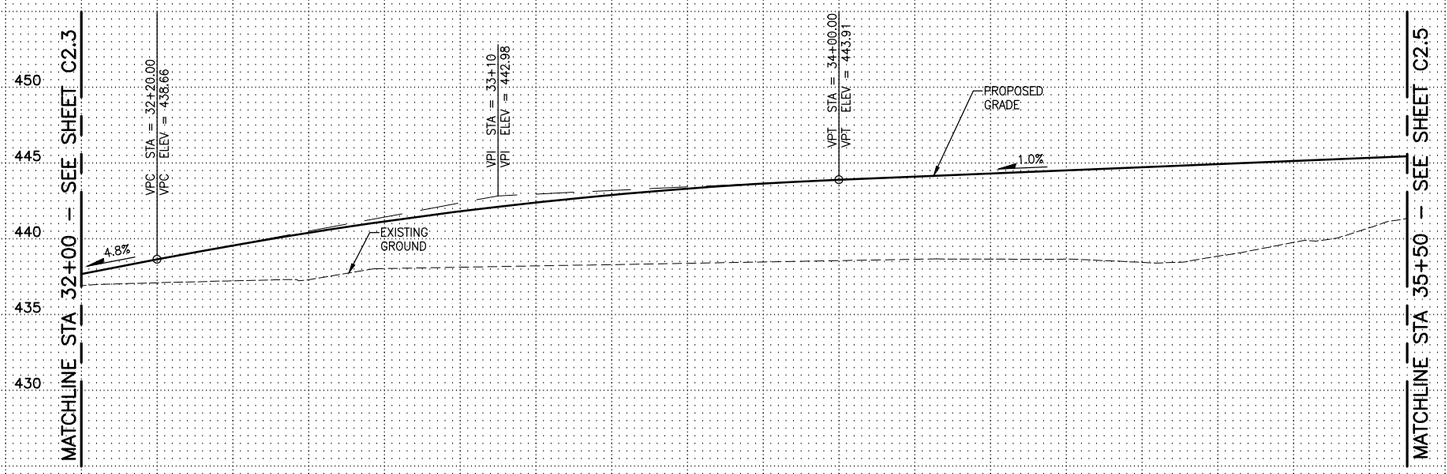

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SHEET NO.	C2.4
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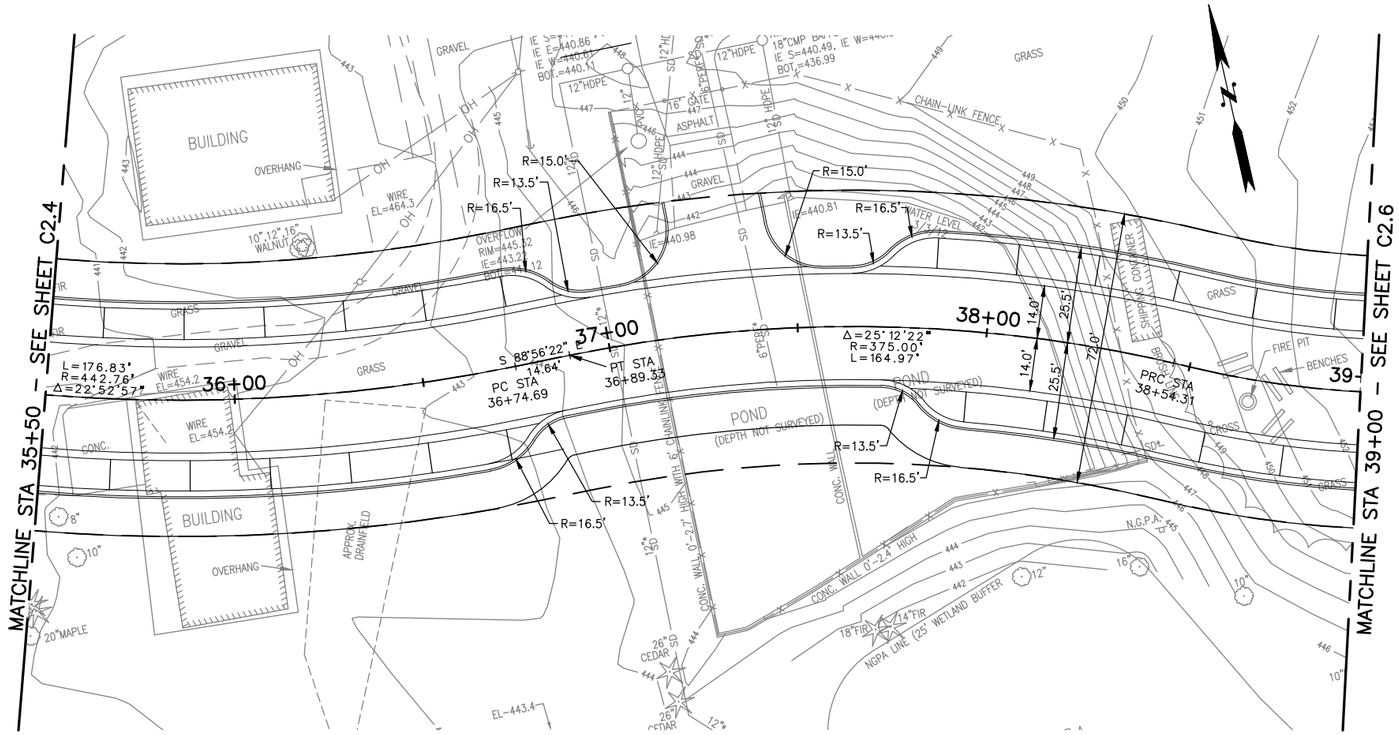

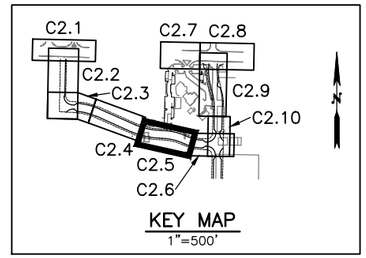

HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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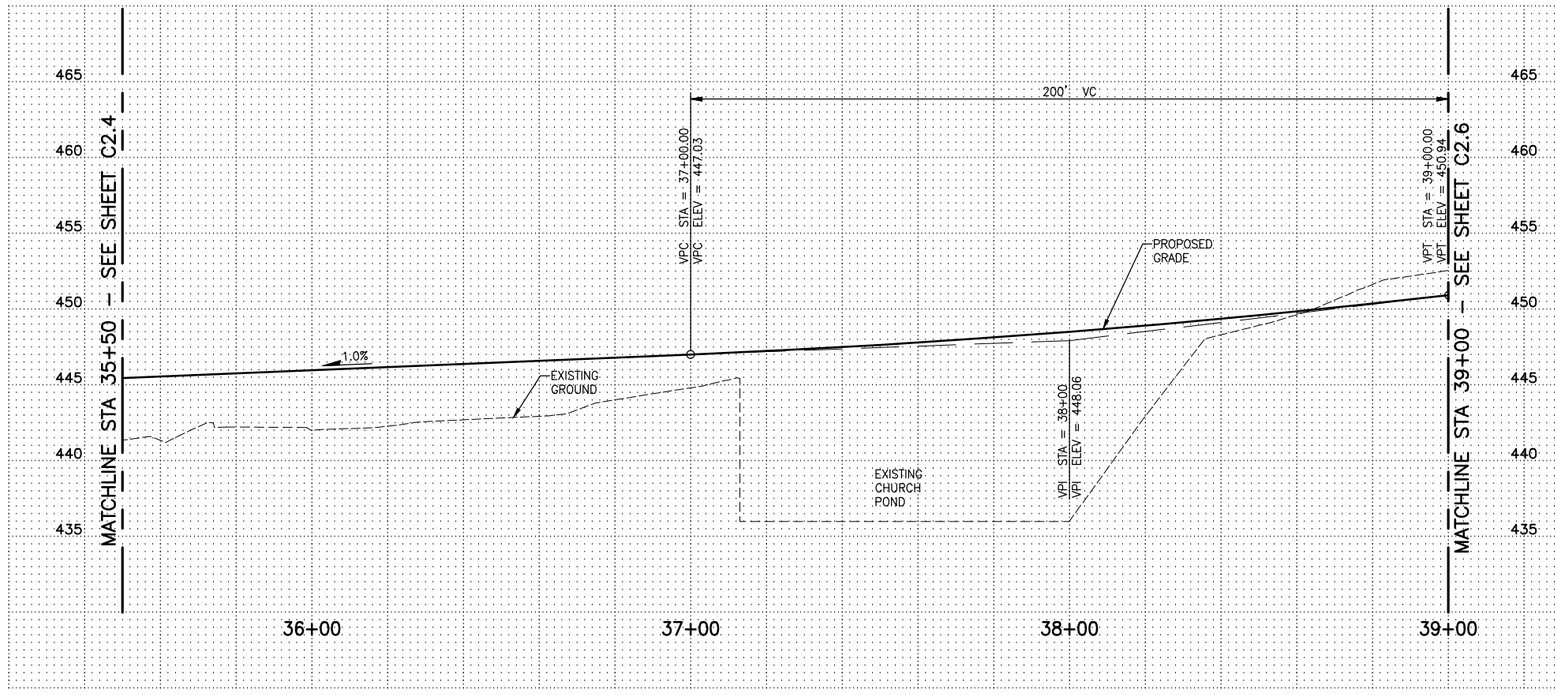

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ROADWAY PLAN AND PROFILE

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DES.	AM
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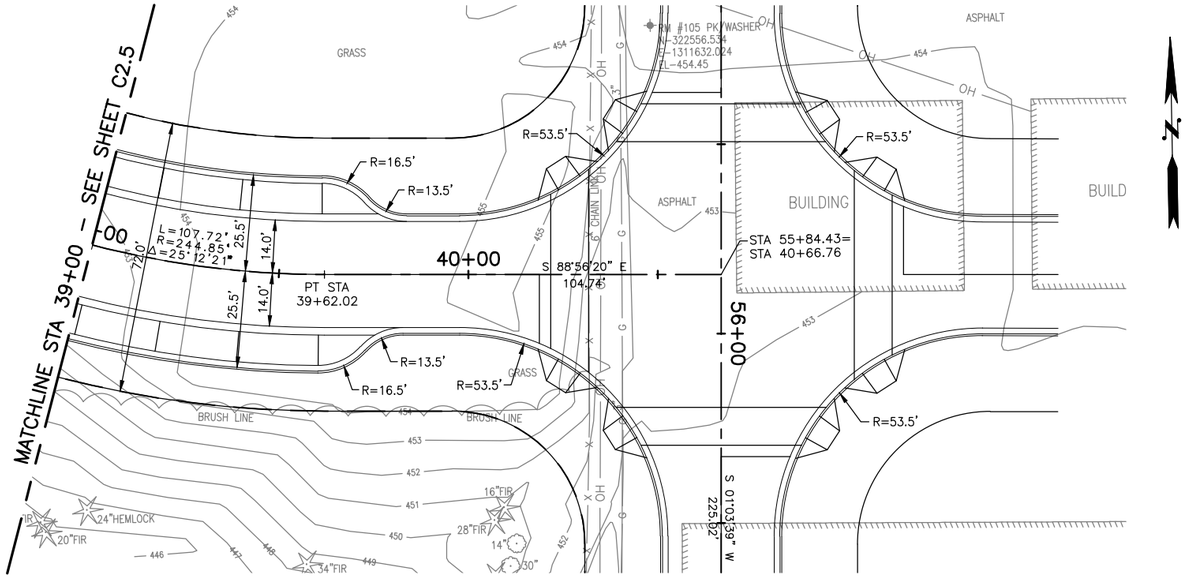
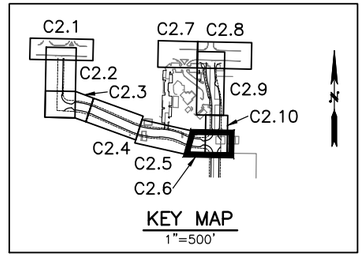
OF	— SHEETS
DATE	MARCH 2013
FILE NO.	212012.005





HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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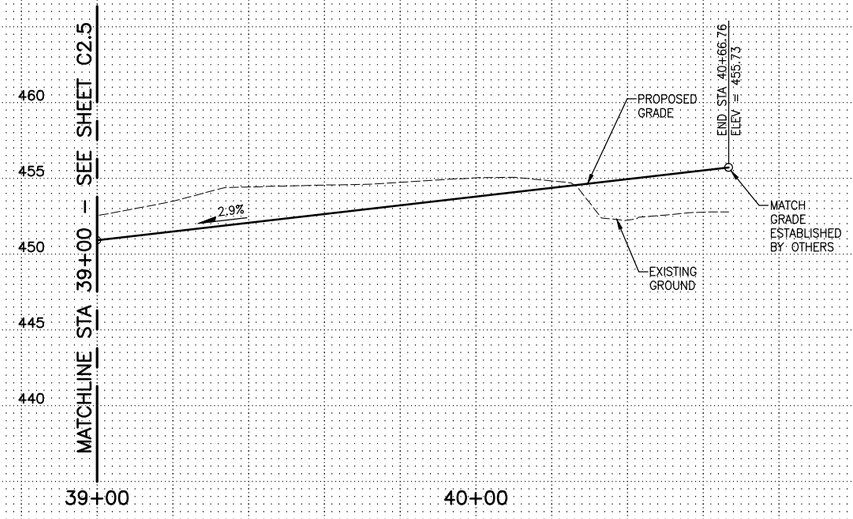

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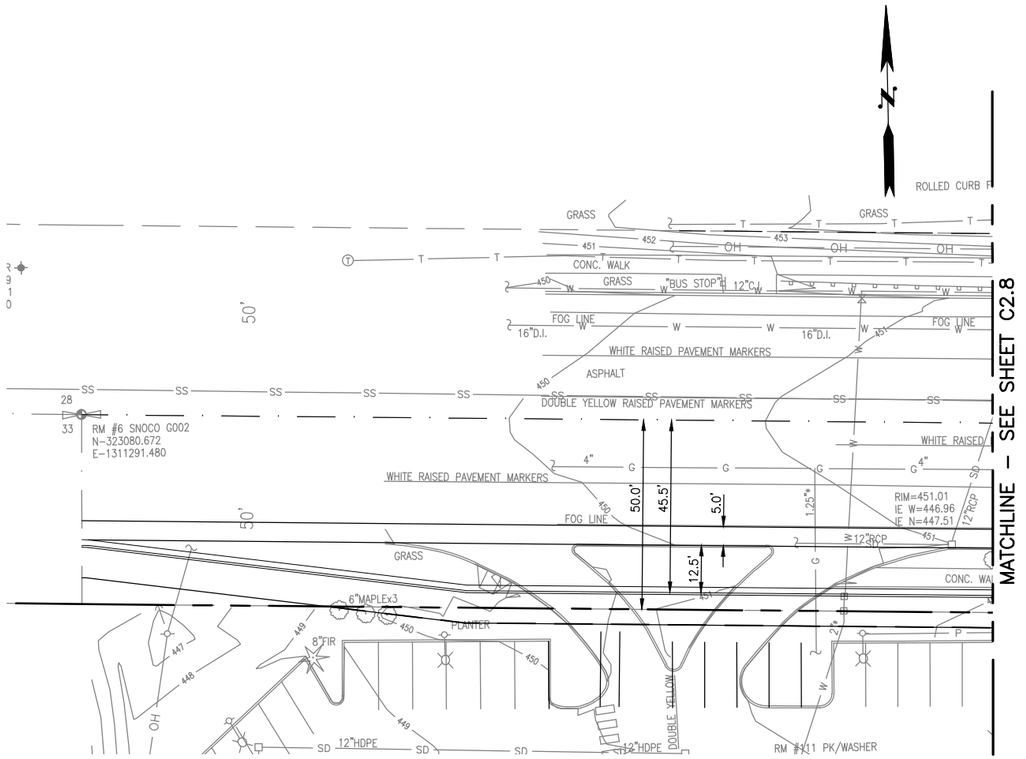

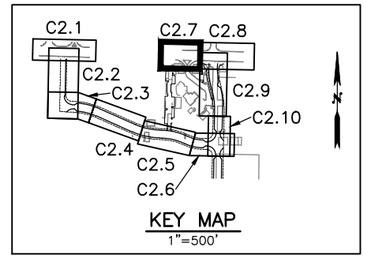

HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10

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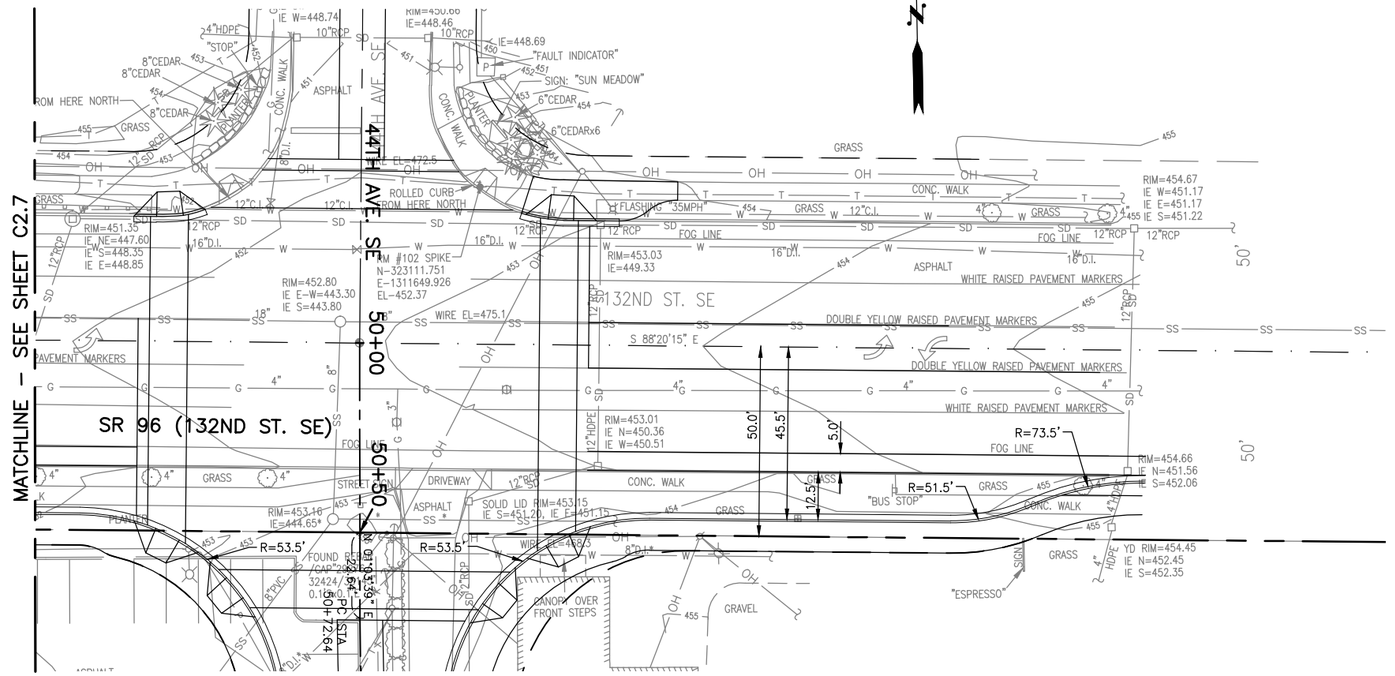

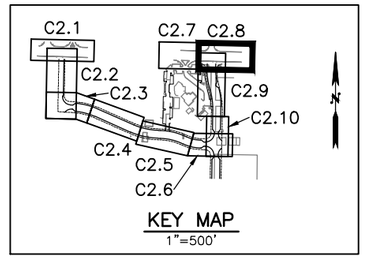

HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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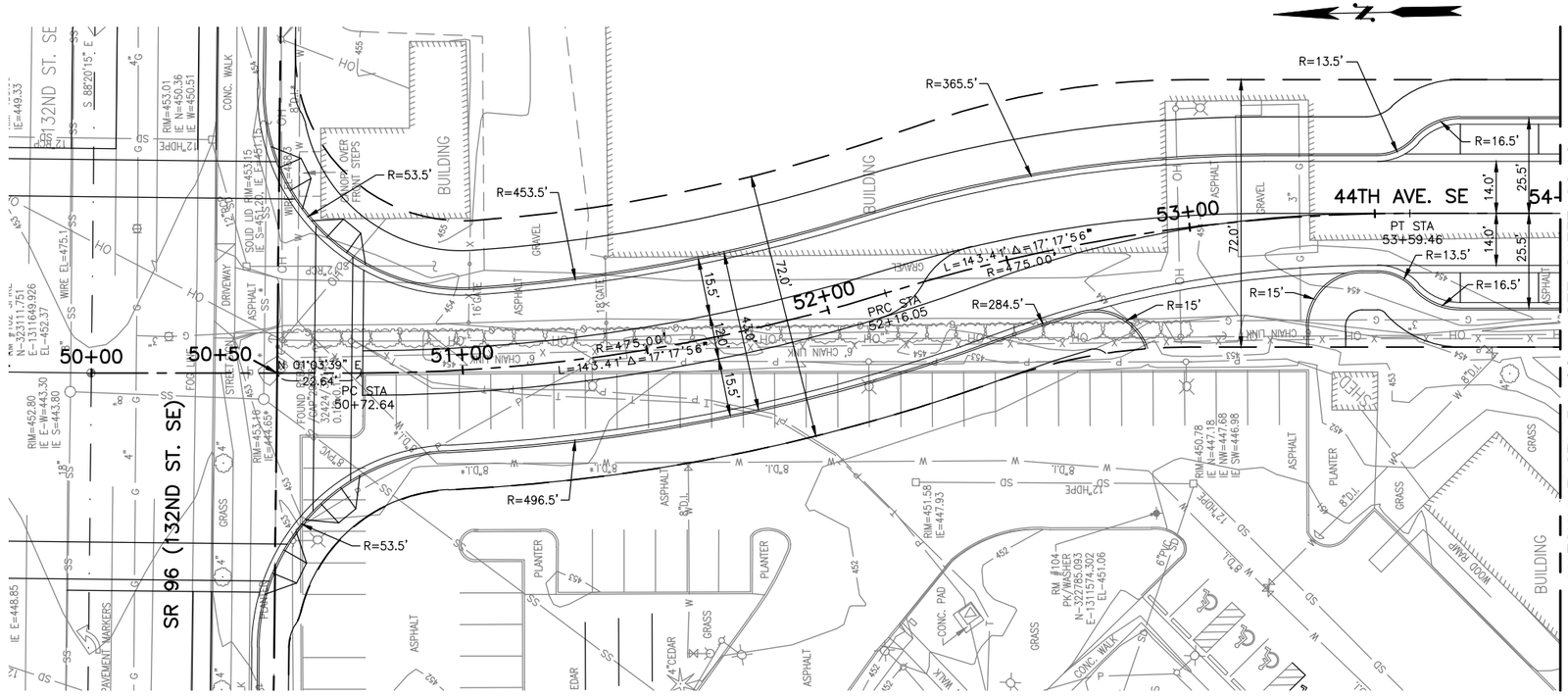

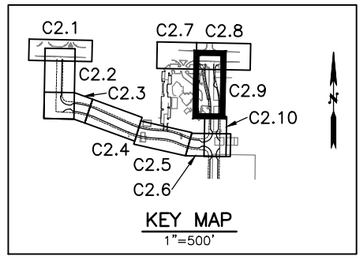

HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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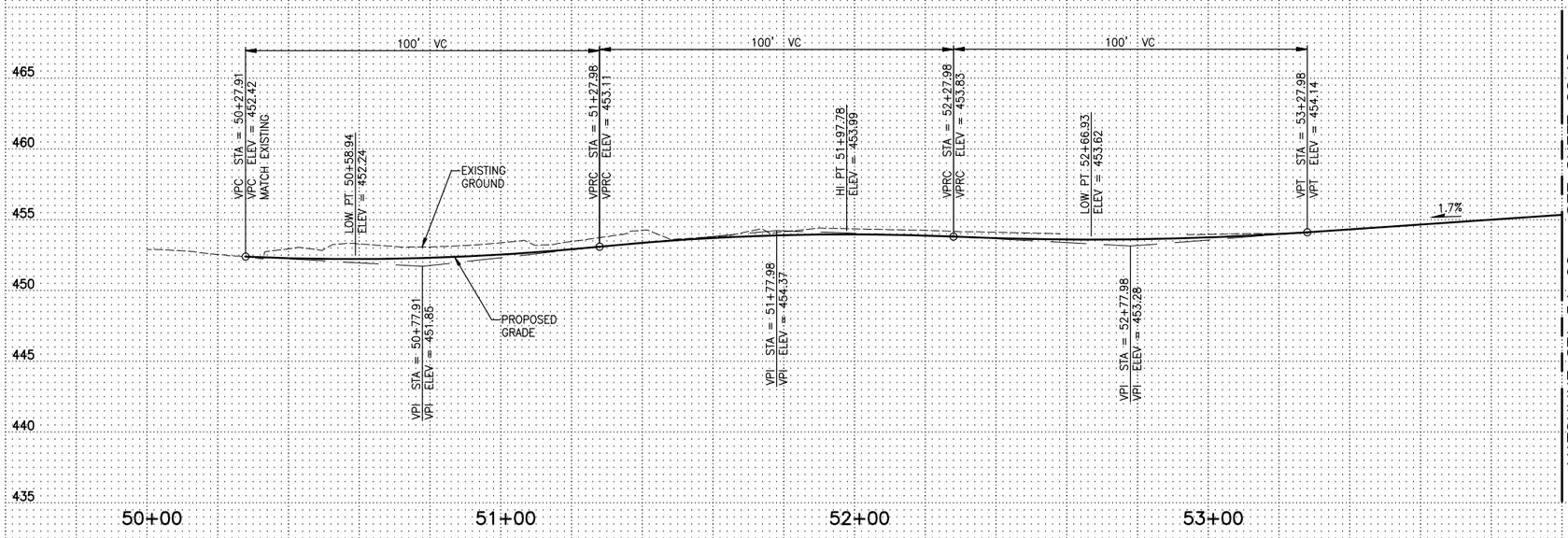

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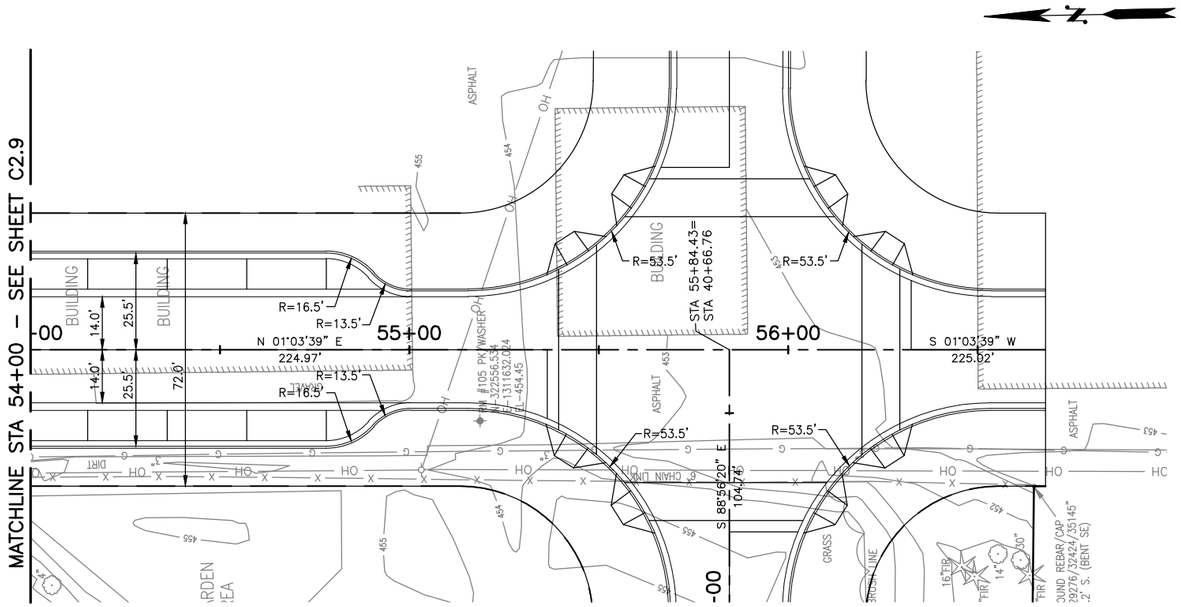

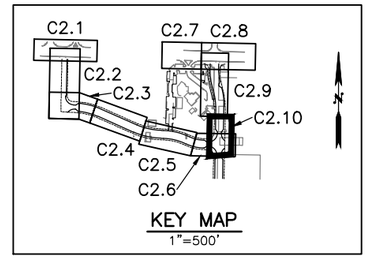

HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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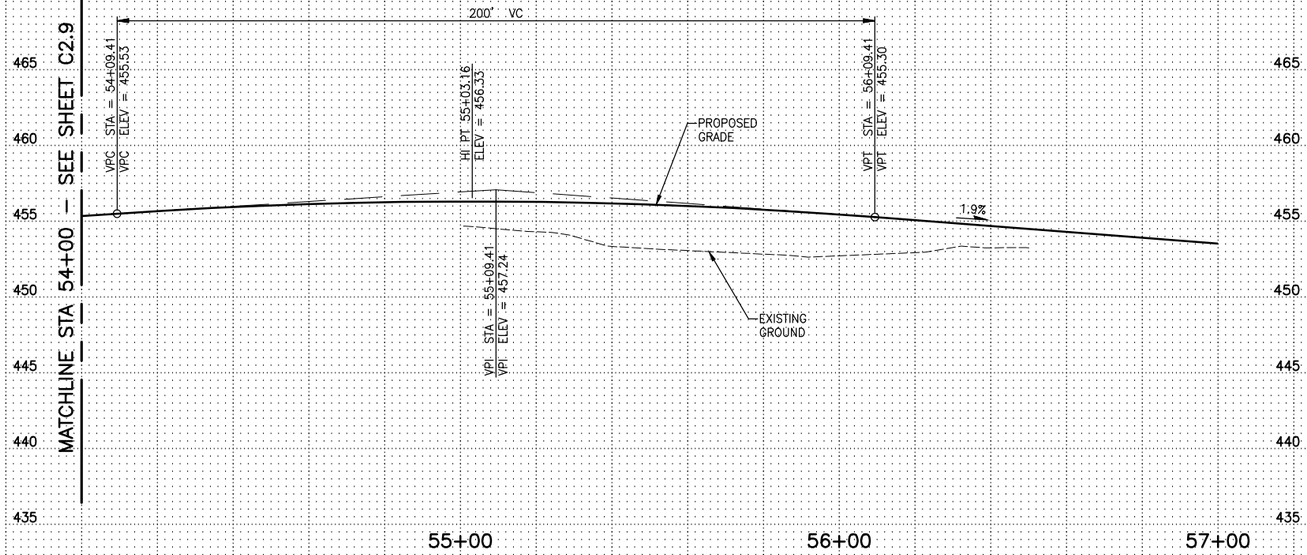

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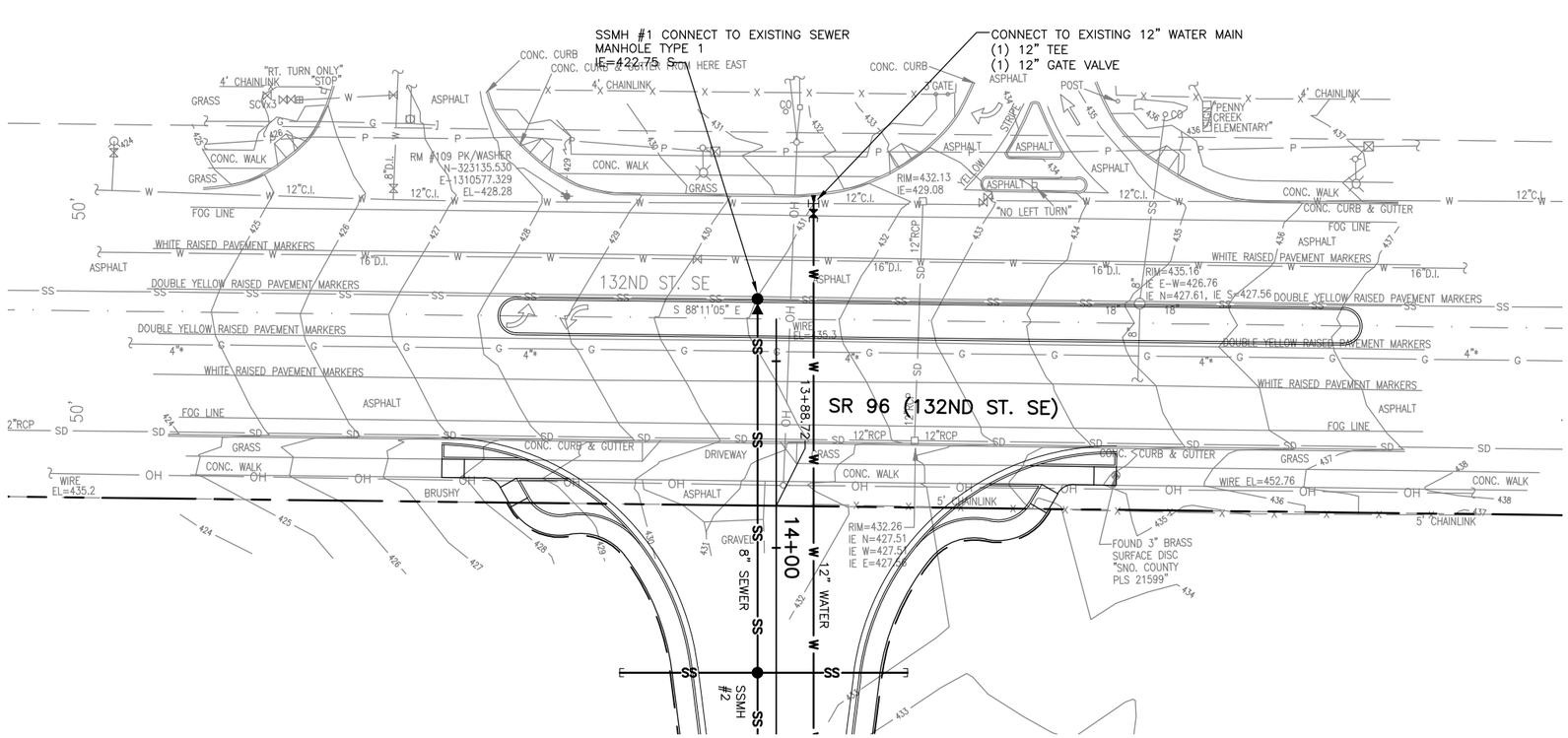
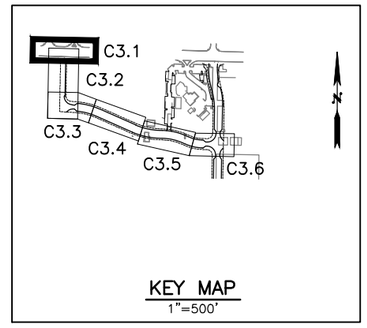


LEDGEND:

- W — WATER MAIN LINE
- SS — SANITARY SEWER LINE
- ● — SS MANHOLE



KEY MAP
1"=500'

HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10

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WATER AND SANITARY SEWER
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CH. _	
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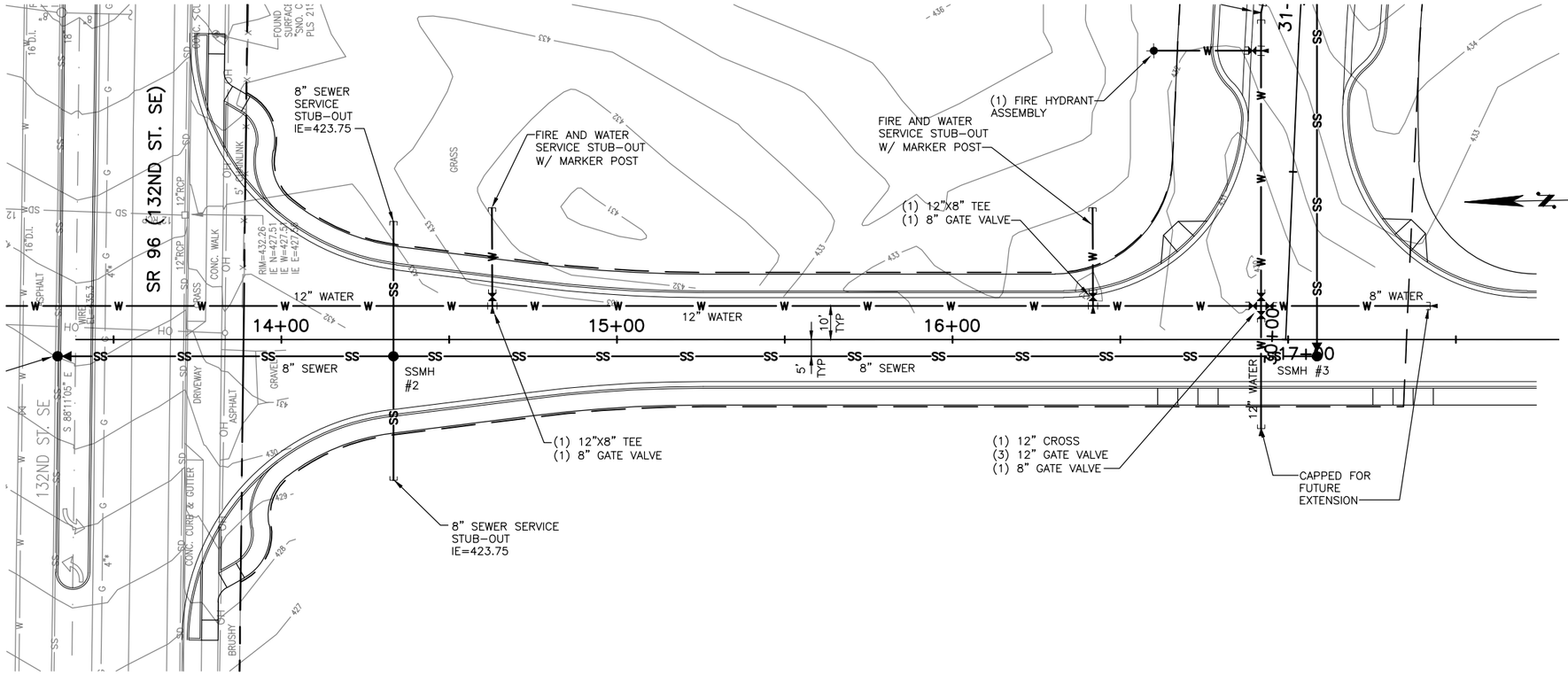
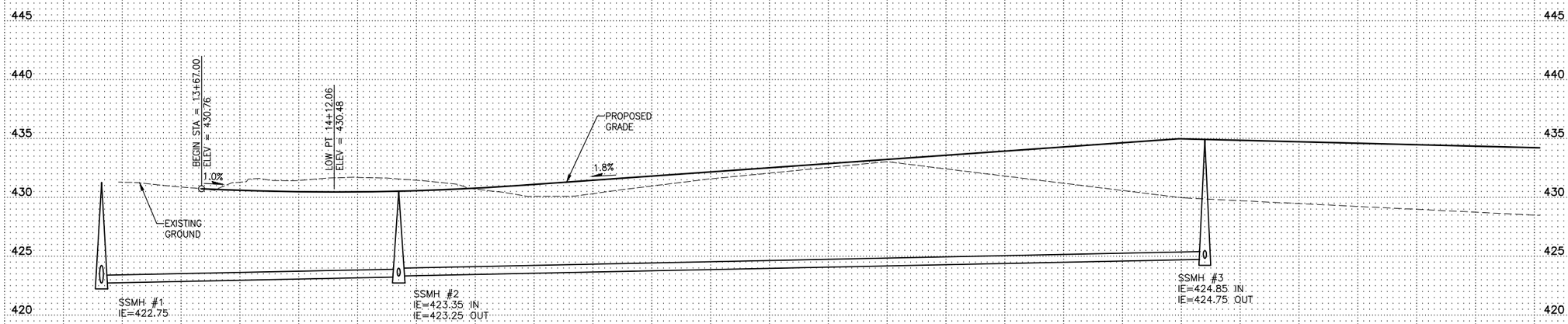
DATE	MARCH 2013
FILE NO.	212012.005





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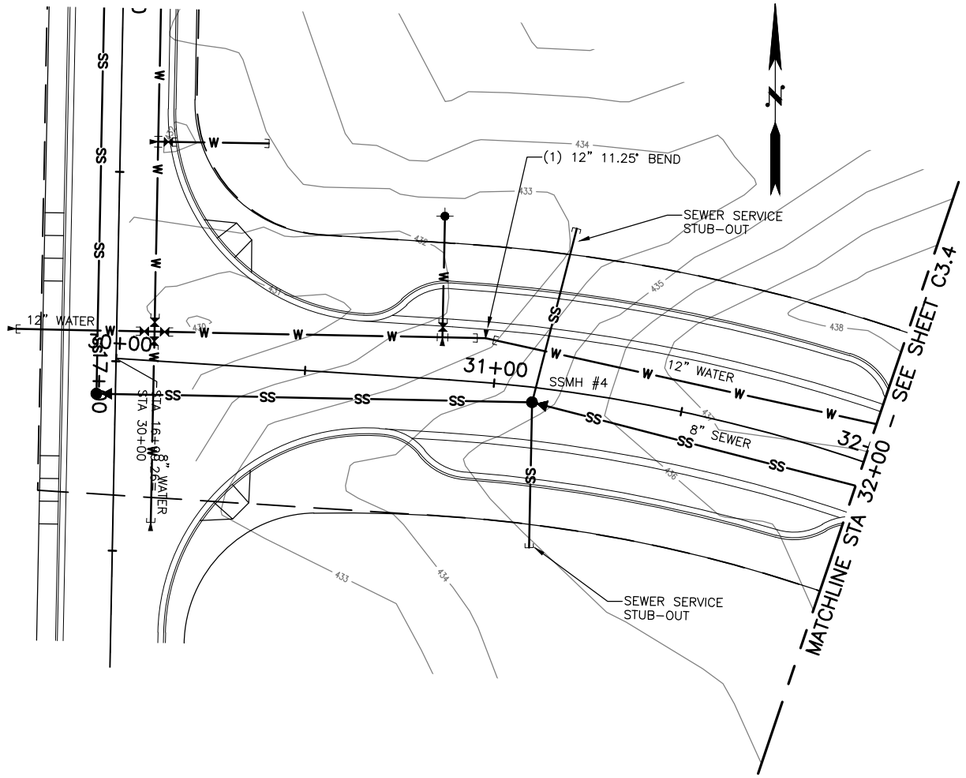

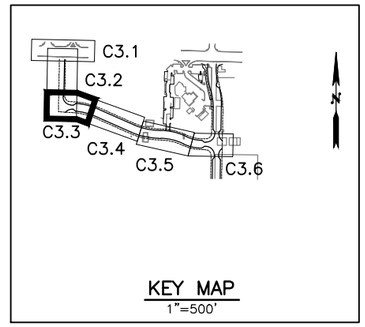

HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
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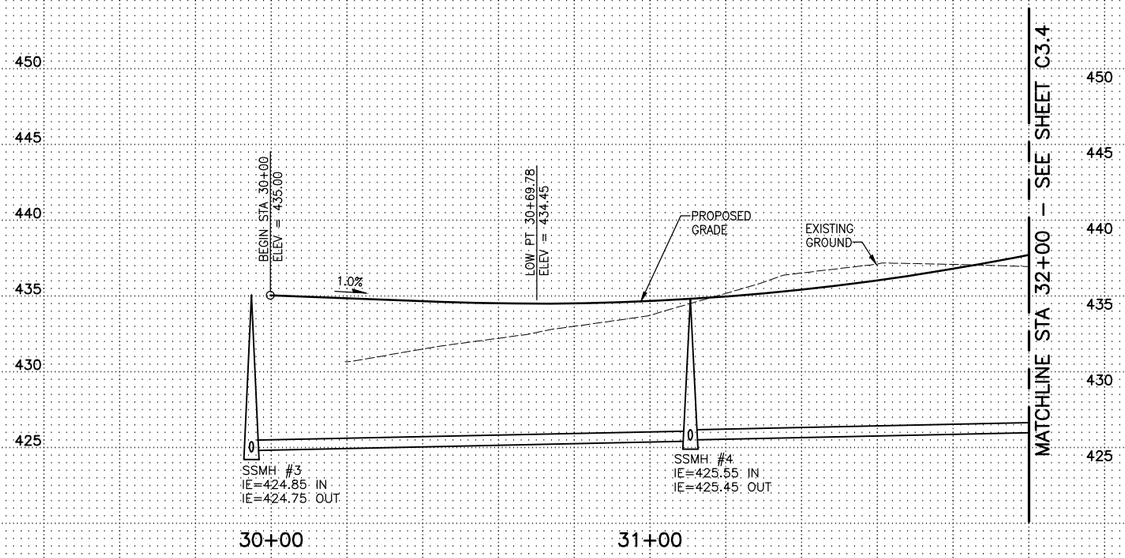

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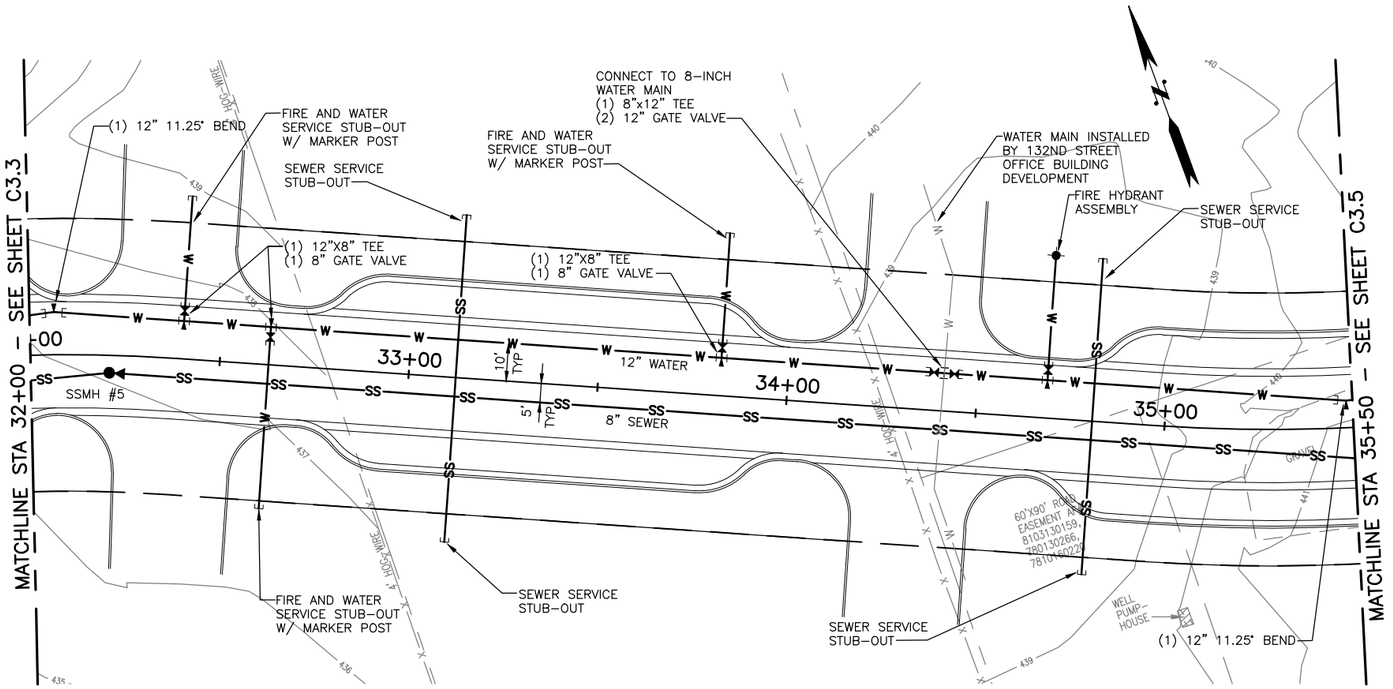

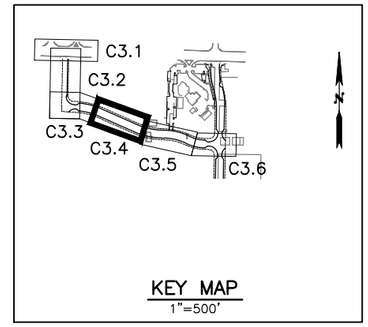

HORIZONTAL SCALE IN FEET
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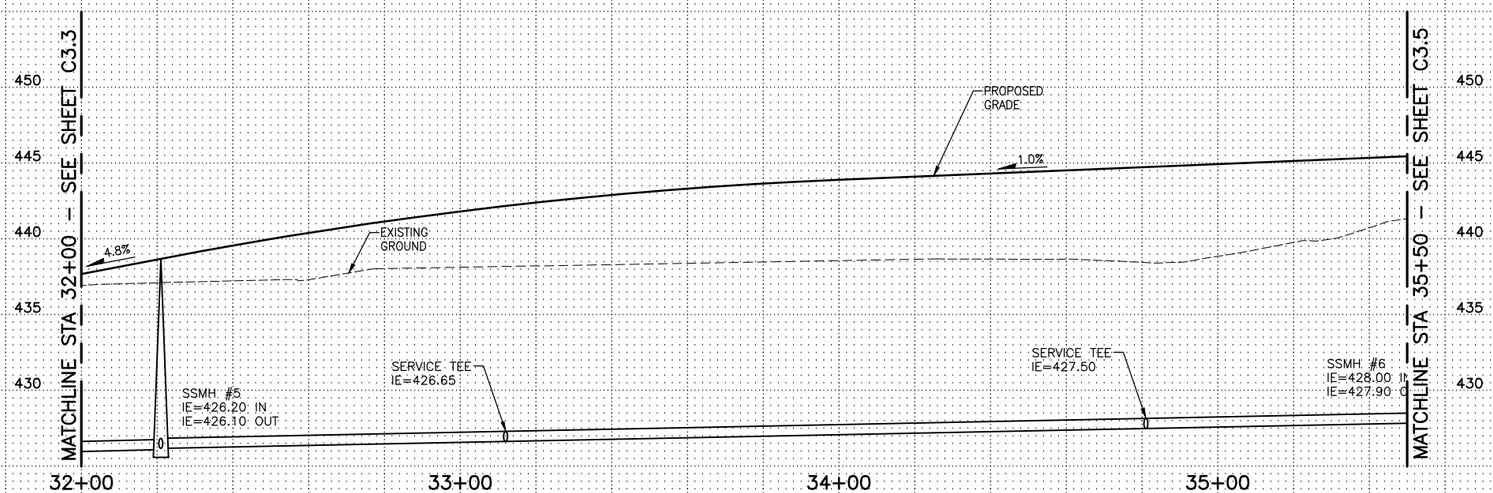

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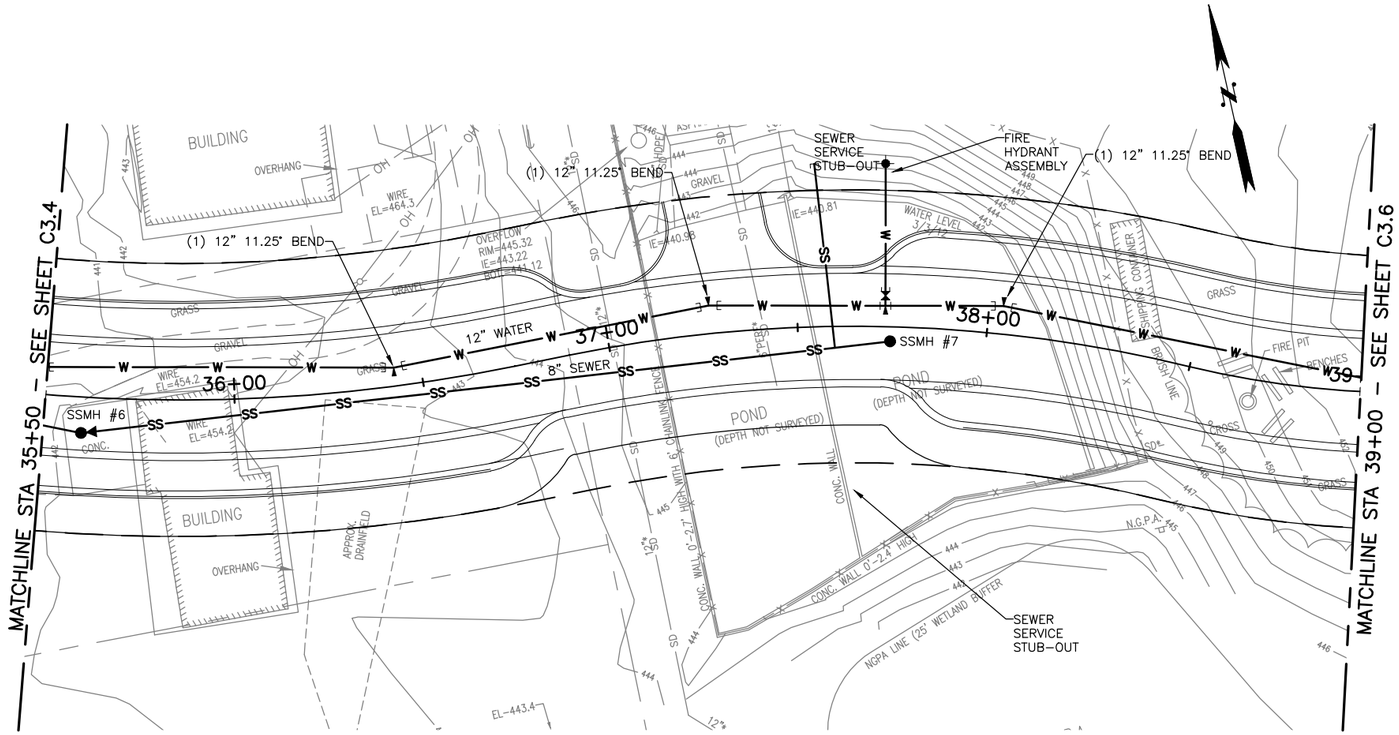
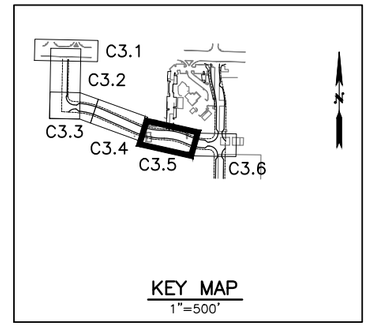
02/21/2013 8:44am I:\21\2012\005 Mill Creek EGUV\Design\1205-C31.dwg

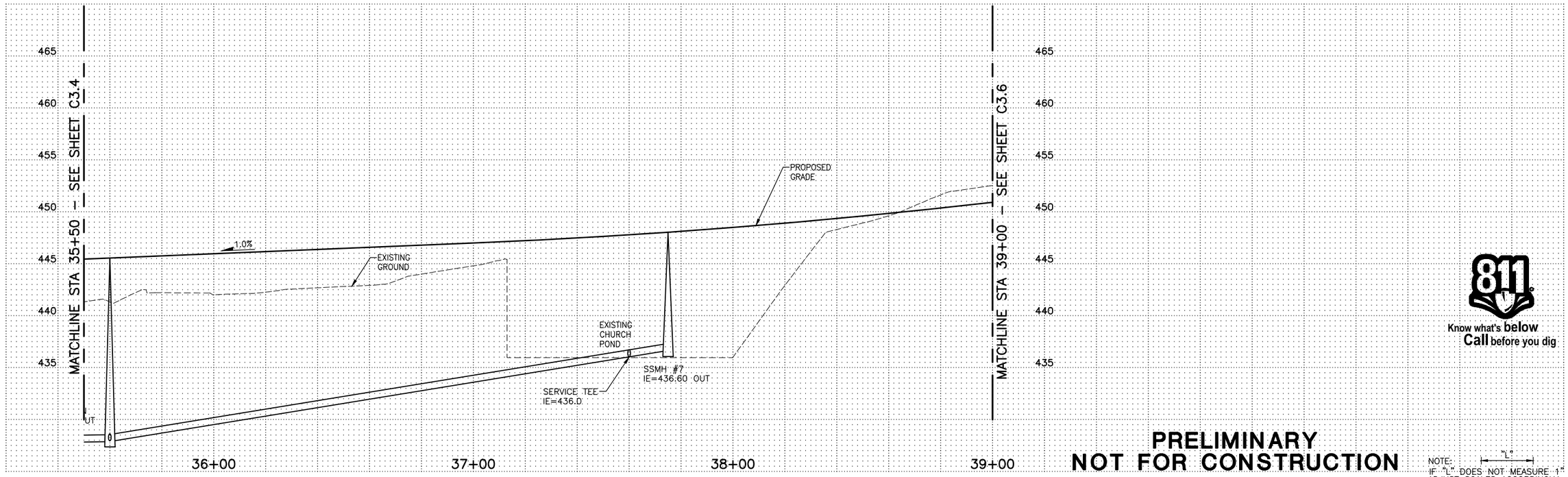




KEY MAP
1"=500'

HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10



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WATER AND SANITARY SEWER
PLAN AND PROFILE

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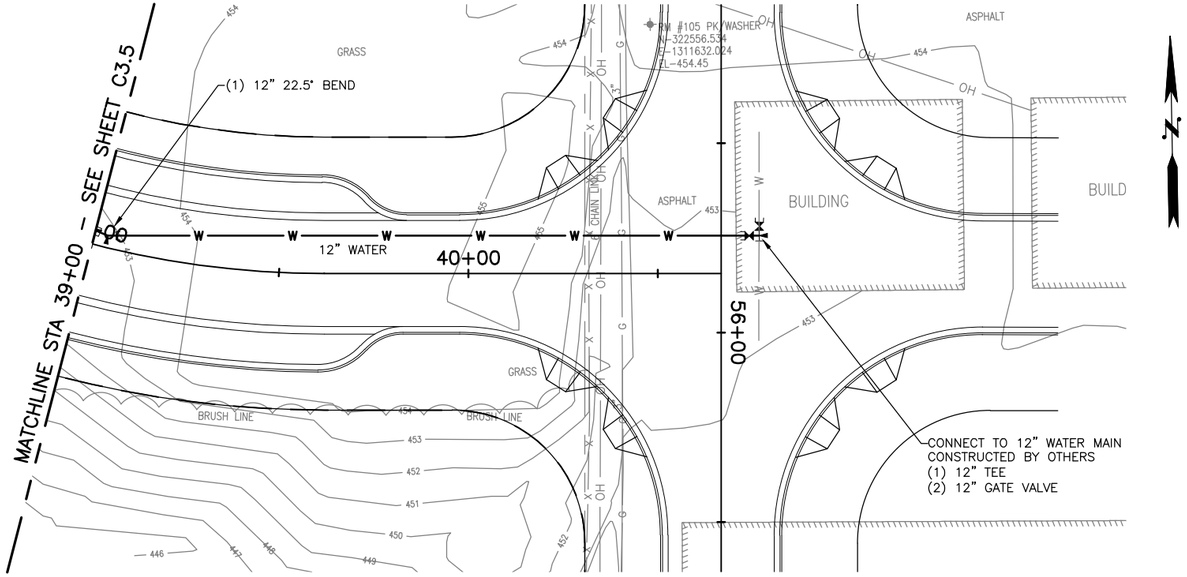
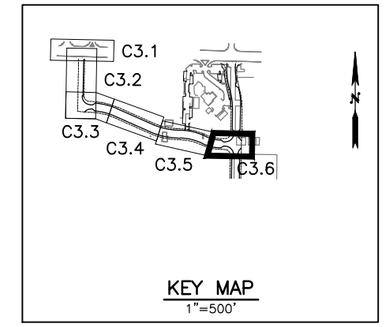
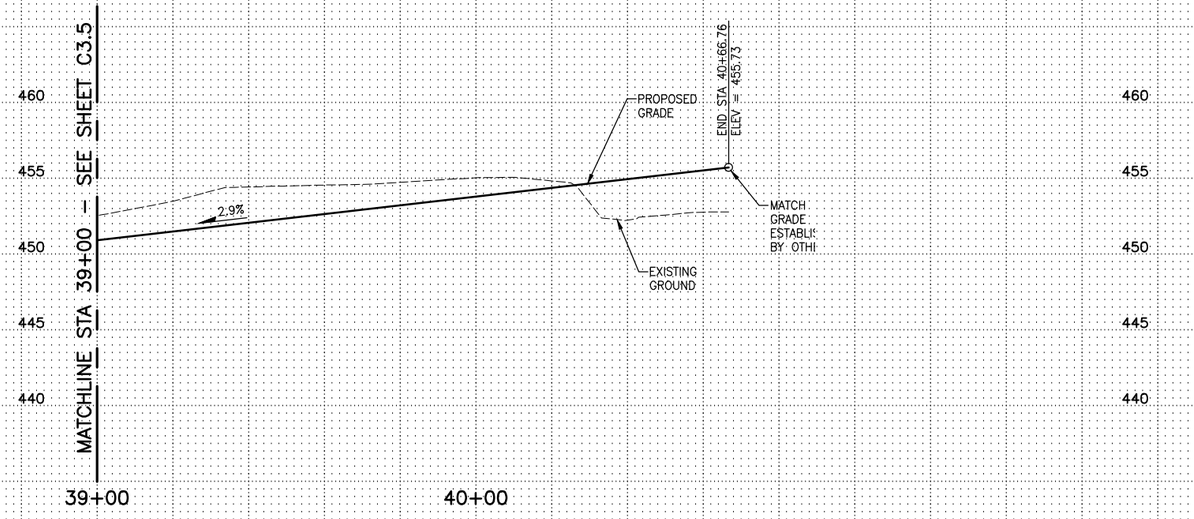




HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10



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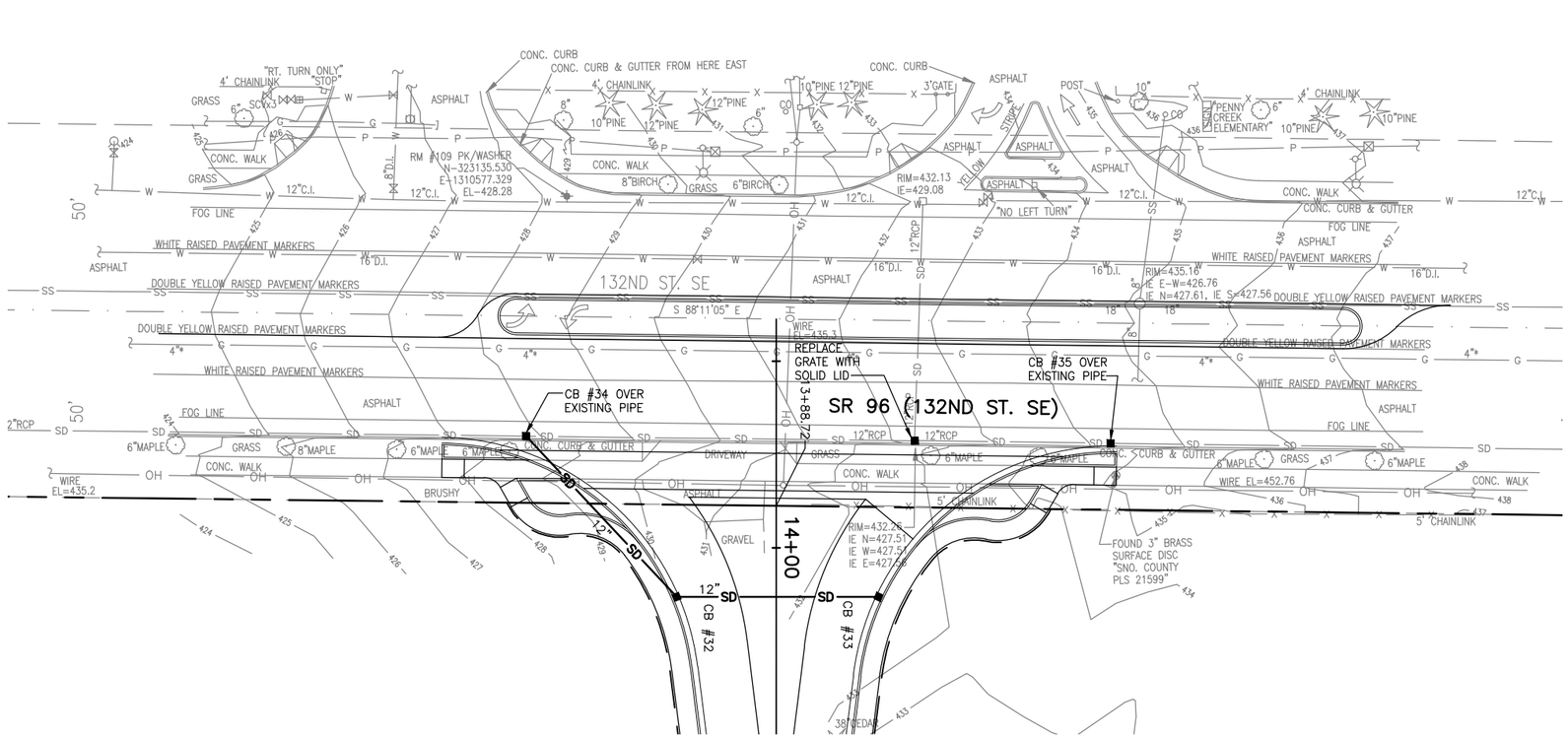
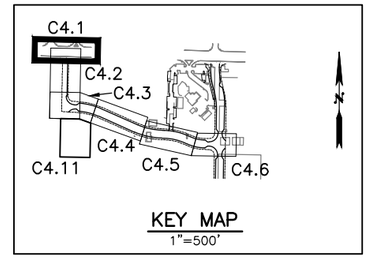


LEGEND:

- SD — STORM DRAIN LINE
- ■ CATCH BASIN TYPE 1
- ● CATCH BASIN TYPE 2
- • CLEAN OUT
- ⊗ SD MANHOLE



KEY MAP
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HORIZONTAL SCALE IN FEET
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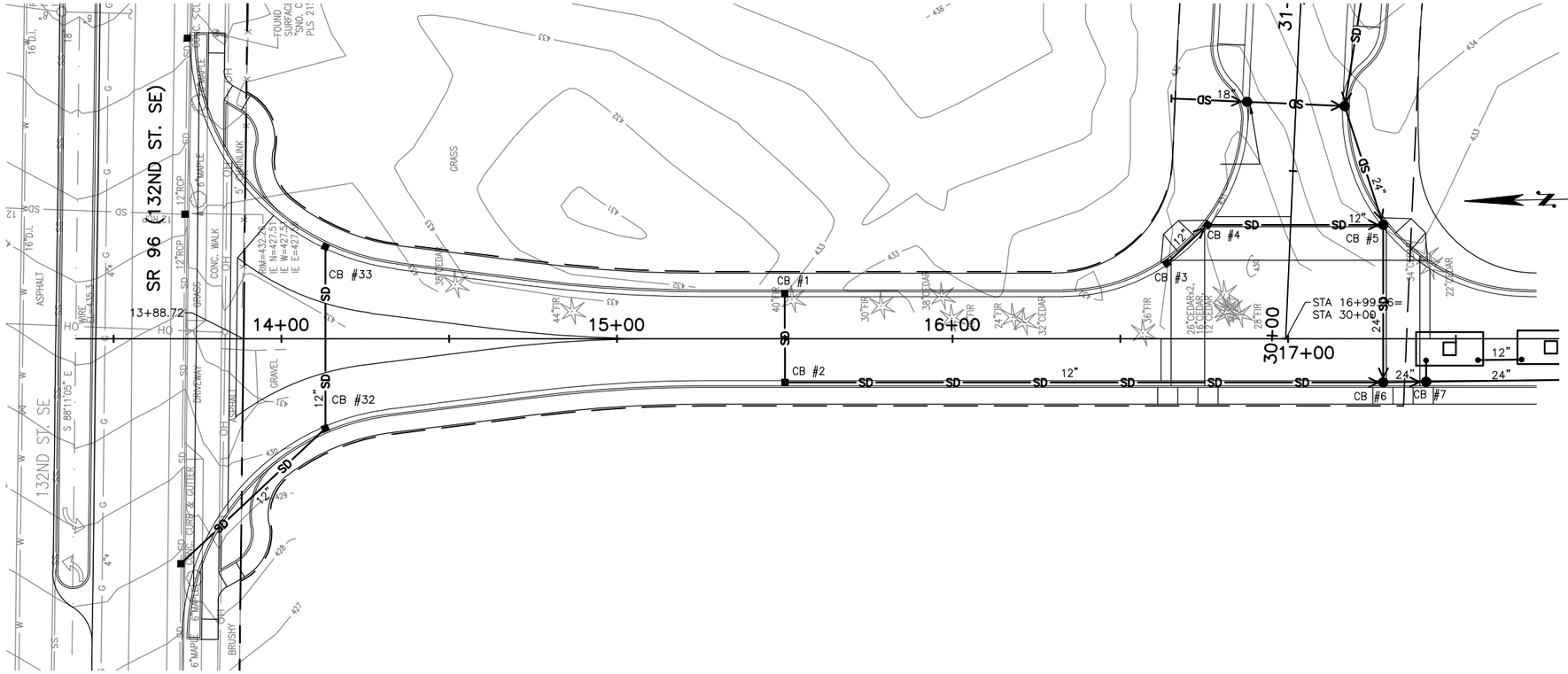

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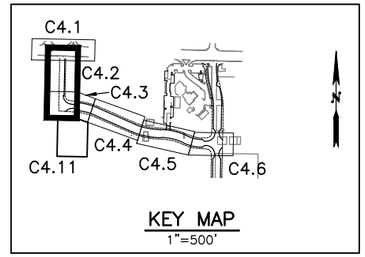

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HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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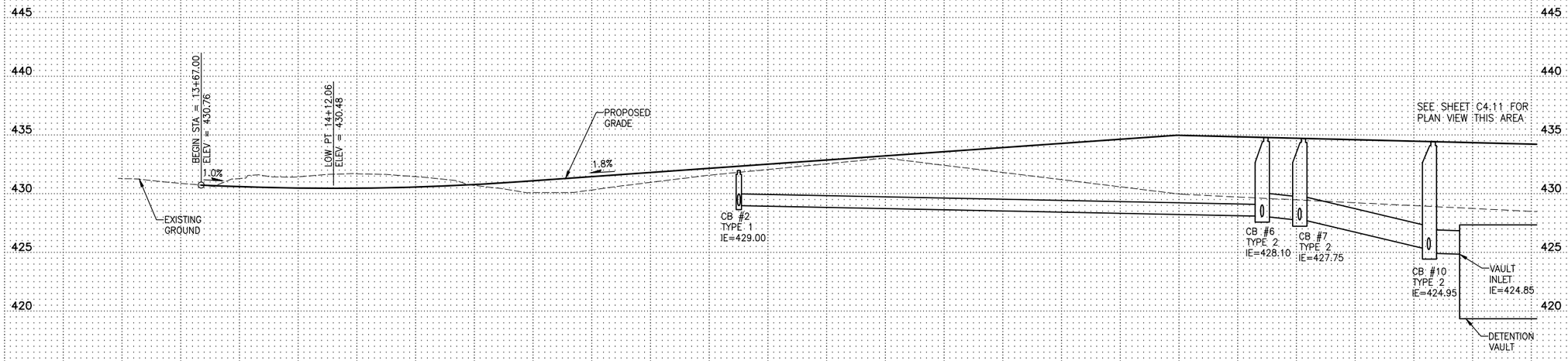

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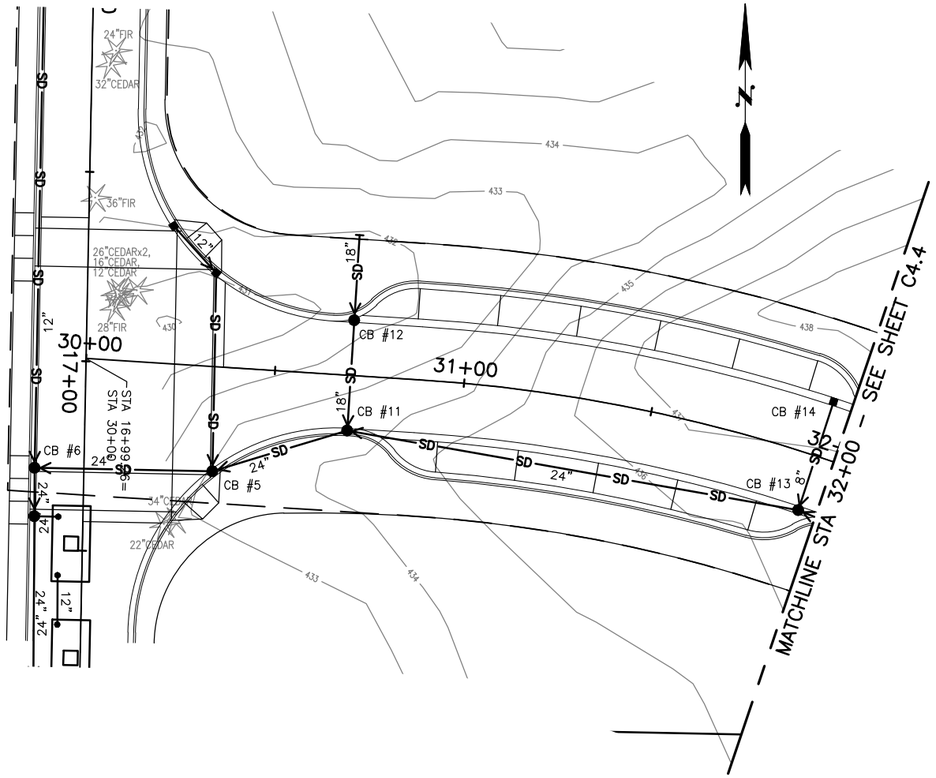

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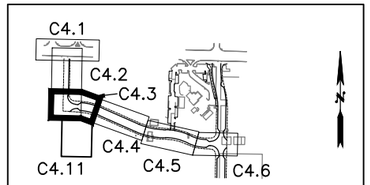

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HORIZONTAL SCALE IN FEET
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VERTICAL SCALE IN FEET
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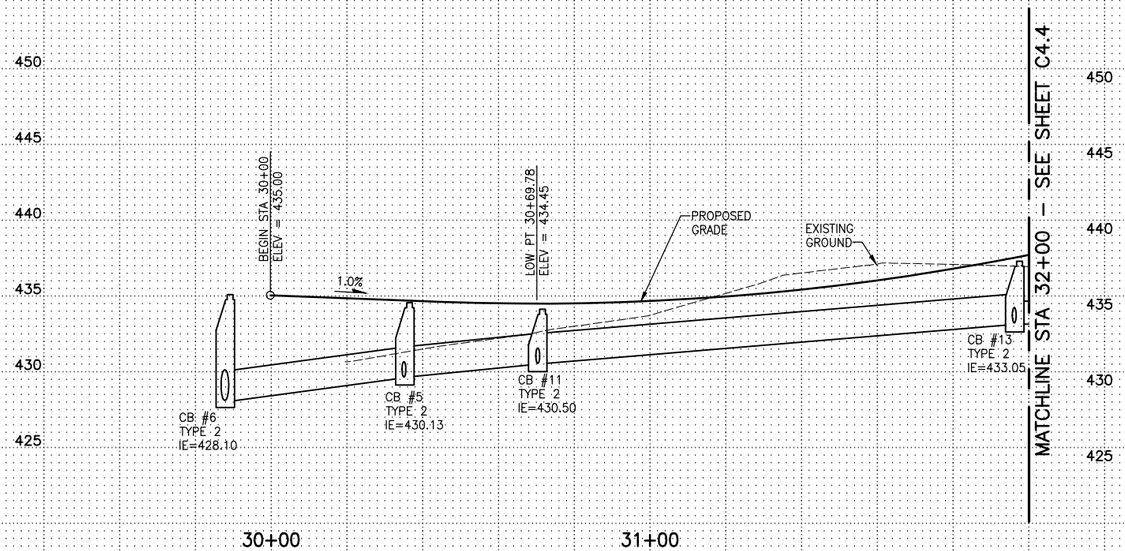

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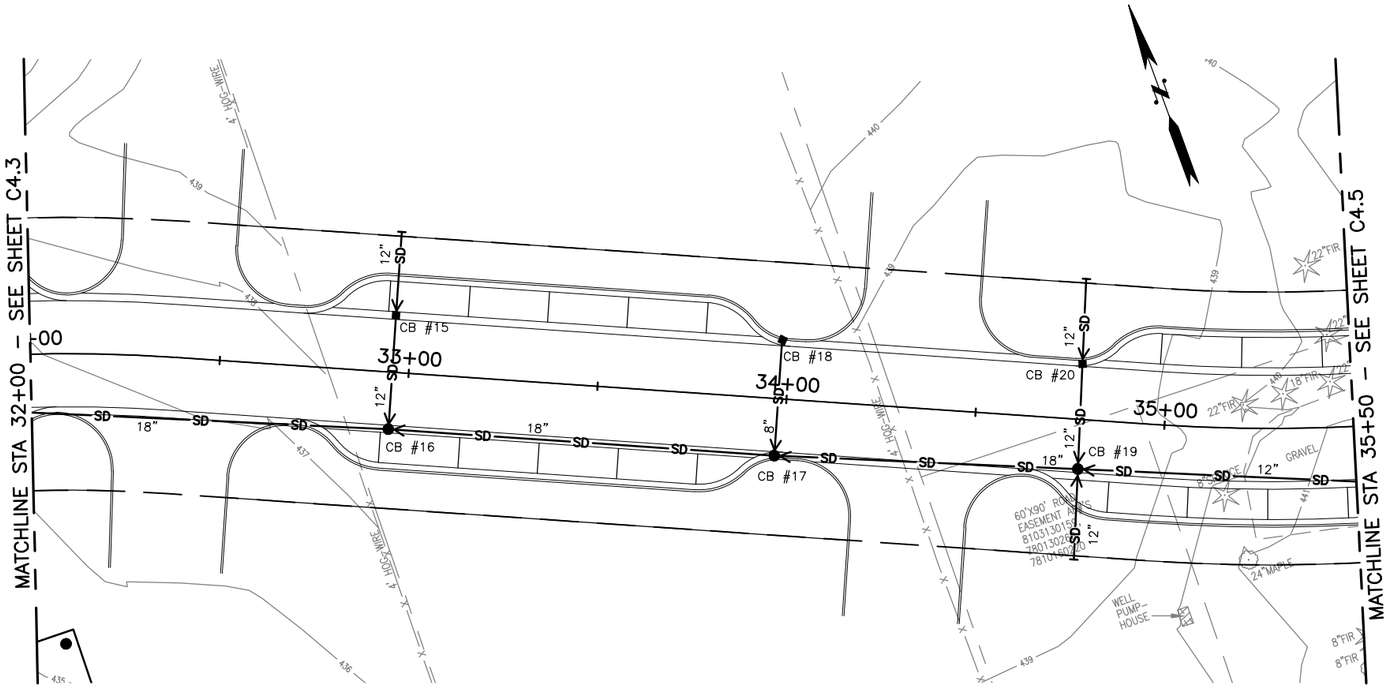

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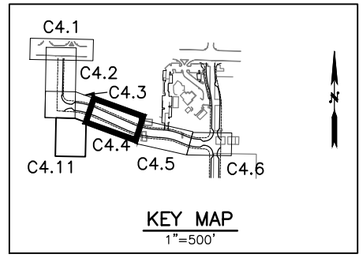

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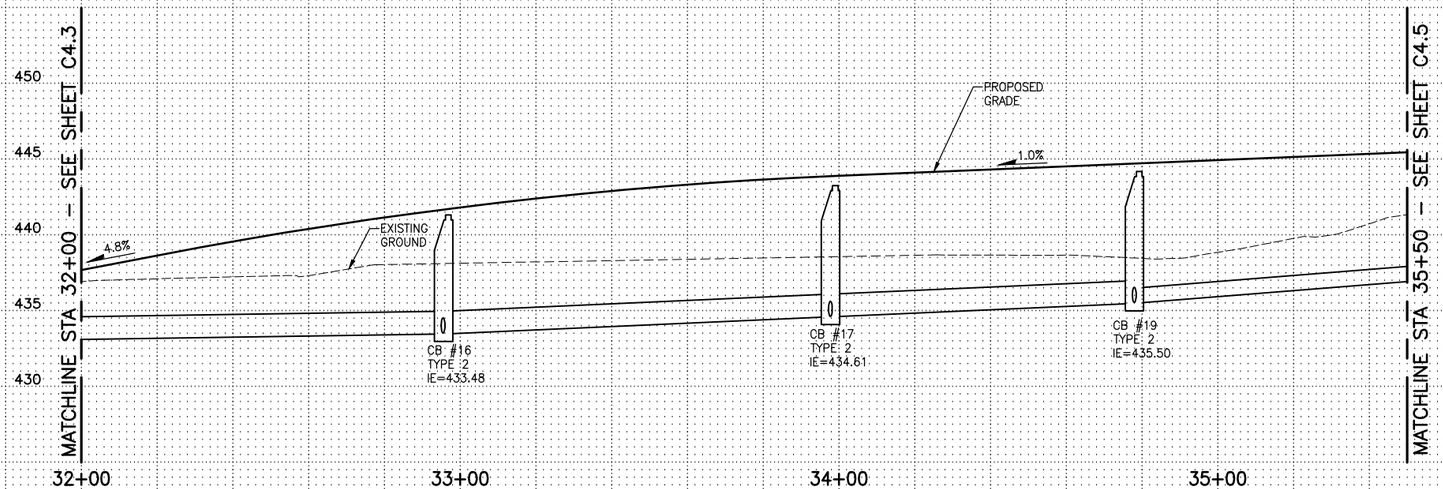

HORIZONTAL SCALE IN FEET
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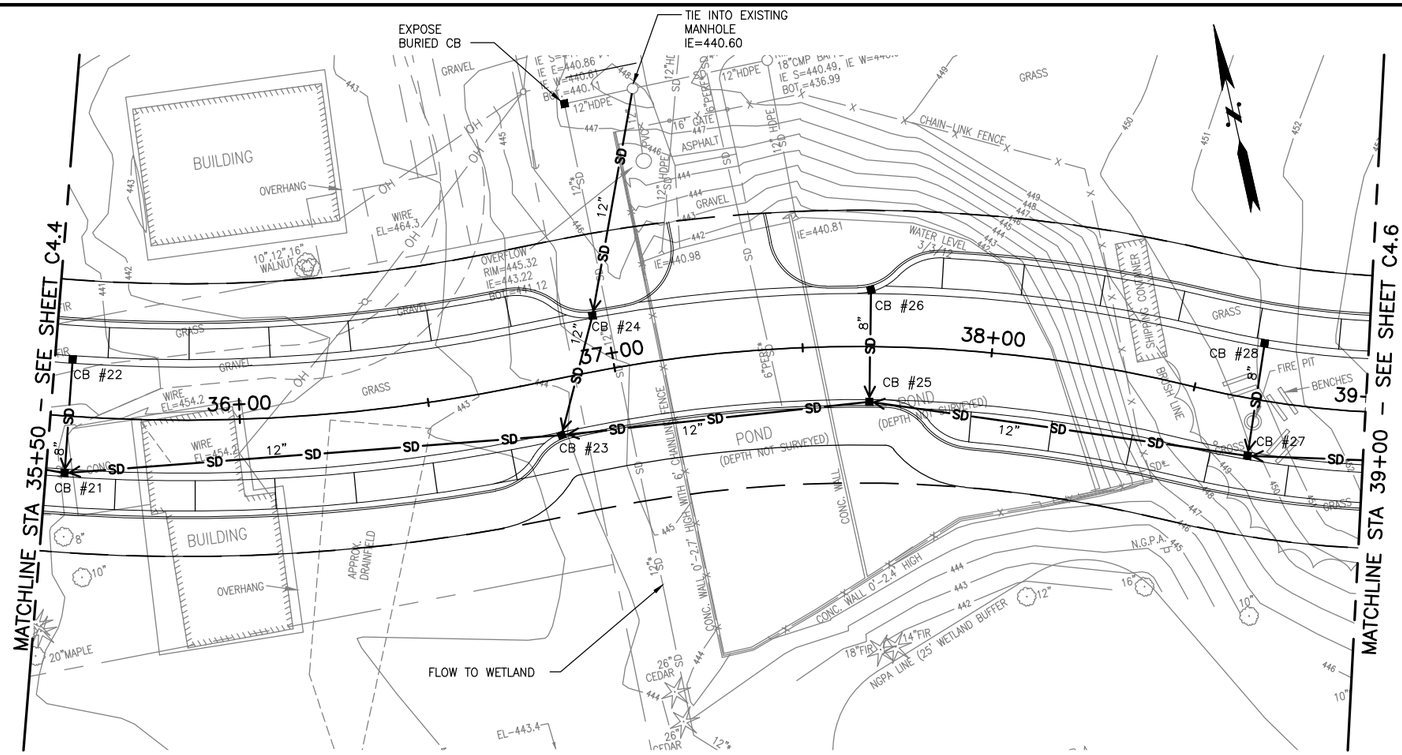

LEGEND:

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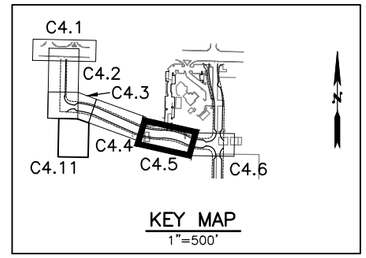

KEY MAP
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VERTICAL SCALE IN FEET
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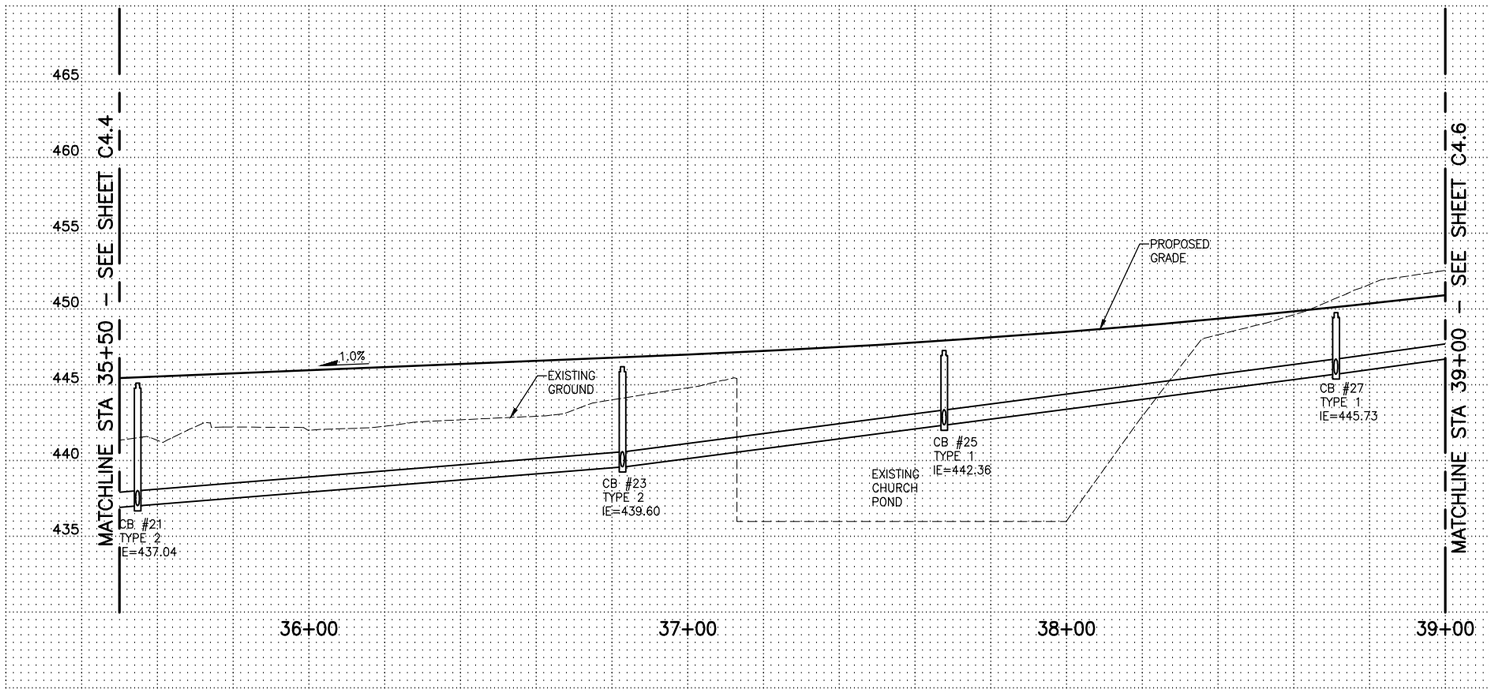

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SHEET NO.	C4.5
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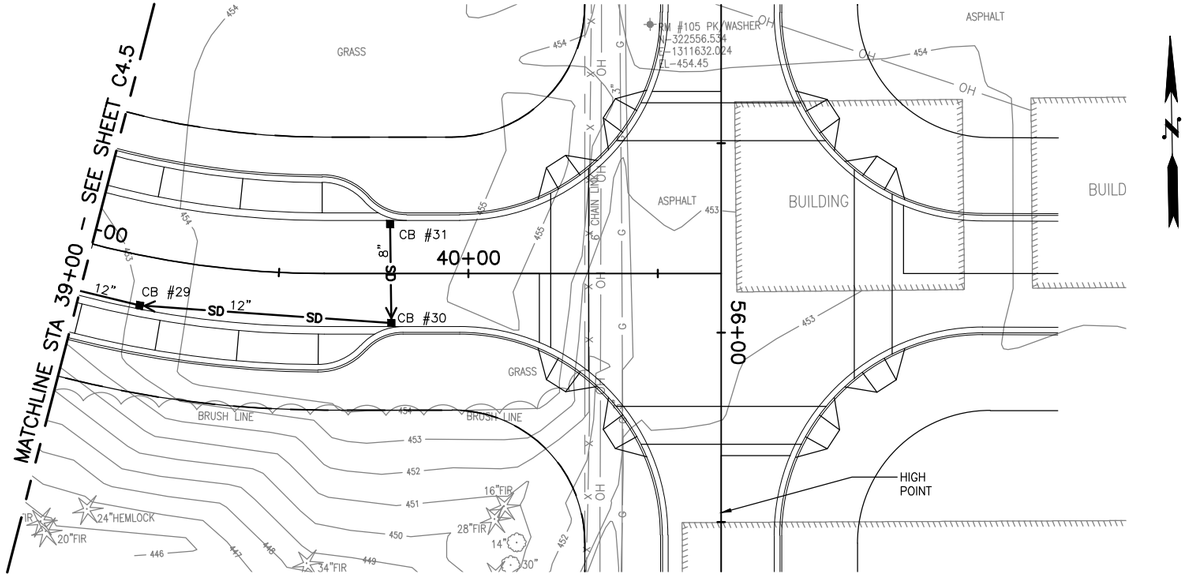

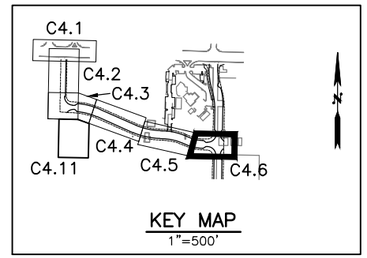

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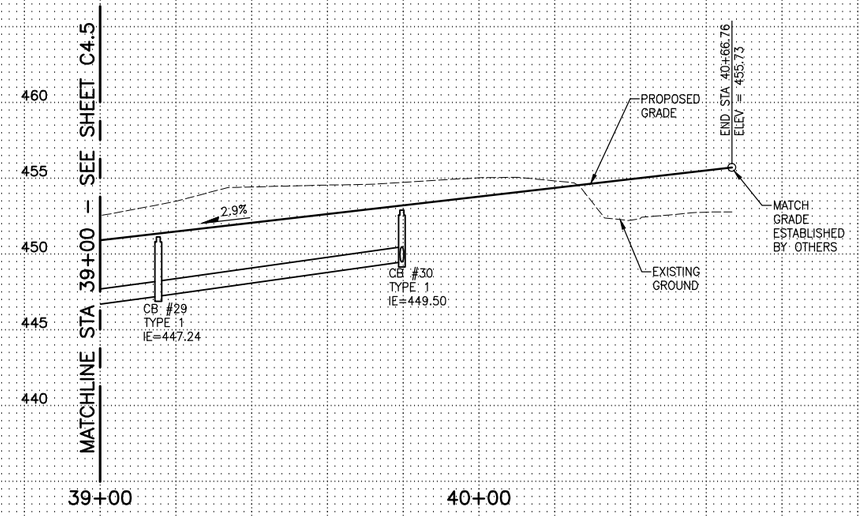
HORIZONTAL SCALE IN FEET
20 0 20 40

VERTICAL SCALE IN FEET
5 0 5 10



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STORM DRAINAGE PLAN AND PROFILE

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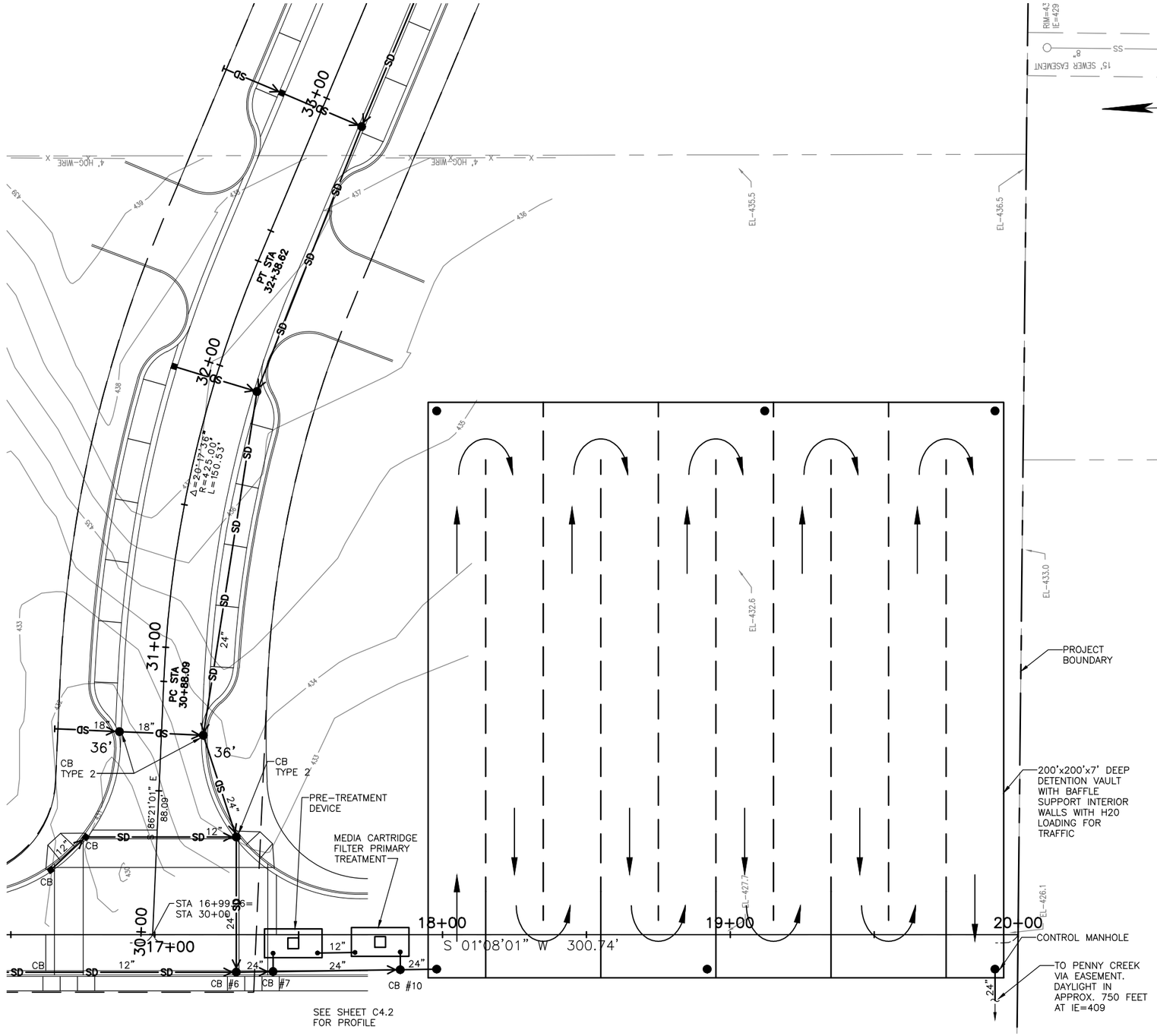

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STORM DRAINAGE VAULT PLAN

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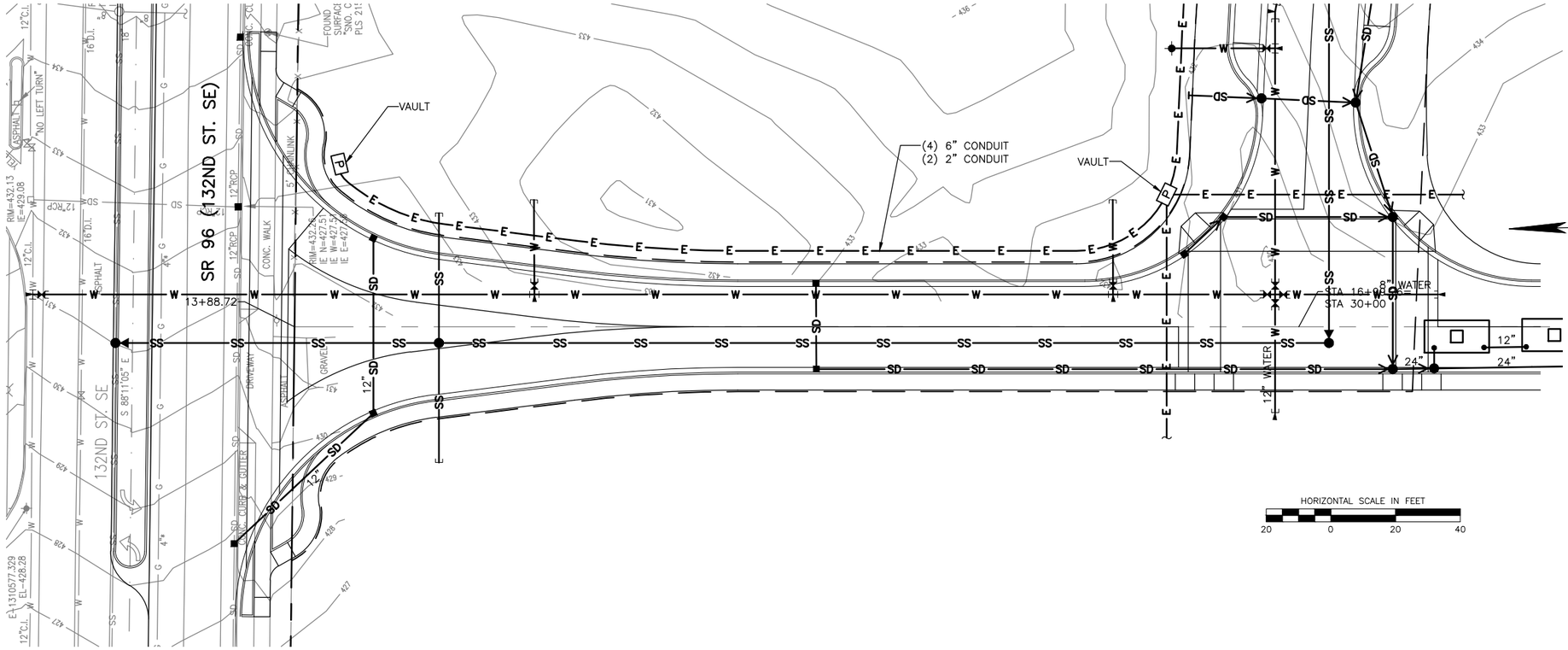
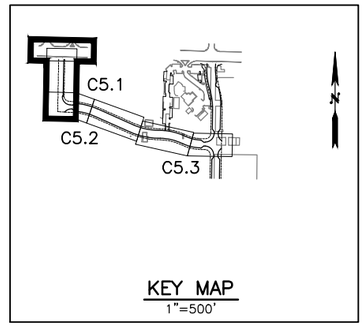


LEDGEND:

- SD — STORM DRAIN LINE
- W — WATER MAIN LINE
- SS — SANITARY SEWER LINE
- CATCH BASIN
- CLEAN OUT
- SD MANHOLE
- SS MANHOLE



KEY MAP
1"=500'

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UTILITY COORDINATION PLAN

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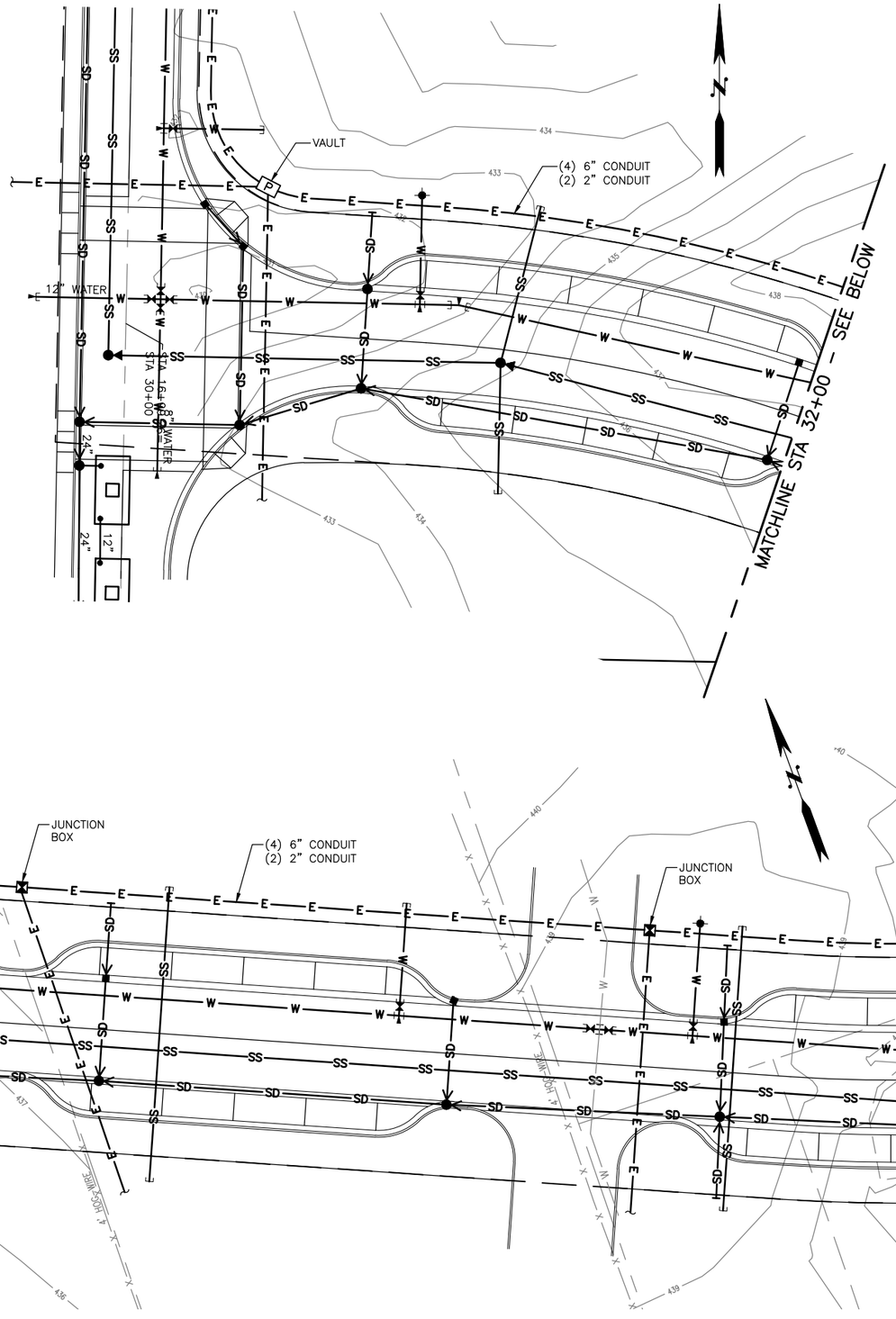

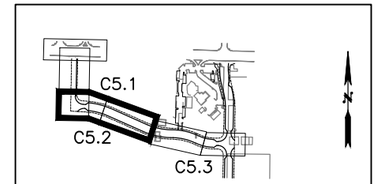

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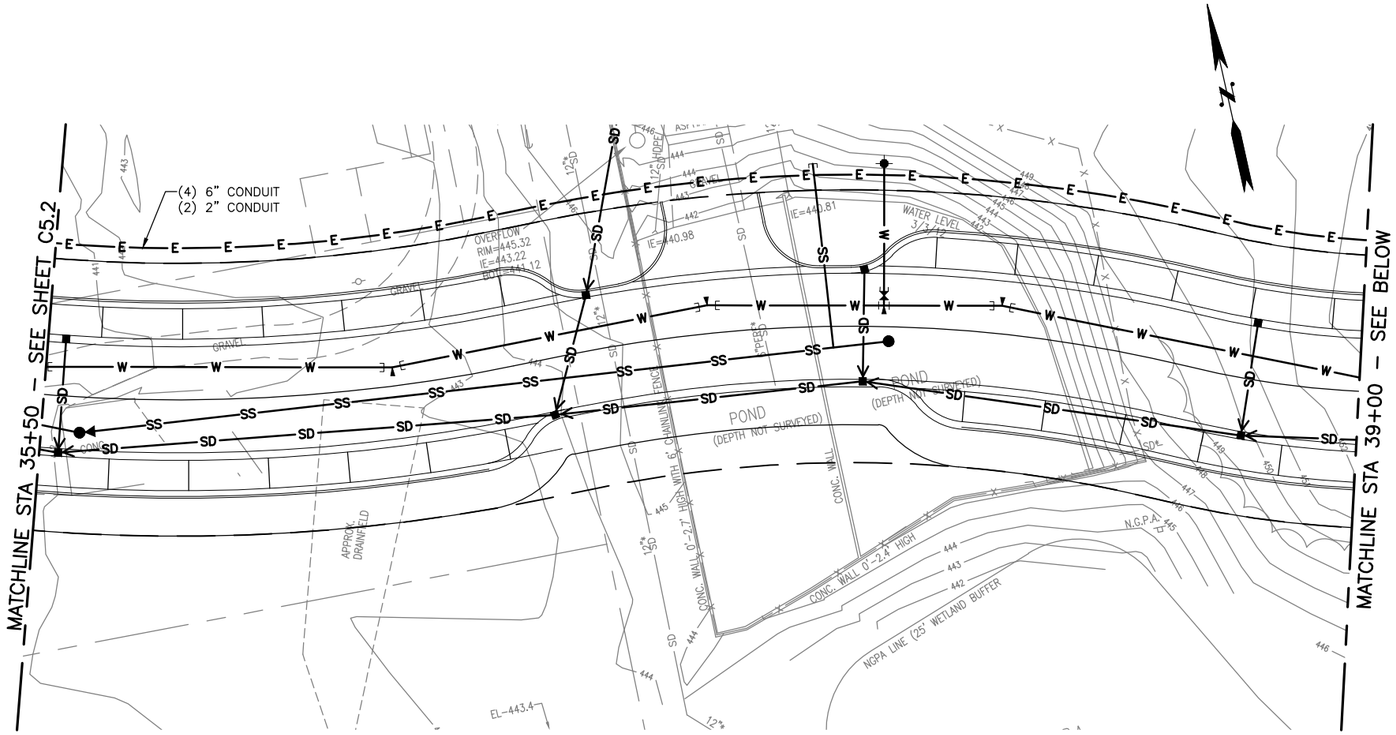

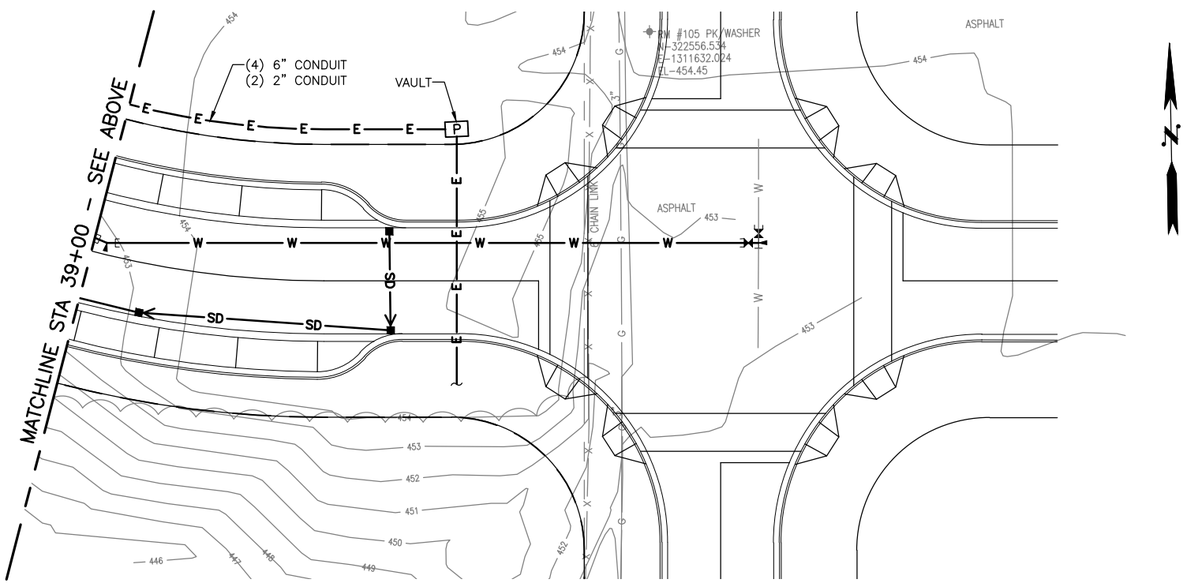

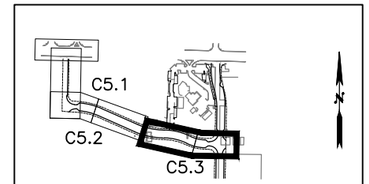

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APPENDIX B
STORMWATER SYSTEM CALCULATIONS

Western Washington Hydrology Model
PROJECT REPORT

Project Name: eguv3
Site Address:
City : Mill Creek
Report Date : 2/19/2013
Gage : Everett
Data Start : 1948/10/01
Data End : 1997/09/30
Precip Scale: 1.00
WWHM3 Version:

PREDEVELOPED LAND USE

Name : EGUV Predeveloped
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Flat	8.3

Impervious Land Use	Acres

Element Flows To:

Surface	Interflow	Groundwater

Name : EGUV Developed
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Lawn, Flat	1.12

Impervious Land Use	Acres
PARKING FLAT	7.18

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1,	Trapezoidal Pond 1,	

Name : Trapezoidal Pond 1
Bottom Length: 180ft.

Bottom Width: 180ft.
Depth : 7ft.
Volume at riser head : 4.5124ft.
Side slope 1: 0 To 1
Side slope 2: 0 To 1
Side slope 3: 0 To 1
Side slope 4: 0 To 1
Discharge Structure
Riser Height: 6 ft.
Riser Diameter: 24 in.
Orifice 1 Diameter: 0.5 in. **Elevation:** 0 ft.
Orifice 1 Diameter: 2.14 in. **Elevation:** 2.528 ft.
Orifice 1 Diameter: 1.26 in. **Elevation:** 2.86 ft.

Element Flows To:
Outlet 1 **Outlet 2**

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.744	0.000	0.000	0.000
0.078	0.744	0.058	0.002	0.000
0.156	0.744	0.116	0.003	0.000
0.233	0.744	0.174	0.003	0.000
0.311	0.744	0.231	0.004	0.000
0.389	0.744	0.289	0.004	0.000
0.467	0.744	0.347	0.004	0.000
0.544	0.744	0.405	0.005	0.000
0.622	0.744	0.463	0.005	0.000
0.700	0.744	0.521	0.005	0.000
0.778	0.744	0.579	0.006	0.000
0.856	0.744	0.636	0.006	0.000
0.933	0.744	0.694	0.006	0.000
1.011	0.744	0.752	0.007	0.000
1.089	0.744	0.810	0.007	0.000
1.167	0.744	0.868	0.007	0.000
1.244	0.744	0.926	0.007	0.000
1.322	0.744	0.983	0.008	0.000
1.400	0.744	1.041	0.008	0.000
1.478	0.744	1.099	0.008	0.000
1.556	0.744	1.157	0.008	0.000
1.633	0.744	1.215	0.008	0.000
1.711	0.744	1.273	0.009	0.000
1.789	0.744	1.331	0.009	0.000
1.867	0.744	1.388	0.009	0.000
1.944	0.744	1.446	0.009	0.000
2.022	0.744	1.504	0.009	0.000
2.100	0.744	1.562	0.010	0.000
2.178	0.744	1.620	0.010	0.000
2.256	0.744	1.678	0.010	0.000
2.333	0.744	1.736	0.010	0.000
2.411	0.744	1.793	0.010	0.000
2.489	0.744	1.851	0.010	0.000
2.567	0.744	1.909	0.034	0.000
2.644	0.744	1.967	0.052	0.000
2.722	0.744	2.025	0.064	0.000
2.800	0.744	2.083	0.074	0.000
2.878	0.744	2.140	0.088	0.000
2.956	0.744	2.198	0.103	0.000
3.033	0.744	2.256	0.114	0.000
3.111	0.744	2.314	0.124	0.000
3.189	0.744	2.372	0.133	0.000
3.267	0.744	2.430	0.142	0.000
3.344	0.744	2.488	0.150	0.000
3.422	0.744	2.545	0.157	0.000
3.500	0.744	2.603	0.164	0.000
3.578	0.744	2.661	0.171	0.000
3.656	0.744	2.719	0.177	0.000
3.733	0.744	2.777	0.184	0.000
3.811	0.744	2.835	0.190	0.000
3.889	0.744	2.893	0.196	0.000
3.967	0.744	2.950	0.201	0.000
4.044	0.744	3.008	0.207	0.000
4.122	0.744	3.066	0.212	0.000
4.200	0.744	3.124	0.217	0.000
4.278	0.744	3.182	0.222	0.000
4.356	0.744	3.240	0.227	0.000
4.433	0.744	3.298	0.232	0.000
4.511	0.744	3.355	0.237	0.000
4.589	0.744	3.413	0.242	0.000
4.667	0.744	3.471	0.246	0.000
4.744	0.744	3.529	0.251	0.000
4.822	0.744	3.587	0.255	0.000
4.900	0.744	3.645	0.259	0.000
4.978	0.744	3.702	0.264	0.000
5.056	0.744	3.760	0.268	0.000
5.133	0.744	3.818	0.272	0.000
5.211	0.744	3.876	0.276	0.000
5.289	0.744	3.934	0.280	0.000
5.367	0.744	3.992	0.284	0.000
5.444	0.744	4.050	0.288	0.000
5.522	0.744	4.107	0.292	0.000
5.600	0.744	4.165	0.295	0.000
5.678	0.744	4.223	0.299	0.000
5.756	0.744	4.281	0.303	0.000
5.833	0.744	4.339	0.306	0.000
5.911	0.744	4.397	0.310	0.000
5.989	0.744	4.455	0.314	0.000
6.067	0.744	4.512	0.652	0.000
6.144	0.744	4.570	1.390	0.000
6.222	0.744	4.628	2.364	0.000
6.300	0.744	4.686	3.528	0.000
6.378	0.744	4.744	4.853	0.000
6.456	0.744	4.802	6.323	0.000
6.533	0.744	4.860	7.924	0.000
6.611	0.744	4.917	9.646	0.000
6.689	0.744	4.975	11.48	0.000
6.767	0.744	5.033	13.42	0.000
6.844	0.744	5.091	15.47	0.000
6.922	0.744	5.149	17.60	0.000
7.000	0.744	5.207	19.83	0.000
7.078	0.744	5.264	22.15	0.000

MITIGATED LAND USE

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.154138
5 year	0.229487
10 year	0.287547
25 year	0.370735
50 year	0.440191
100 year	0.516366

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.0808
5 year	0.124732
10 year	0.16181
25 year	0.219241
50 year	0.270733
100 year	0.330621

Yearly Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1950	0.058	0.064
1951	0.216	0.077
1952	0.126	0.069
1953	0.112	0.062
1954	0.124	0.061
1955	0.189	0.074
1956	0.282	0.208
1957	0.202	0.216
1958	0.261	0.070
1959	0.190	0.073
1960	0.163	0.071
1961	0.159	0.067
1962	0.153	0.131
1963	0.176	0.057
1964	0.261	0.069
1965	0.150	0.061
1966	0.155	0.074
1967	0.081	0.064
1968	0.210	0.073
1969	0.223	0.076
1970	0.103	0.070
1971	0.119	0.068
1972	0.167	0.215
1973	0.162	0.063
1974	0.116	0.077
1975	0.137	0.115
1976	0.121	0.061
1977	0.124	0.076
1978	0.094	0.058
1979	0.123	0.062
1980	0.328	0.054
1981	0.132	0.064
1982	0.135	0.056
1983	0.157	0.075
1984	0.136	0.076
1985	0.150	0.184
1986	0.213	0.201
1987	0.528	0.187
1988	0.221	0.178
1989	0.120	0.078
1990	0.149	0.060
1991	0.158	0.072
1992	0.169	0.078
1993	0.120	0.071
1994	0.079	0.055
1995	0.067	0.078
1996	0.154	0.122
1997	0.292	0.082
1998	0.632	0.505

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.6324	0.5055
2	0.5277	0.2161
3	0.3277	0.2149
4	0.2920	0.2081
5	0.2819	0.2014
6	0.2613	0.1867
7	0.2611	0.1839
8	0.2229	0.1775
9	0.2212	0.1314
10	0.2156	0.1217
11	0.2134	0.1154
12	0.2102	0.0820
13	0.2018	0.0781
14	0.1904	0.0780
15	0.1894	0.0780
16	0.1762	0.0768
17	0.1694	0.0767
18	0.1674	0.0761
19	0.1635	0.0759
20	0.1622	0.0755
21	0.1585	0.0750
22	0.1578	0.0742
23	0.1566	0.0738
24	0.1553	0.0732
25	0.1537	0.0728
26	0.1531	0.0720
27	0.1503	0.0715
28	0.1498	0.0711
29	0.1493	0.0700
30	0.1375	0.0696
31	0.1365	0.0688
32	0.1354	0.0686

33	0.1319	0.0676
34	0.1261	0.0674
35	0.1241	0.0642
36	0.1239	0.0641
37	0.1227	0.0638
38	0.1213	0.0630
39	0.1197	0.0624
40	0.1195	0.0617
41	0.1192	0.0610
42	0.1163	0.0608
43	0.1121	0.0608
44	0.1026	0.0605
45	0.0936	0.0578
46	0.0808	0.0567
47	0.0792	0.0562
48	0.0673	0.0551
49	0.0580	0.0540

POC #1
The Facility PASSED

Facility FAILED duration standard for 1+ flows.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
0.0771	4781	4871	101	Fail
0.0807	4424	2390	54	Pass
0.0844	3956	1453	36	Pass
0.0881	3557	1389	39	Pass
0.0917	3285	1353	41	Pass
0.0954	2926	1324	45	Pass
0.0991	2607	1281	49	Pass
0.1027	2406	1251	51	Pass
0.1064	2158	1217	56	Pass
0.1101	1946	1185	60	Pass
0.1137	1782	1143	64	Pass
0.1174	1581	1081	68	Pass
0.1211	1392	1033	74	Pass
0.1248	1288	971	75	Pass
0.1284	1170	914	78	Pass
0.1321	1058	839	79	Pass
0.1358	984	784	79	Pass
0.1394	882	722	81	Pass
0.1431	790	686	86	Pass
0.1468	733	634	86	Pass
0.1504	649	570	87	Pass
0.1541	569	525	92	Pass
0.1578	526	469	89	Pass
0.1614	479	446	93	Pass
0.1651	430	431	100	Pass
0.1688	411	416	101	Pass
0.1724	381	400	104	Pass
0.1761	353	378	107	Pass
0.1798	332	357	107	Pass
0.1834	305	327	107	Pass
0.1871	283	309	109	Pass
0.1908	272	257	94	Pass
0.1944	255	225	88	Pass
0.1981	243	198	81	Pass
0.2018	228	178	78	Pass
0.2054	208	159	76	Pass
0.2091	190	142	74	Pass
0.2128	181	129	71	Pass
0.2164	163	106	65	Pass
0.2201	157	97	61	Pass
0.2238	150	85	56	Pass
0.2275	146	83	56	Pass
0.2311	138	81	58	Pass
0.2348	133	78	58	Pass
0.2385	126	74	58	Pass
0.2421	121	71	58	Pass
0.2458	120	68	56	Pass
0.2495	115	65	56	Pass
0.2531	114	63	55	Pass
0.2568	112	61	54	Pass
0.2605	110	58	52	Pass
0.2641	105	55	52	Pass
0.2678	105	49	46	Pass
0.2715	103	40	38	Pass
0.2751	101	35	34	Pass
0.2788	99	29	29	Pass
0.2825	96	19	19	Pass
0.2861	93	15	16	Pass
0.2898	88	12	13	Pass
0.2935	84	12	14	Pass
0.2971	82	12	14	Pass
0.3008	81	11	13	Pass
0.3045	77	11	14	Pass
0.3081	75	11	14	Pass
0.3118	74	11	14	Pass
0.3155	73	11	15	Pass
0.3192	72	11	15	Pass
0.3228	71	10	14	Pass
0.3265	70	10	14	Pass
0.3302	68	10	14	Pass
0.3338	66	10	15	Pass
0.3375	66	9	13	Pass
0.3412	64	9	14	Pass
0.3448	62	9	14	Pass
0.3485	60	9	15	Pass
0.3522	58	9	15	Pass
0.3558	58	9	15	Pass
0.3595	57	9	15	Pass
0.3632	54	9	16	Pass
0.3668	54	9	16	Pass
0.3705	54	9	16	Pass
0.3742	52	9	17	Pass
0.3778	52	9	17	Pass
0.3815	50	8	16	Pass
0.3852	49	8	16	Pass
0.3888	49	8	16	Pass
0.3925	48	8	16	Pass
0.3962	45	7	15	Pass
0.3998	45	6	13	Pass

0.4035	43	6	13	Pass
0.4072	41	6	14	Pass
0.4108	41	5	12	Pass
0.4145	40	5	12	Pass
0.4182	38	4	10	Pass
0.4219	37	4	10	Pass
0.4255	36	4	11	Pass
0.4292	35	4	11	Pass
0.4329	34	4	11	Pass
0.4365	34	4	11	Pass
0.4402	33	4	12	Pass

The development has an increase in flow durations from 1/2 predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.

Water Quality BMP Flow and Volume for POC 1.
On-line facility volume: 0.7162 acre-feet
On-line facility target flow: 0.01 **cfs.**
Adjusted for 15 min: 1.086 **cfs.**
Off-line facility target flow: 0.5585 **cfs.**
Adjusted for 15 min: 0.6207 **cfs.**

Perlnd and Implnd Changes
No changes have been made.

City of Mill Creek
East Gateway Urban Village Detention Vault

Jeffrey D. Jenks, P.E.
2/19/13

WWHM Output Detention

180' x 180' x 6' with 1' freeboard

	4.51 AC-FT	WWHM Live Storage
+	1.00 AC-FT	Church Pond Volume
	5.51 AC-FT	Total Live Storage

5.51 AC-FT = 240,015 CF
240,015 CF / 6 FT Depth = 40,002 SF = 200'x200'

200' x 200' Vault (6' Live Storage + 1' freeboard)

APPENDIX C
STORMWATER QUALITY TREATMENT ALTERNATIVES ASSESSMENT

The following pages assess alternatives for components that make up a water quality management system for East Gateway Urban Village. Treatment system options are restricted by project requirements that the systems be subsurface. This requirement eliminates biofiltration systems and wetpond systems from consideration. The system as proposed here is comprised of stormwater pre-treatment and stormwater primary treatment elements. There are a number of primary treatment technologies available that will be assessed below. However, the primary contaminant generated by this project that needs to be addressed is total suspended solids and oils borne by parking lot and roadway runoff. An assessment of the pre-treatment alternatives is presented first, with assessment of primary treatment alternatives following.

Pretreatment Alternative 1: Pre-settling Vault

<table>
<tr><td colspan="2">Element: Stormwater Quality Pre-treatment</td></tr>
<tr><td colspan="2">Option: Pre-settling Vault</td></tr>
<tr><td colspan="2">Description: Wetpool facility to allow settlement of suspended solids prior to discharge to primary treatment.</td></tr>
<tr><td>Pros:
Effective removal of larger suspended solids and trash prior to primary treatment.
Maintenance similar to catch basins.</td><td>Cons:
High cost of initial installation.
Requires annual maintenance to remove sediments and debris.</td></tr>
<tr><td colspan="2">Cost: Estimated $50,000</td></tr>
<tr><td colspan="2">Operations & Maintenance Considerations:
Access to the vault for cleaning and annual maintenance is through the pre-designed openings in the vault. The vault design and maintenance must meet OSHA confined-space entry requirements. The vault must be inspected annually for sediment and debris collection. The sediment should be tested for toxicants prior to disposal in compliance with disposal requirements.</td></tr>
</table>

Pre-treatment Alternative 2: Oil/Water Separator

<table>
<tr><td colspan="2">Element: Stormwater Quality Pretreatment</td></tr>
<tr><td colspan="2">Option: Oil Water Separator</td></tr>
<tr><td colspan="2">Description: Coalescing Plate (CP) Separator. The design of this prefabricated vault and inner plate system efficiently removes small floating and dispersed oil, 10 mg/L and less, from stormwater. The oil is retained within the vault baffles for removal and reprocessing. The purpose is to mitigate oil contamination from the stormwater flow discharge. The oil/water separator shall be placed up stream of detention and primary treatment facilities. All runoff from primary surfaces that have the potential of contributing oils, such as parking lots and streets, shall pass through the oil/water separator diversion system. The size of the oil/water separator is determined by the peak rate of flow of the water quality design stormwater flow as designated by the Washington Department of Ecology.</td></tr>
<tr><td>Pros:
Effective removal of surface oil and grease in a single location.</td><td>Cons:
High cost of initial installation.
Requires annual maintenance, including replacement of baffles as necessary.</td></tr>
<tr><td colspan="2">Cost: Estimated $50,000</td></tr>
<tr><td colspan="2">Operations & Maintenance Considerations:
Access to the separator for cleaning and annual maintenance is through the predesigned openings in the vault. The vault design and maintenance must meet OSHA confined space entry requirements. The vault must be inspected annually for sediment and debris collection. The sediment in the inlet wet pool needs to be removed annually and the depth and volume recorded. The sediment should be tested for toxicants prior to disposal in compliance with disposal requirements. If the volume of oil requires decanting, any water removed during the maintenance also needs to be disposed of properly to the sanitary sewer.</td></tr>
</table>

Pre-treatment Alternative 3: Vortex Device

Element: **Stormwater Quality Pre-Treatment**	
Option: **Vortex Device** (BaySeparator, Stormceptor, Aqua-Swirl, etc).	
Description: Engineered pre-treatment device in a vault or manhole utilizing a vortex to settle suspended solids. Devices approved by Washington State Department of Ecology for pretreatment.	
Pros: Smaller footprint than other options. Maintenance similar to catch basins.	Cons: May require replacement of parts. Requires annual maintenance to remove sediments and debris.
Cost: Estimated $30,000-$50,000	
Operations & Maintenance Considerations: Access to the vault for cleaning and annual maintenance is through the predesigned openings in the vault. The vault design and maintenance must meet OSHA confined space entry requirements. The vault must be inspected annually for sediment and debris collection. The sediment should be tested for toxicants prior to disposal in compliance with disposal requirements.	

Alternative 1: Pre-treatment followed by combined detention & water quality wet vault

Element: **Stormwater Quality Primary Treatment**	
Option: **Combined Detention and Water Quality Wet Vault**	
Description: A combined detention and water quality wet pool facility appears similar to a stormwater detention vault facility but contains a permanent wet pool designed to provide settling of particulate pollutants such as sand and silt and other suspended solids and minerals that attach to such. Design of a dual-purpose facility requires care in addressing storm cycles to mitigate remixing of settled materials during peak flow events. The combined detention and water quality wet vault will provide water quality treatment and stormwater detention for flow control. The upper portion of the vault is active volume for detention. The lower portion, of the wet pool, is considered dead storage and cannot be calculated as part of the active detention system. The wet pool volume shall be equal to or greater than the total volume of runoff from a 6-month, 24-hour storm event. The location of the deep portion of the wet pool shall be placed at the inlet to capture incoming sediment. Minimum sediment storage depth in the deep portion is one foot with the remaining portion to provide six inches of sediment storage.	
Pros: The use of a combined detention and water quality wet vault takes up less space. The facility, if totally underground, allows for the surface above the vault to serve a secondary purpose, parking, lawn, and open space. The wetvault portion of the vault is maintained at the same time as the detention system.	Cons: Maintenance triggers OSHA access limitations. The construction cost is high due to larger vault size, greater depth, and disposal of excess excavation. The wet pool being underground does not provide for biological pollutant removal, something not required for this site according to the Washington State Department of Ecology. Pollutant removal is less effective compared to other alternatives. Use is discouraged by Ecology.
Cost: 30% Design Estimate $375,000 (Cost for added volume to detention vault at $12 per cubic foot)	
Operation & Maintenance Considerations: The vault design and maintenance must meet OSHA confined space entry requirements. The vault must be inspected annually for sediment and debris collection. The sediment in the inlet wet pool needs to be removed annually the depth and volume recorded. The sediment should be tested for toxicants prior to disposal in compliance with disposal requirements. The water removed during the maintenance also needs to be disposed of properly to the sanitary sewer.	

Alternative 2: Pre-treatment followed by media filtration system followed by stormwater detention vault.

<table>
<tr><td colspan="2">Element: Stormwater Quality Primary Treatment</td></tr>
<tr><td colspan="2">Option: Media Filtration System</td></tr>
<tr><td colspan="2">Description: The media filtration treatment system provides the capture and treatment of surface stormwater runoff from streets, parking lots, and roof drains in a predesigned concrete vault that reconnects to the trunk stormwater collection system. The system utilizes special media to remove total suspended solids, soluble heavy metals, oils and greases, total nutrients, and organic toxicants. It has a Washington State Department of Ecology general use approval. The vault placement and sizing of the units will treat the upstream stormwater flows up to and including the 6-month water quality storm based on a siphon rate of 7.5 gpm per cartridge. A typical filter cartridge requires a minimum 2.3-foot elevation difference between the inlet and outlet to function properly.</td></tr>
<tr><td>Pros:
Each unit provides total basic water quality treatment of the surface stormwater tributary to the unit.

The media filter vault will be installed underground and not take up valuable surface areas.

Maintenance can be contracted to manufacturer of the system.</td><td>Cons:
Maintenance triggers OSHA access limitations.

Annual inspection required. Filter cartridges must be replaced every 12 to 24 months depending on sediment loading.

Pre-treatment may be required to extend cartridge life.</td></tr>
<tr><td colspan="2">Cost: Price delivered $75,000 with an estimated $25,000 for installation.</td></tr>
<tr><td colspan="2">Each unit is placed in the traffic or parking area to allow access for maintenance.
Operations & Maintenance considerations include annual inspection to do the following:
1. Inspect the condition of the vault.
1. Remove debris, silt, and trash.
2. Filter cartridge evaluation and replacement as necessary.
3. Disposal of refuse.
4. Record maintenance of the unit.</td></tr>
</table>

Alternative 3: Pre-treatment followed by sand filter vault system followed by stormwater detention vault.

<table>
<tr><td colspan="2">Element: Stormwater Quality Primary Treatment</td></tr>
<tr><td colspan="2">Option: Sand Filter Vault System</td></tr>
<tr><td colspan="2">Description: Filtration treatment facilities collect and treat design runoff volumes to remove total suspended solids (TSS), phosphorous, and insoluble organics (including oils) from stormwater. A typical sand filtration system consists of a pretreatment system, flow spreader(s), sand bed, and underdrain piping. The sand filter bed includes a geotextile fabric between the sand bed and the bottom underdrain system. The vault design will incorporate presettling and sand filtration cells.</td></tr>
<tr><td>Pros:
Each unit provides total basic water quality treatment of the surface stormwater tributary to the unit.

Sand filter media is not proprietary and more readily available.</td><td>Cons:
Maintenance triggers OSHA access limitations.

To prevent anoxic conditions, a minimum of 24 square feet of ventilation grate at the ground surface should be provided for each 250 square feet of sand bed surface area.

Removable panels must be provided over the entire sand bed.

Inspections required every 6 months.
Pretreatment device mandatory.</td></tr>
<tr><td colspan="2">Cost: 24,000-square-foot vault surface area. Not viable for this project.</td></tr>
<tr><td colspan="2">Each unit is placed in the traffic or parking area to allow access for maintenance.
Operations & Maintenance considerations include annual inspection to do the following:
1. Inspect the condition of the vault.
5. Remove debris, silt, and trash.
6. Inspect sand bed for signs of concentrated flows.
7. Sand filter evaluation and replacement as necessary.
8. Disposal of refuse.
9. Record maintenance of the unit.</td></tr>
</table>

APPENDIX D
OPINION OF PROBABLE CONSTRUCTION COST

City of Mill Creek
East Gateway Urban Village

30% Design
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated:02/21/13
Calc By: JDJ
Check By: WAJ/DY

ESTIMATE SUMMARY

Item No.	Description		Current Amount	Notes
1.0	Church Parcel		$1,361,700	
2.0	132nd Street LLC Parcel		$1,084,200	
3.0	Rim/Kim Parcel		$1,017,300	
4.0	Mollgaard Parcel		$2,063,800	
5.0	Penny Creek Parcel		$309,800	
SUBTOTAL			**$5,836,800**	
Design contingency		15%	$875,520	
CONSTRUCTION SUBTOTAL			**$6,712,300**	
General conditions		10%	$671,230	
General contractor's OH & P		10%	$671,230	
Construction Contingency		5%	$335,615	
Sales Tax - **not included**				
TOTAL CURRENT CONSTRUCTION COST			**$8,390,375**	
Design Fees		5%	$419,519	
Right of Way Property Acquisition			$1,103,500	
Right of Way Agent			$60,000	
GRAND TOTAL			**$9,973,394**	

Notes & Assumptions:

1. Assumed on-site materials are not contaminated. Site cleanup & mitigation is not included.
2. Assumed native soil is not suitable for utility trench backfill
3. Soft costs such as permitting fees are not included.
4. Common Costs such as Mobilization, Erosion Control, Traffic Control, Surveying and PUD Joint Trench were proportioned to lots based on roadway length.

THIS COST ESTIMATE IS APPROXIMTE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS

City of Mill Creek
East Gateway Urban Village

Church Parcel
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ/WAJ
Check By:

26% of Roadway Construction for Common Items

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	774	$4.00	$3,096	
1.02	Construction Entrance	ea	0.50	$2,500.00	$1,250	
1.03	CB Filters, Ditches, Berms	lf	386	$3.00	$1,158	per lf of roadway
1.04	Sediment Trap/Pond	ls	0.26	$1,500.00	$390	
1.05	Treatment Train Rental	month	1.55	$2,500.00	$3,875	
1.06	Treatment Train Mob/Setup/Demob	ls	0.26	$5,000.00	$1,300	
1.07	Treatment Train Operate and Maintenance	month	1.55	$2,000.00	$3,095	
1.08	NPDES Inspections & Maintenance	month	1.55	$500.00	$774	NPDES Permit Reqs
1.09	Water Discharge Monitoring & Test	ls	2.6	$250.00	$650	NPDES Permit Reqs
TOTAL EROSION CONTROL					**$15,600**	
2.0	**DEMOLITION**					
2.01	Building Demolition	sf	0	$2.00	$0	
2.02	Site Demolition	sf	0	$2.00	$0	Conc. Slab & Misc.
2.03	Pond Demolition	ls	1	$15,000.00	$15,000	Not incld Fill
TOTAL DEMOLITION					**$15,000**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	27,380	$0.15	$4,107	
3.02	Stripping, Export and Disposal	cy	507	$22.00	$11,154	6" Stripping Depth
3.03	Excavate and Dispose of Unsuitable	cy	1,014	$22.00	$22,308	Assume 1' Depth Avg
3.04	Onsite Cut and Fill	cy	1,000	$6.00	$6,000	Rough Grade for Road
3.05	Import and Place Gravel Borrow for Fill	cy	5,750	$30.00	$172,500	Includes Fill Pond
3.06	Fine Grading	sf	27,380	$0.10	$2,738	
TOTAL EARTHWORK					**$218,800**	
4.0	**WATER SYSTEM**					
4.01	Connect to Exist. Water Main - Wet Tap	ea	1	$3,000.00	$3,000	
4.02	8" Ductile Iron Pipe, incl. trench & native backfill	lf	50	$45.00	$2,250	
4.03	12" Ductile Iron Pipe, incl. trench & native backfill	lf	389	$70.00	$27,230	
4.04	12" Butterfly Valve	ea	1	$4,000.00	$4,000	
4.05	8" Gate Valve	ea	1	$1,800.00	$1,800	
4.06	8" Connection Stub-Out	ea	1	$2,650.00	$2,650	
4.07	Fire Hydrant Assembly	ea	1	$4,000.00	$4,000	300 ft O.C.
4.08	Dispose of Unsuitable Soil	cy	115	$22.00	$2,530	
4.09	Import Gravel Borrow for Trench Backfill	cy	58	$26.00	$1,508	
4.10	DCVA & Box for Irrigation System	ea	4	$1,500.00	$6,000	Street Plantings
4.11	Roadway Irrigation System	lf	700	$6.00	$4,200	
TOTAL WATER SYSTEM					**$59,200**	
5.0	**SANITARY SEWER SYSTEM**					
5.01	Connect to Exist. Sewer Manhole	ea	0	$4,000.00	$0	
5.02	Side Sewer Connection Stubout	ea	2	$1,200.00	$2,400	
5.03	8" PVC Pipe, including trench & native fill	lf	233	$45.00	$10,485	
5.04	6" PVC Pipe, including trench & native fill	lf	100	$35.00	$3,500	
5.05	Sewer Manhole	ea	2	$3,500.00	$7,000	
5.06	Dispose of Unsuitable	cy	150	$22.00	$3,300	
5.07	Import Gravel Borrow for Trench Backfill	cy	75	$26.00	$1,950	
TOTAL SANITARY SEWER SYSTEM					**$28,600**	

6.0	**STORM DRAINAGE**					
6.01	8" Storm Drain Pipe,excluding trench & backfill	lf	90	$15.00	$1,350	
6.02	12" Storm Drain Pipe, excluding trench & backfill	lf	382	$23.00	$8,786	
6.03	Catch Basin Type I	ea	8	$1,200.00	$9,600	
6.04	Catch Basin Type 2, 48-inch	ea	0	$3,100.00	$0	
6.05	Connect to Existing System to WQ & Detention	ea	1	$1,000.00	$1,000	
6.06	Dispose of Unsuitable	cy	360	$22.00	$7,920	
6.07	Import Gravel Borrow for Trench Backfill	cy	180	$26.00	$4,680	
6.08	Detention System	ls	0.2121	$3,538,200	$750,452	By Road Area plus Pond
TOTAL STORM DRAINAGE					**$783,800**	
7.0	**ROADWAY**					
7.01	6" Asphalt Pavement	sf	10,505	$3.00	$31,515	$80 per ton
7.02	4" Concrete Sidewalk	sf	8,775	$4.50	$39,488	
7.03	8" Concrete Pavement (Parking)	sf	3,375	$6.00	$20,250	
7.04	6" Crushed Surfacing Base	sf	13,880	$0.85	$11,798	$25 per ton
7.05	Concrete Gutter	lf	500	$12.00	$6,000	
7.06	Concrete Curb & Gutter	lf	630	$15.00	$9,450	
7.07	Pavement Marking Lines	lf	1,035	$0.35	$362	
7.08	Roadway Signs	ls	1	$500.00	$500	
7.09	Street Lighting	lf	345	$90.00	$31,050	Lights @ 75' O.C.
TOTAL ROADWAY					**$150,400**	
8.0	**ELECTRICAL, COMMUNICATIONS & NATURAL GAS**					
8.01	Joint Trench and PUD Conduit System	ls	0.26	$215,800.00	$56,108	Joint Trench Plus PUD
8.02	Telecommunication + Cable Conduit					Incl in Joint Trench
8.03	Natural Gas Main					Incl in Joint Trench
TOTAL ELECTRICAL, COMMUNICATIONS & NATURAL GAS					**$56,100**	
9.0	**LANDSCAPING**					
9.01	Street Tree Grates w/ Tree	ea	10	$750.00	$7,500	75 Feet Spacing
TOTAL LANDSCAPING					**$7,500**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0.26	$50,000.00	$12,895	
10.02	Traffic Control	day	12	$800.00	$9,600	Work near intersection
10.03	Surveying	day	3	$1,400.00	$4,200	
TOTAL MISCELLANEOUS					**$26,700**	
	SUBTOTAL				**$1,361,700**	

THIS COST ESTIMATE IS APPROXIMATE AND SHOULD BE USED ONLY FOR PRELIMINARY PLANNING PURPOSES. ACTUAL CONSTRUCTION BIDS MAY VARY SIGNIFICANTLY FROM THIS STATEMENT OF PROBABLE COSTS DUE TO TIMING OF CONSTRUCTION, CHANGED CONDITIONS, LABOR RATE CHANGES, OR OTHER FACTORS BEYOND THE CONTROL OF THE ESTIMATOR.

City of Mill Creek
East Gateway Urban Village

132nd Street LLC Parcel
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ
Check By: WAJ/DY

18% of Roadway Construction for Common Items

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	540	$4.00	$2,160	
1.02	Construction Entrance	ea	0.36	$2,500.00	$900	
1.03	CB Filters, Ditches, Berms	lf	270	$3.00	$810	per lf of roadway
1.04	Sediment Trap/Pond	ea	0.18	$1,500.00	$270	
1.05	Treatment Train Rental	month	1.08	$2,500.00	$2,700	
1.06	Treatment Train Mob/Setup/Demob	ea	0.18	$5,000.00	$900	
1.07	Treatment Train Operate and Maintenance	month	1.08	$2,000.00	$2,160	
1.08	NPDES Inspections & Maintenance	month	1.08	$500.00	$540	NPDES Permit Reqs
1.09	Water Discharge Monitoring & Test	ea	1.80	$250.00	$450	NPDES Permit Reqs
TOTAL EROSION CONTROL					**$10,900**	
2.0	**DEMOLITION**					
2.01	Building Demolition	sf	5,000	$3.00	$15,000	
2.02	Site Demolition	sf	500	$2.00	$1,000	Conc. Slab & Misc.
TOTAL DEMOLITION					**$16,000**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	25,500	$0.15	$3,825	
3.02	Stripping, Export and Disposal	cy	470	$22.00	$10,340	6" Stripping Depth
3.03	Excavate and Dispose of Unsuitable	cy	940	$22.00	$20,680	Assume 1' Depth Avg
3.04	Onsite Cut and Fill	cy	940	$6.00	$5,640	Rough Grade for Road
3.05	Import and Place Gravel Borrow for Fill	cy	5,185	$30.00	$155,550	5' Avg Depth
3.06	Fine Grading	sf	25,500	$0.10	$2,550	
TOTAL EARTHWORK					**$198,600**	
4.0	**WATER SYSTEM**					
4.01	Connect to Exist. Water Main - Wet Tap	ea	0	$3,000.00	$0	
4.02	8" Ductile Iron Pipe, incl. trench & native backfill	lf	50	$45.00	$2,250	
4.03	12" Ductile Iron Pipe, incl. trench & native backfill	lf	260	$70.00	$18,200	
4.04	12" Butterfly Valve	ea	2	$4,000.00	$8,000	
4.05	8" Gate Valve	ea	1	$1,800.00	$1,800	
4.06	8" Connection Stub-Out	ea	1	$2,650.00	$2,650	
4.07	Fire Hydrant Assembly	ea	1	$4,000.00	$4,000	300 ft O.C.
4.08	Dispose of Unsuitable Soil	cy	98	$22.00	$2,156	
4.09	Import Gravel Borrow for Trench Backfill	cy	49	$26.00	$1,274	
4.10	DCVA & Box for Irrigation System	ea	1	$1,500.00	$1,500	Street Plantings
4.11	Roadway Irrigation System	lf	260	$6.00	$1,560	
TOTAL WATER SYSTEM					**$43,400**	
5.0	**SANITARY SEWER SYSTEM**					
5.01	Connect to Exist. Sewer Manhole	ea	0	$4,000.00	$0	
5.02	Side Sewer Connection Stubout	ea	2	$1,200.00	$2,400	
5.03	8" PVC Pipe, including trench & native fill	lf	260	$45.00	$11,700	
5.04	6" PVC Pipe, including trench & native fill	lf	100	$35.00	$3,500	
5.05	Sewer Manhole	ea	1	$3,500.00	$3,500	
5.06	Dispose of Unsuitable	cy	320	$22.00	$7,040	
5.07	Import Gravel Borrow for Trench Backfill	cy	160	$26.00	$4,160	
TOTAL SANITARY SEWER SYSTEM					**$32,300**	
6.0	**STORM DRAINAGE**					
6.01	8" Storm Drain Pipe,excluding trench & backfill	lf	30	$15.00	$450	
6.02	12" Storm Drain Pipe, excluding trench & backfill	lf	280	$23.00	$6,440	
6.03	18" Storm Drain Pipe, excluding trench & backfill	lf	50	$38.00	$1,900	
6.04	Catch Basin Type I	ea	3	$1,200.00	$3,600	
6.05	Catch Basin Type 2, 54-inch	ea	1	$3,500.00	$3,500	
6.06	Dispose of Unsuitable	cy	215	$22.00	$4,730	
6.07	Import Gravel Borrow for Trench Backfill	cy	108	$26.00	$2,808	
6.08	Detention System	ls	0.1655	$3,538,200	$585,572	By Lot Area
TOTAL STORM DRAINAGE					**$609,000**	
7.0	**ROADWAY**					
7.01	6" Asphalt Pavement	sf	7,500	$3.00	$22,500	$80 per ton
7.02	4" Concrete Sidewalk	sf	5,485	$4.50	$24,683	
7.03	8" Concrete Pavement (Parking)	sf	3,900	$6.00	$23,400	
7.04	6" Crushed Surfacing Base	sf	11,400	$0.85	$9,690	$25 per ton
7.05	Concrete Gutter	lf	522	$12.00	$6,264	
7.06	Concrete Curb & Gutter	lf	470	$15.00	$7,050	
7.07	Pavement Marking Lines	lf	780	$0.35	$273	
7.08	Roadway Signs	ls	0.18	$5,000.00	$900	
7.09	Street Lighting	lf	260	$90.00	$23,400	Lights @ 75' O.C.
TOTAL ROADWAY					**$118,200**	
8.0	**ELECTRICAL, COMMUNICATIONS & NATURAL GAS**					
8.01	Joint Trench plus PUD	ls	0.18	$214,800.00	$38,664	Joint Trench Plus PUD
8.02	Telecommunication + Cable Conduit					Incl in Joint Trench
8.03	Natural Gas Main					Incl in Joint Trench
TOTAL ELECTRICAL, COMMUNICATIONS & NATURAL GAS					**$38,700**	
9.0	**LANDSCAPING**					
9.01	Street Tree Grates w/ Tree	ea	7	$750.00	$5,250	75 Feet Spacing
TOTAL LANDSCAPING					**$5,300**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0.18	$50,000.00	$9,000	
10.02	Traffic Control	day	0	$800.00	$0	Work near existing roads
10.03	Surveying	day	2	$1,400.00	$2,800	
TOTAL MISCELLANEOUS					**$11,800**	
	SUBTOTAL				**$1,084,200**	

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City of Mill Creek
East Gateway Urban Village

Rim/Kim Parcel
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ
Check By: WAJ/DY

10.5% of Roadway Construction for Common Items

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	320	$4.00	$1,280	
1.02	Construction Entrance	ea	0	$2,500.00	$0	
1.03	CB Filters, Ditches, Berms	lf	160	$3.00	$480	per lf of roadway
1.04	Sediment Trap/Pond	ea	0.11	$1,500.00	$158	
1.05	Treatment Train Rental	month	0.63	$2,500.00	$1,575	
1.06	Treatment Train Mob/Setup/Demob	ea	0.11	$5,000.00	$525	
1.07	Treatment Train Operate and Maintenance	month	0.63	$2,000.00	$1,260	
1.08	NPDES Inspections & Maintenance	month	0.63	$500.00	$315	NPDES Permit Reqs
1.09	Water Discharge Monitoring & Test	ea	1.05	$250.00	$263	NPDES Permit Reqs
TOTAL EROSION CONTROL					**$5,900**	
2.0	**DEMOLITION**					
2.01	Building Demolition	sf	0	$2.00	$0	
2.02	Site Demolition	sf	0	$2.00	$0	Conc. Slab & Misc.
TOTAL DEMOLITION					**$0**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	14,600	$0.15	$2,190	
3.02	Stripping, Export and Disposal	cy	270	$22.00	$5,940	6" Stripping Depth
3.03	Excavate and Dispose of Unsuitable	cy	540	$22.00	$11,880	Assume 1' Depth Avg
3.04	Onsite Cut and Fill	cy	540	$6.00	$3,240	Rough Grade for Road
3.05	Import and Place Gravel Borrow for Fill	cy	3,065	$30.00	$91,950	5' Avg Depth
3.06	Fine Grading	sf	14,600	$0.10	$1,460	
TOTAL EARTHWORK					**$116,700**	
4.0	**WATER SYSTEM**					
4.01	Connect to Exist. Water Main - Wet Tap	ea	0	$3,000.00	$0	
4.02	8" Ductile Iron Pipe, incl. trench & native backfill	lf	50	$45.00	$2,250	
4.03	12" Ductile Iron Pipe, incl. trench & native backfill	lf	150	$70.00	$10,500	
4.04	12" Butterfly Valve	ea	0	$4,000.00	$0	
4.05	8" Gate Valve	ea	1	$1,800.00	$1,800	
4.06	8" Connection Stub-Out	ea	1	$2,650.00	$2,650	
4.07	Fire Hydrant Assembly	ea	0	$4,000.00	$0	300 ft O.C.
4.08	Dispose of Unsuitable Soil	cy	60	$22.00	$1,320	
4.09	Import Gravel Borrow for Trench Backfill	cy	30	$26.00	$780	
4.10	DCVA & Box for Irrigation System	ea	0.5	$1,500.00	$750	Street Plantings
4.11	Roadway Irrigation System	lf	320	$6.00	$1,920	
TOTAL WATER SYSTEM					**$22,000**	
5.0	**SANITARY SEWER SYSTEM**					
5.01	Connect to Exist. Sewer Manhole	ea	0	$4,000.00	$0	
5.02	Side Sewer Connection Stubout	ea	2	$1,200.00	$2,400	
5.03	8" PVC Pipe, including trench & native fill	lf	150	$45.00	$6,750	
5.04	6" PVC Pipe, including trench & native fill	lf	100	$35.00	$3,500	
5.05	Sewer Manhole	ea	1	$3,500.00	$3,500	
5.06	Dispose of Unsuitable	cy	165	$22.00	$3,630	
5.07	Import Gravel Borrow for Trench Backfill	cy	85	$26.00	$2,210	
TOTAL SANITARY SEWER SYSTEM					**$22,000**	
6.0	**STORM DRAINAGE**					
6.01	8" Storm Drain Pipe,excluding trench & backfill	lf	30	$15.00	$450	
6.02	12" Storm Drain Pipe, excluding trench & backfill	lf	70	$23.00	$1,610	
6.03	18" Storm Drain Pipe, excluding trench & backfill	lf	135	$38.00	$5,130	
6.04	Catch Basin Type I	ea	2	$1,200.00	$2,400	
6.05	Catch Basin Type 2, 54-inch	ea	2	$3,500.00	$7,000	
6.06	Dispose of Unsuitable	cy	165	$22.00	$3,630	
6.07	Import Gravel Borrow for Trench Backfill	cy	80	$26.00	$2,080	
6.08	Detention System	ls	0.2043	$3,538,200	$722,854	By Lot Area
TOTAL STORM DRAINAGE					**$745,200**	
7.0	**ROADWAY**					
7.01	6" Asphalt Pavement	sf	4,540	$3.00	$13,620	$80 per ton
7.02	4" Concrete Sidewalk	sf	3,290	$4.50	$14,805	
7.03	8" Concrete Pavement (Parking)	sf	2,415	$6.00	$14,490	
7.04	6" Crushed Surfacing Base	sf	6,955	$0.85	$5,912	$25 per ton
7.05	Concrete Gutter	lf	300	$12.00	$3,600	
7.06	Concrete Curb & Gutter	lf	310	$15.00	$4,650	
7.07	Pavement Marking Lines	lf	450	$0.35	$158	
7.08	Roadway Signs	ls	0.11	$5,000.00	$525	
7.09	Street Lighting	lf	160	$90.00	$14,400	Lights @ 75' O.C.
TOTAL ROADWAY					**$72,200**	
8.0	**ELECTRICAL, COMMUNICATIONS & NATURAL GAS**					
8.01	Electrical Main Ductbank	ls	0.105	$214,800.00	$22,554	Joint Trench Plus PUD
8.02	Telecommunication + Cable Conduit	lf			$0	Incl in Joint Trench
8.03	Natural Gas Main	lf			$0	Incl in Joint Trench
TOTAL ELECTRICAL, COMMUNICATIONS & NATURAL GAS					**$22,600**	
9.0	**LANDSCAPING**					
9.01	Street Tree Grates w/ Tree	ea	4	$750.00	$3,000	75 Feet Spacing
TOTAL LANDSCAPING					**$3,000**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0.11	$50,000.00	$5,250	
10.02	Traffic Control	day	1.26	$800.00	$1,008	Work near 132nd St
10.03	Surveying	day	1.05	$1,400.00	$1,470	
TOTAL MISCELLANEOUS					**$7,700**	
	SUBTOTAL				**$1,017,300**	

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City of Mill Creek
East Gateway Urban Village

Mollgaard Parcel
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ
Check By: WAJ/DY

32.5% of Roadway Construction for Common Items

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	820	$4.00	$3,280	
1.02	Construction Entrance	ea	1	$2,500.00	$2,500	
1.03	CB Filters, Ditches, Berms	lf	490	$3.00	$1,470	per lf of roadway
1.04	Sediment Trap/Pond	ea	0.33	$1,500.00	$488	
1.05	Treatment Train Rental	month	1.95	$2,500.00	$4,875	
1.06	Treatment Train Mob/Setup/Demob	ea	0.33	$5,000.00	$1,625	
1.07	Treatment Train Operate and Maintenance	month	1.95	$2,000.00	$3,900	
1.08	NPDES Inspections & Maintenance	month	1.95	$500.00	$975	NPDES Permit Reqs
1.09	Water Discharge Monitoring & Test	ea	3.25	$250.00	$813	NPDES Permit Reqs
TOTAL EROSION CONTROL					**$19,900**	
2.0	**DEMOLITION**					
2.01	Building Demolition	sf	0	$2.00	$0	
2.02	Site Demolition	sf	0	$2.00	$0	Conc. Slab & Misc.
TOTAL DEMOLITION					**$0**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	33,455	$0.15	$5,018	
3.02	Stripping, Export and Disposal	cy	700	$22.00	$15,400	6" Stripping Depth
3.03	Excavate and Dispose of Unsuitable	cy	2,800	$22.00	$61,600	Assume 2' Depth Avg
3.04	Onsite Cut and Fill	cy	1,400	$6.00	$8,400	Rough Grade for Road
3.05	Import and Place Gravel Borrow for Fill	cy	2,250	$30.00	$67,500	0.5' Avg Depth
3.06	Fine Grading	sf	33,455	$0.10	$3,346	
TOTAL EARTHWORK					**$161,300**	
4.0	**WATER SYSTEM**					
4.01	Connect to Exist. Water Main - Wet Tap	ea	0.5	$3,000.00	$1,500	
4.02	8" Ductile Iron Pipe, incl. trench & native backfill	lf	60	$45.00	$2,700	
4.03	12" Ductile Iron Pipe, incl. trench & native backfill	lf	512	$70.00	$35,840	
4.04	12" Butterfly Valve	ea	3	$4,000.00	$12,000	
4.05	8" Gate Valve	ea	2	$1,800.00	$3,600	
4.06	8" Connection Stub-Out	ea	2	$2,650.00	$5,300	
4.07	Fire Hydrant Assembly	ea	1	$4,000.00	$4,000	300 ft O.C.
4.08	Dispose of Unsuitable Soil	cy	245	$22.00	$5,390	
4.09	Import Gravel Borrow for Trench Backfill	cy	123	$26.00	$3,198	
4.10	DCVA & Box for Irrigation System	ea	1	$1,500.00	$1,500	Street Plantings
4.11	Roadway Irrigation System	lf	805	$6.00	$4,830	
TOTAL WATER SYSTEM					**$79,900**	
5.0	**SANITARY SEWER SYSTEM**					
5.01	Connect to Exist. Sewer Manhole	ea	0.5	$4,000.00	$2,000	
5.02	Side Sewer Connection Stubout	ea	3	$1,200.00	$3,600	
5.03	8" PVC Pipe, including trench & native fill	lf	472	$45.00	$21,240	
5.04	6" PVC Pipe, including trench & native fill	lf	120	$35.00	$4,200	
5.05	Sewer Manhole	ea	3	$3,500.00	$10,500	
5.06	Dispose of Unsuitable	cy	395	$22.00	$8,690	
5.07	Import Gravel Borrow for Trench Backfill	cy	200	$26.00	$5,200	
TOTAL SANITARY SEWER SYSTEM					**$55,400**	
6.0	**STORM DRAINAGE**					
6.01	8" Storm Drain Pipe,excluding trench & backfill	lf	30	$15.00	$450	
6.02	12" Storm Drain Pipe, excluding trench & backfill	lf	126	$23.00	$2,898	
6.03	18" Storm Drain Pipe, excluding trench & backfill	lf	145	$38.00	$5,510	
6.04	24" Storm Drain Pipe, excluding trench & backfill	lf	179	$54.00	$9,666	
6.05	Catch Basin Type I	ea	4	$1,200.00	$4,800	
6.06	Catch Basin Type 2, 54-inch	ea	1	$3,500.00	$3,500	
6.07	Catch Basin Type 2, 60-inch	ea	3	$4,000.00	$12,000	
6.08	Dispose of Unsuitable	cy	385	$22.00	$8,470	
6.09	Import Gravel Borrow for Trench Backfill	cy	193	$26.00	$5,018	
6.10	Detention System	ls	0.3981	$3,538,200	$1,408,557	By Lot Area
TOTAL STORM DRAINAGE					**$1,460,900**	
7.0	**ROADWAY**					
7.01	6" Asphalt Pavement	sf	15,640	$3.00	$46,920	$80 per ton
7.02	4" Concrete Sidewalk	sf	8,085	$4.50	$36,383	
7.03	8" Concrete Pavement (Parking)	sf	3,535	$6.00	$21,210	
7.04	6" Crushed Surfacing Base	sf	19,175	$0.85	$16,299	$25 per ton
7.05	Concrete Gutter	lf	403	$12.00	$4,836	
7.06	Concrete Curb & Gutter	lf	898	$15.00	$13,470	
7.07	Pavement Marking Lines	lf	1,415	$0.35	$495	
7.08	Roadway Signs	ls	0.33	$5,000.00	$1,625	
7.09	Street Lighting	lf	488	$90.00	$43,920	Lights @ 75' O.C.
TOTAL ROADWAY					**$185,200**	
8.0	**ELECTRICAL, COMMUNICATIONS & NATURAL GAS**					
8.01	Joint Trench + PUD Ductbank	ls	0.33	$214,800.00	$69,810	Joint Trench Plus PUD
8.02	Telecommunication + Cable Conduit					Incl in Joint Trench
8.03	Natural Gas Main					Incl in Joint Trench
TOTAL ELECTRICAL, COMMUNICATIONS & NATURAL GAS					**$69,800**	
9.0	**LANDSCAPING**					
9.01	Street Tree Grates w/ Tree	ea	10	$750.00	$7,500	75 Feet Spacing
TOTAL LANDSCAPING					**$7,500**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0.33	$50,000.00	$16,250	
10.02	Traffic Control	day	3.9	$800.00	$3,120	Work near 132nd St
10.03	Surveying	day	3.25	$1,400.00	$4,550	
TOTAL MISCELLANEOUS					**$23,900**	
	SUBTOTAL				**$2,063,800**	

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City of Mill Creek
East Gateway Urban Village

Penny Creek Parcel
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ
Check By: WAJ/DY

13% of Roadway Construction for Common Items

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	410	$4.00	$1,640	
1.02	Construction Entrance	ea	0.5	$2,500.00	$1,250	
1.03	CB Filters, Ditches, Berms	lf	410	$3.00	$1,230	per lf of roadway
1.04	Sediment Trap/Pond	ea	0.13	$1,500.00	$195	
1.05	Treatment Train Rental	month	0.78	$2,500.00	$1,950	
1.06	Treatment Train Mob/Setup/Demob	ea	0.13	$5,000.00	$650	
1.07	Treatment Train Operate and Maintenance	month	0.78	$2,000.00	$1,560	
1.08	NPDES Inspections & Maintenance	month	0.78	$500.00	$390	NPDES Permit Reqs
1.09	Water Discharge Monitoring & Test	ea	1.3	$250.00	$325	NPDES Permit Reqs
TOTAL EROSION CONTROL					**$9,200**	
2.0	**DEMOLITION**					
2.01	Building Demolition	sf	0	$2.00	$0	
2.02	Site Demolition	sf	0	$2.00	$0	Conc. Slab & Misc.
TOTAL DEMOLITION					**$0**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	12,590	$0.15	$1,889	
3.02	Stripping, Export and Disposal	cy	233	$22.00	$5,126	6" Stripping Depth
3.03	Excavate and Dispose of Unsuitable	cy	466	$22.00	$10,252	Assume 1' Depth Avg
3.04	Onsite Cut and Fill	cy	466	$6.00	$2,796	Rough Grade for Road
3.05	Import and Place Gravel Borrow for Fill	cy	995	$30.00	$29,850	1' Avg Depth
3.06	Fine Grading	sf	12,590	$0.10	$1,259	
TOTAL EARTHWORK					**$51,200**	
4.0	**WATER SYSTEM**					
4.01	Connect to Exist. Water Main - Wet Tap	ea	0.5	$3,000.00	$1,500	
4.02	8" Ductile Iron Pipe, incl. trench & native backfill	lf	0	$45.00	$0	
4.03	12" Ductile Iron Pipe, incl. trench & native backfill	lf	230	$70.00	$16,100	
4.04	12" Butterfly Valve	ea	2	$4,000.00	$8,000	
4.05	8" Gate Valve	ea	0	$1,800.00	$0	
4.06	8" Connection Stub-Out	ea	0	$2,650.00	$0	
4.07	Fire Hydrant Assembly	ea	0	$4,000.00	$0	300 ft O.C.
4.08	Dispose of Unsuitable Soil	cy	105	$22.00	$2,310	
4.09	Import Gravel Borrow for Trench Backfill	cy	50	$26.00	$1,300	
4.10	DCVA & Box for Irrigation System	ea	1.0	$1,500.00	$1,500	Street Plantings
4.11	Roadway Irrigation System	lf	400	$6.00	$2,400	
TOTAL WATER SYSTEM					**$33,100**	
5.0	**SANITARY SEWER SYSTEM**					
5.01	Connect to Exist. Sewer Manhole	ea	0.5	$4,000.00	$2,000	
5.02	Side Sewer Connection Stubout	ea	1	$1,200.00	$1,200	
5.03	8" PVC Pipe, including trench & native fill	lf	188	$45.00	$8,460	
5.04	6" PVC Pipe, including trench & native fill	lf	40	$35.00	$1,400	
5.05	Sewer Manhole	ea	1	$3,500.00	$3,500	
5.06	Dispose of Unsuitable	cy	205	$22.00	$4,510	
5.07	Import Gravel Borrow for Trench Backfill	cy	102	$26.00	$2,652	
TOTAL SANITARY SEWER SYSTEM					**$23,700**	

6.0	**STORM DRAINAGE**					
6.01	12" Storm Drain Pipe, excluding trench & backfill	lf	126	$23.00	$2,898	
6.02	24" Storm Drain Pipe, excluding trench & backfill	lf	24	$54.00	$1,296	
6.03	Catch Basin Type I	ea	2	$1,200.00	$2,400	
6.04	Catch Basin Type 2, 48-inch	ea	1	$3,100.00	$3,100	
6.05	Catch Basin Type 2, 60-inch	ea	1	$4,000.00	$4,000	
6.06	Connect to Existing System to WQ & Detention	ea	1	$1,000.00	$1,000	
6.07	Dispose of Unsuitable	cy	135	$22.00	$2,970	
6.08	Import Gravel Borrow for Trench Backfill	cy	70	$26.00	$1,820	
6.09	Detention System	ls	0.0199	$3,538,200	$70,410	By Lot Area (Road Only)
TOTAL STORM DRAINAGE					**$89,900**	
7.0	**ROADWAY**					
7.01	6" Asphalt Pavement	sf	6,670	$3.00	$20,010	$80 per ton
7.02	4" Concrete Sidewalk	sf	2,280	$4.50	$10,260	
7.03	8" Concrete Pavement (Parking)	sf	0	$6.00	$0	
7.04	6" Crushed Surfacing Base	sf	6,670	$0.85	$5,670	$25 per ton
7.05	Concrete Gutter	lf	0	$12.00	$0	
7.06	Concrete Curb & Gutter	lf	440	$15.00	$6,600	
7.07	Pavement Marking Lines	lf	500	$0.35	$175	
7.08	Roadway Signs	ls	0.13	$5,000.00	$650	
7.09	Street Lighting	lf	200	$90.00	$18,000	Lights @ 75' O.C.
TOTAL ROADWAY					**$61,400**	
8.0	**ELECTRICAL, COMMUNICATIONS & NATURAL GAS**					
8.01	Electrical Main Ductbank	ls	0.13	$214,800.00	$27,924	Joint Trench Plus PUD
8.02	Telecommunication + Cable Conduit					Incl in Joint Trench
8.03	Natural Gas Main					Incl in Joint Trench
TOTAL ELECTRICAL, COMMUNICATIONS & NATURAL GAS					**$27,900**	
9.0	**LANDSCAPING**					
9.01	Street Tree Grates w/ Tree	ea	5	$750.00	$3,750	75 Feet Spacing
TOTAL LANDSCAPING					**$3,800**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0.13	$50,000.00	$6,500	
10.02	Traffic Control	day	1.56	$800.00	$1,248	Work near 132nd St
10.03	Surveying	day	1.3	$1,400.00	$1,820	
TOTAL MISCELLANEOUS					**$9,600**	
	SUBTOTAL				**$309,800**	

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City of Mill Creek
East Gateway Urban Village

Urban Village Regional Storm Detention and WQ System
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/18/12
Updated: 2/20/13
Calc By: JDJ
Check By: WAJ/DY

Assumes construction concurrent with roadway

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**TEMPORARY EROSION CONTROL**					
1.01	Silt Fence	lf	500	$5.25	$2,625	
1.02	Construction Entrance	ea	0	$2,500.00	$0	Incl in Roadway
1.03	CB Filters, Ditches, Berms	lf	0	$3.00	$0	Incl in Roadway
1.04	Sediment Trap/Pond	ea	0	$1,500.00	$0	Incl in Roadway
1.05	Treatment Train Rental	month	0	$2,500.00	$0	Incl in Roadway
1.06	Treatment Train Mob/Setup/Demob	ea	0	$5,000.00	$0	Incl in Roadway
1.07	Treatment Train Operate and Maintenance	month	0	$2,000.00	$0	Incl in Roadway
1.08	NPDES Inspections & Maintenance	month	0	$500.00	$0	Incl in Roadway
1.09	Water Discharge Monitoring & Test	ea	0	$250.00	$0	Incl in Roadway
TOTAL EROSION CONTROL					**$2,600**	
3.0	**EARTHWORK**					
3.01	Clearing	sf	50,000	$0.15	$7,500	
3.02	Stripping, Export and Disposal	cy	0	$22.00	$0	Incld in Vault CF Cost
3.03	Excavate and Dispose of Unsuitable	cy	0	$22.00	$0	Incld in Vault CF Cost
3.04	Onsite Cut and Fill	cy	0	$6.00	$0	Incld in Vault CF Cost
3.05	Import and Place Gravel Borrow for Fill	cy	0	$30.00	$0	Incld in Vault CF Cost
3.06	Fine Grading	sf	0	$0.10	$0	Incld in Vault CF Cost
TOTAL EARTHWORK					**$7,500**	
6.0	**STORM DRAINAGE**					
6.01	Connect to Existing System or Outfall	ea	1	$1,000.00	$1,000	
6.02	6" Perimeter Storm Drain Pipe, including trench & n	lf	1,600	$10.00	$16,000	
6.03	24" Storm Drain Pipe, including trench & back fill	lf	20	$54.00	$1,080	
6.04	200'x200' Detention Vault	cf	280,000	$12.00	$3,360,000	CF includes freeboard
6.05	Coalesing Plate Oil/Water Separator installed	ls	1	$50,000.00	$50,000	Pre-Treatment
6.06	Media Filtration Vault	ls	1	$100,000.00	$100,000	Primary Treatment
TOTAL	**STORM DRAINAGE**				**$3,528,100**	
10.0	**MISCELLANEOUS**					
10.01	Mobilization	ls	0	$40,000.00	$0	Incl in Roadway
10.02	Traffic Control	day	0	$150.00	$0	Incl in Roadway
10.03	Surveying	day	0	$1,400.00	$0	Incl in Roadway
TOTAL MISCELLANEOUS					**$0**	
	SUBTOTAL				**$3,538,200**	

City of Mill Creek
East Gateway Urban Village

Joint Utility Trench
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/21/13
Calc By: JDJ
Check By: WAJ/DY

#REF!

Assumes construction concurrent with roadway construction

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**PUD TRENCH AND CONDUIT**					
1.01	Joint Trench Excavation	lf	1,800	$5.00	$9,000	4'Wx5'D
1.02	Export and Dispose Unsuitable	cy	700.00	$22.00	$15,400	Assumes 1/2 volume
1.03	PUD Conduit	lf	1,800	$30.00	$54,000	(4)-6" and (2)-2"
1.04	Concrete Encasement	lf	30.00	$1,500.00	$45,000	4cf per ft
1.05	Import and Place Gravel Borrow for Backfill	cy	700.00	$30.00	$21,000	
1.06	Coordinate Utility Company Work	lf	1,800.00	$3.00	$5,400	
1.07	PUD Vaults - Large	ea	3.00	$15,000.00	$45,000	
1.08	PUD Vaults - Small	ea	2.00	$10,000.00	$20,000	
TOTAL JOINT TRENCH					**$214,800**	
	SUBTOTAL				**$214,800**	

City of Mill Creek
East Gateway Urban Village

Right of Way Costs
OPINION OF PROBABLE CONSTRUCTION COSTS

Job#: 21-12-005
Created: 12/11/12
Updated: 2/20/13
Calc By: JDJ/WAJ
Check By:

Item No.	Description	Unit	Quantity	Unit Price	Current Amount	Notes
1.0	**RIGHT OF WAY PROPERTY COST**					
1.01	Advent Lutheran Church Property	sf	25,110.61	$12.00	$301,327	
1.02	132nd Street LLC Property	sf	18,723.49	$12.00	$224,682	
1.03	RIM/KIM Property	sf	10,863.05	$12.00	$130,357	
1.04	Mollgard Property	sf	28,300.12	$12.00	$339,601	
1.05	Penny Creek Property	sf	8,959.61	$12.00	$107,515	
SUBTOTAL RIGHT OF WAY					**$1,103,500**	

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Mill Creek EGUV
Parcel Share of Common Costs

Common Items (Except Regional Detention) By Roadway Length

Church	26%
Attorney	18%
RIM	10.5%
Molgard	32.5%
Penny Creek	13%

Regional Detention
280,000 Cubic Feet

Church Pond Replacement is	43,560	CF
Remaining Volume =	236,440	CF

Parcel Share of Remaining Volume	Area (ac)	% of Volume	Cubic Feet
Church (Road Only)	0.54	6.70%	15,840.89
Attorney	1.58	19.60%	46,349.28
RIM	1.95	24.19%	57,203.23
Mollgaard	3.80	47.15%	111,472.95
Penny Creek (Road Only)	0.19	2.36%	5,573.65
Total	8.06	100.00%	236,440

Total Share of Detention System 280,000 Cubic Feet

	CF	% of Cost	
Church	59,400.89	21.21%	adding pond volume back in
Attorney	46,349.28	16.55%	
RIM	57,203.23	20.43%	
Mollgaard	111,472.95	39.81%	
Penny Creek	5,573.65	1.99%	
Total	280,000	100%	

APPENDIX E
TRAFFIC ANALYSIS

East Gateway Urban Village -Update

Traffic Analysis and Development Standards

Prepared by

DKS Associates
TRANSPORTATION SOLUTIONS

September 2012

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DKS Associates
TRANSPORTATION SOLUTIONS

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September 2012

1 INTRODUCTION

This document summarizes the results of the updated traffic analysis and development standards completed for the development of the City of Mill Creek East Gateway Urban Village. The purpose of this document is to identify the maximum potential transportation impacts of the East Gateway Urban Village on the surrounding street network in terms of level of service, queue lengths, and level of traffic control at access points to the East Gateway Urban Village development. Additionally, this document identifies the development standards including, trip generation, location of access, and access control.

The East Gateway Urban Village (EGUV) is approximately 50 acres of property located within the north east portion of the City of Mill Creek. In general, the EGUV area is located east of 35th Avenue SE, south of 132nd Street SE (SR-96), and west of Seattle Hill Road. The Washington State Department of Transportation (WSDOT) currently operates and maintains the signals on 132nd Street SE (SR-96) and Snohomish County operates and maintains Seattle Hill Road near the EGUV area.

1.1 Project Description

The EGUV plan includes the development of a mix of residential units, retail services, religious institutions, office spaces, public parks and a new internal street connection. The City of Mill Creek completed a SEPA analysis and Comprehensive Plan Amendment for the EGUV area in 2007, in which the proposed land use assumptions were documented. The EGUV Master Plan was updated in 2010 and the "Option B" land uses from the 2010 update of the EGUV Master Plan were used as the basis for the updated traffic analysis. The "Option B" land use assumptions were then updated as a part of this analysis to reflect maximum potential development based on current proposals for development within the EGUV area. The results of the traffic analysis update are based on the following land use assumptions within the EGUV:

- 327 apartments
- 117 townhomes
- 25,700 square feet of church facilities (existing and planned)
- 132,500 square feet discount store
- 30,000 square feet library
- 78,000 square feet specialty retail
- 24,000 square feet of medical/dental office building
- 1.02 acre city park

The EGUV includes an internal spine road through the project area that will connect to 132nd Street SE and Seattle Hill Road. The exact alignment of the spine roadway is still under consideration; however, three full access points have been identified to the EGUV area at the following locations: 132nd Street SE/39th Avenue SE, 132nd Street SE/44th Avenue SE, and Seattle Hill Road/136th Street SE. Additionally, a dedicated right-in/right-out only access point to the EGUV will be located off of 132nd Street SE between 39th Avenue SE and 44th Avenue SE. The traffic impacts of the proposed EGUV development were evaluated assuming all trips utilize these four access point to the site. Figure 1 illustrates the EGUV

development area and the proposed spine road alignment and connections to the existing roadway network.

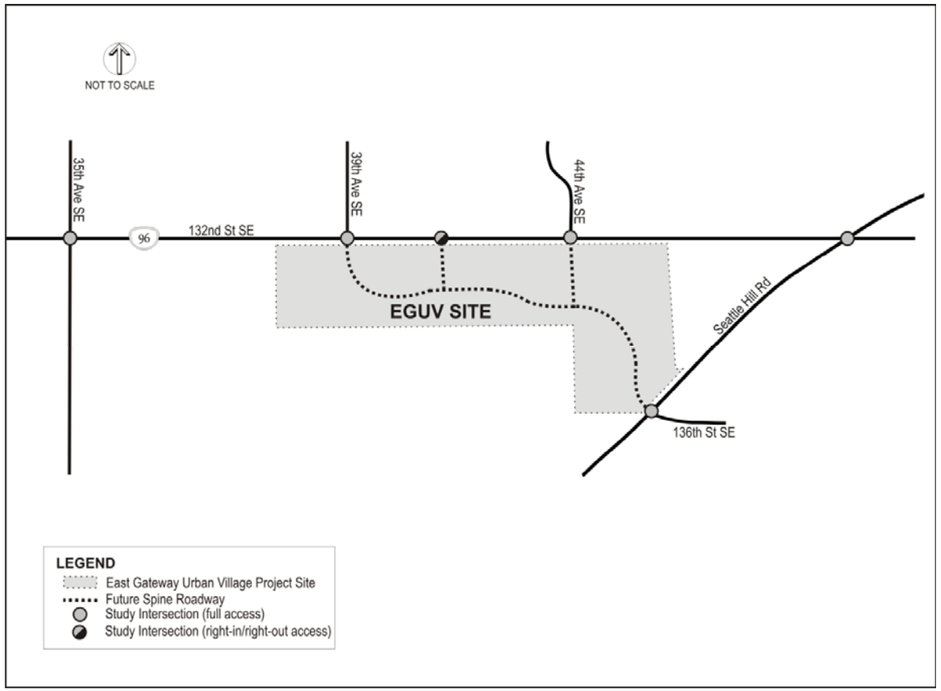

Figure 1: East Gateway Urban Village Study Area

2 Existing Conditions

This section documents the existing transportation conditions near the EGUV development. The existing transportation conditions in the study area include the roadway network, intersection traffic control and lane geometries, traffic volumes and intersection operation near the proposed development. Based on the anticipated increase in traffic volumes generated by the proposed development, the following intersections were included in the traffic analysis:

1. 132nd Street SE/35th Avenue SE (signalized)
2. 132nd Street SE/39th Avenue SE (signalized)
3. 132nd Street SE/44th Avenue SE (unsignalized)
4. 132nd Street SE/Seattle Hill Road (signalized)
5. Seattle Hill Road/136th Street SE (unsignalized)

The intersections of 132nd Street SE/ 35th Avenue SE, 139th Street SE/39th Avenue SE, and 132nd Street SE/Seattle Hill Road are signalized intersections operated by WSDOT. The intersection of 132nd Street SE/44th Avenue SE is an unsignalized T-intersection with stop control on the southbound, minor street approach. The intersection of 44th Avenue SE currently serves a predominantly residential development north of 132nd Street SE. The intersection of Seattle Hill Road/136th Street SE is an unsignalized T-intersection with stop control on the westbound, minor approach. 136th Street SE currently serves as the access to a residential development east of Seattle Hill Road. Figure 2 summarizes the existing lane configurations and intersection traffic control at the study intersections.

2.1 Site Description

The EGUV development is located directly south of 132nd Street SE and is bordered on the east by a portion of Seattle Hill Road. The site is bordered to the south by the Westfield Park and Bluegrass subdivisions and by undeveloped property to the west.

The proposed EGUV will include the development of vacant property as well as redevelopment of currently occupied property. The EGUV will include an internal spine road connecting to 132nd Street SE at 39th Ave SE and Seattle Hill Road at approximately 136th Street SE. The internal roadway network also includes two spur connections: one connection from the spine road to 132nd Street SE at 44th Avenue SE for a full access point, and one connection from the spine road to 132nd Street SE at a point between 39th Avenue SE and 44th Avenue SE for a right-in/right-out access point. .

2.2 Roadway Network

Within the study area there are two major roadways that would be impacted by the proposed EGUV development. Those roadways include 132nd Street SE and Seattle Hill Road. 132nd Street SE (SR-96) is classified as a principal arterial street that is operated and maintained by WSDOT. Seattle Hill Road is classified as a minor arterial street that is operated and maintained by Snohomish County. Table 1 summarizes the characteristics of the roadways within the study area. There is a reduced speed limit of 35 mph on 132nd Street SE within the school zone between 39th Avenue SE and 44th Avenue SE near the Archbishop Murphy High School.

Table 1: Existing Roadway Characteristics

Roadway	Jurisdiction	Classification	Posted Speed Limit	Number of Lanes	ADT*
132nd Street SE (SR-96)	WSDOT	Principal Arterial	45 mph	5	31,200
Seattle Hill Road	Snoh. Co.	Minor Arterial	35 mph	2	7,450

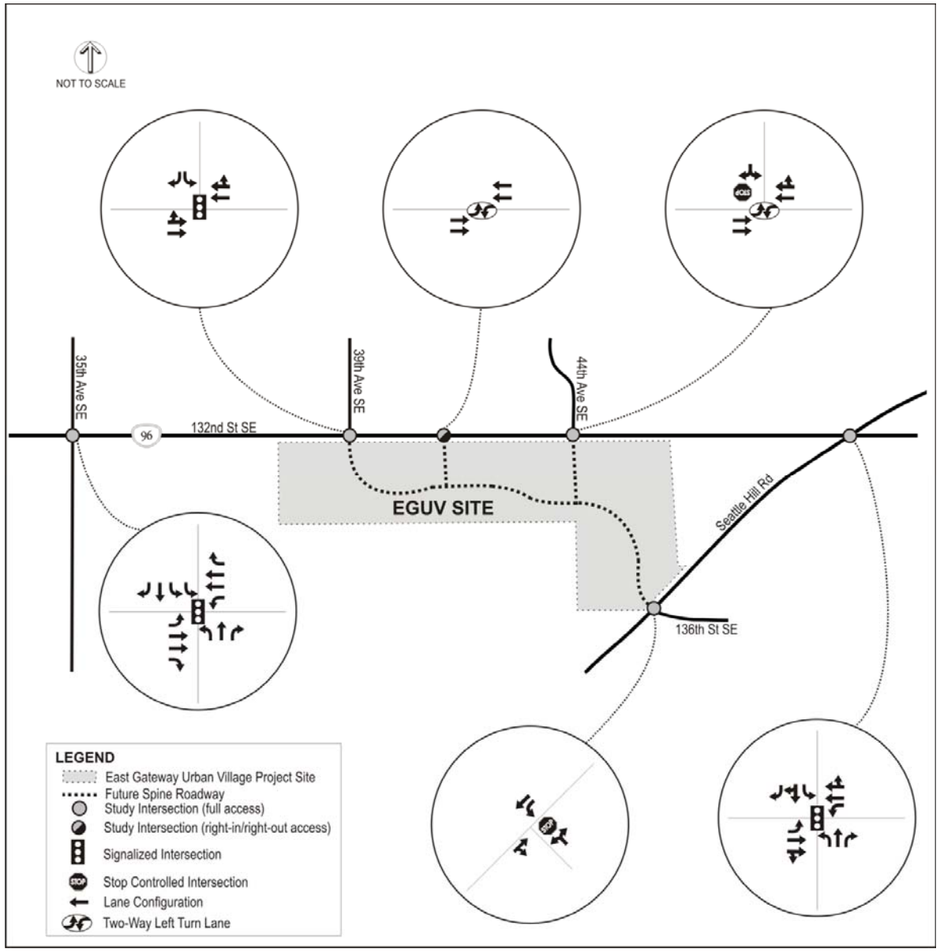

Figure 2: Existing Lane Geometry and Intersection Control

2.3 Existing Intersection Performance

Level of service (LOS) is used as a measure of effectiveness for intersection operation. The LOS at signalized intersections is defined by the average vehicle delay for the entire intersection, and at unsignalized intersections is defined by the average vehicle delay for the stop controlled movements. LOS is similar to a "report card" rating ranging from LOS A to F. LOS A represents free-flow conditions with little or no delay. LOS E represents conditions at intersection capacity, and LOS F represents worst case or over capacity conditions.

The existing PM peak hour traffic volumes at the intersections on 132nd Street SE at 35th Avenue SE, 44th Avenue SE and Seattle Hill Road were collected in January 2010 and the traffic volumes at Seattle Hill Road/136th Street SE was collected in June 2010. Intersection turning movement counts at 132nd Street SE/39th Avenue SE were obtained from WSDOT. The PM peak hour traffic volumes at these five intersections are summarized in Figure 3.

The intersection turning movement counts were used in conjunction with the existing lane geometry, traffic control, and signal timing (at signalized intersections) to determine the existing LOS at the study intersections using *Synchro* traffic analysis software. The existing lane geometry, speed limits, and traffic control were collected from a field review of the site and on aerial maps of the study area. The existing signal timing cards were collected from WSDOT and used to input the current signal timing for the intersections of 132nd Street SE/35th Avenue SE, 132nd Street St/39th Avenue SE, and 132nd Street SE/Seattle Hill Road.

The existing LOS at the study intersections is summarized in Table 2. For the signalized intersections, the average LOS and delay of the entire intersection are reported. For unsignalized intersections, the LOS and delay are reported for both the average of the intersection and for the worst movement of the minor street approach (intersection average/minor approach). The minor street LOS reported in Table 2 corresponds to the southbound left turn at the unsignalized intersection of 132nd Street SE/44th Avenue SE and the westbound through/left movement at the unsignalized intersection of Seattle Hill Road/136th Street SE.

Table 2: Existing PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	D	47	0.91
132nd Street SE/39th Avenue SE	signalized	C	22	0.76
132nd Street SE/44th Avenue SE	unsignalized	A / B	1 / 15	-
132nd Street SE/Seattle Hill Road	signalized	D	42	0.80
Seattle Hill Road/136th Street SE	unsignalized	A / B	1 / 12	-

Note: For unsignalized intersections, the LOS and delay are reported for both the total intersection/minor street approach. V/C ratios are not defined for unsignalized intersections.

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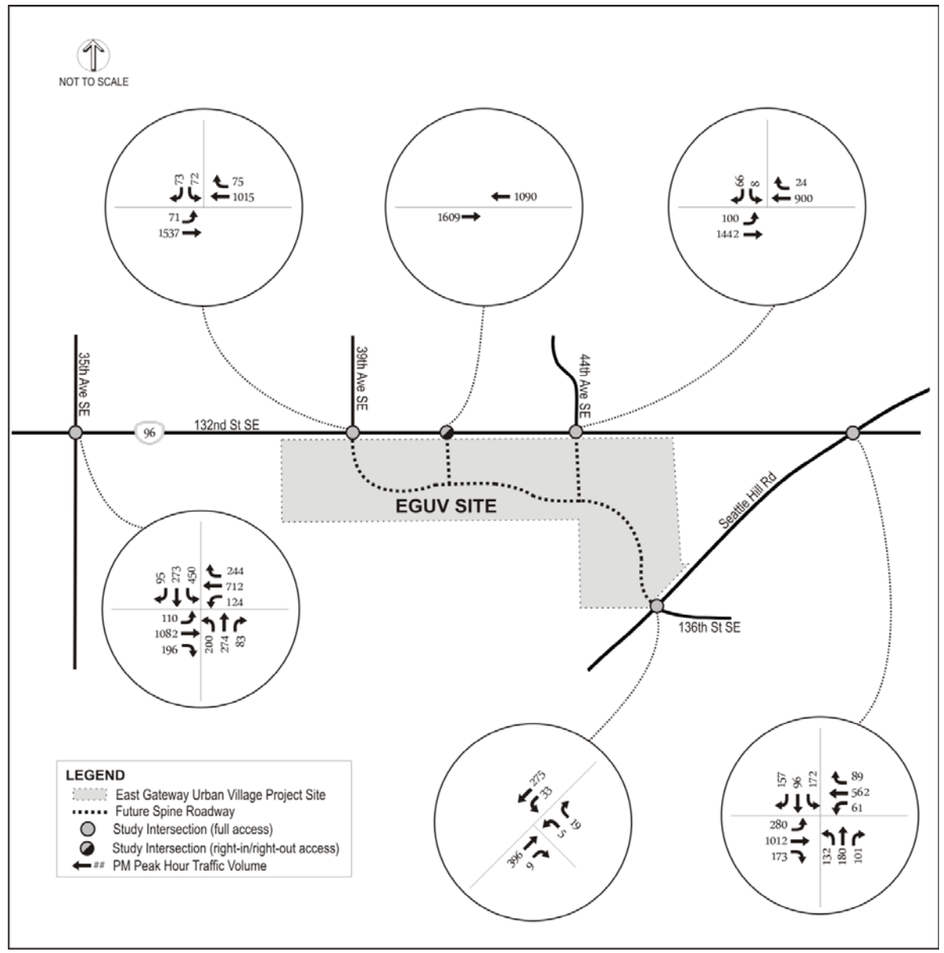

Figure 3: Existing PM Peak Hour Intersection Turning Movement Volumes

2.4 Vehicle Collision History

Collision data within the study area was obtained from WSDOT for the three-year period between January 2007 and October 2009. Table 3 summarizes the collision history at the study intersections on 132nd Street SE. Approximately 79 collisions occurred at the study intersections during the three year analysis period. Approximately 62% of the recorded collisions were property damage only, 38% were personal injury, and there were no fatalities. The majority of the collisions at the study intersections were read-end collisions.

Table 3: Study Area Collision Data (2007-2009)

Intersection	Total Collisions	Collision Type			Collision Rate*
		PDO	Injury	Fatal	
132nd Street SE/35th Ave SE	41	28	13	0	0.58
132nd Street SE/39th Ave SE	6	2	4	0	0.12
132nd Street SE/44th Ave SE	2	2	0	0	0.04
132nd Street SE/Seattle Hill Road	30	17	13	0	0.55
Percent of Total:	100%	62%	38%	0%	

*Collision rate represents the number of annual collisions per million entering vehicles.

A collision rate representing the three year analysis period was calculated for each intersection based on the number of recorded collisions and average daily traffic volume entering the intersection. An intersection collision rate greater than 1.0 is generally indicative of an operational or collision-related problem. The intersection of 132nd Street SE/35th Avenue SE experienced the highest collision rate of 0.58 which is well below the threshold for recommended further investigation.

3 Traffic Forecasts

This section reviews the impact of the full build-out of the proposed EGUV development on the study area transportation system. The analysis includes trip generation, trip distribution, and trip assignment to the surrounding street system.

3.1 Trip Generation

Trip generation to the site was determined based upon published trip generation rates from the Institute of Transportation Engineers (ITE) *Trip Generation, 8th Edition* for similar land uses as proposed within the EGUV development. Trip generation was developed for the following land uses within the EGUV site.

- 327 apartments
- 117 townhomes
- 25,700 square feet of church facilities (existing and planned)
- 132,500 square feet discount store
- 30,000 square feet library
- 78,000 square feet specialty retail
- 24,000 square feet of medical/dental office building
- 1.02 acre city park

The methodology outlined in the ITE *Trip Generation* report allows for a reduction in trips for specific land uses associated with internal capture of trips and pass-by activity within a multi-use site where the proposed land uses and site conditions closely reflect and align with the land uses and conditions specified in the ITE *Trip Generation* report. Internal trip capture refers to trips made within a multi-use development containing offices, retail, and residential uses, where a portion of the trips generated by one land use would originate and be destined to other land uses within close proximity on the same site. Pass-by trips account for traffic that currently travels on the adjacent roadways to the proposed project that would stop into the development as a part of their pre-existing trip. Pass-by trips are dependent on the type and location of the proposed development with respect to access point locations. Internal trip capture rates are highly variable depending upon the types and proximity of adjacent land uses to the proposed development. Since the EGUV will be built-out incrementally as a series of individual developments and the type, size and proximity of each individual land use and development could vary significantly under the allowable EGUV land uses, no internal or pass-by trip reductions were included when calculating the trip generation of the full build-out EGUV. This allows for a worst case analysis of the future trip generation and potential traffic impacts.

Table 4 summarizes the trip generation estimate for the EGUV proposed development impact analysis. The EGUV would generate approximately 1,444 new PM peak hour trips and 16,236 new daily trips onto the local roadways.

Table 4: Trip Generation of Proposed EGUV Development

Land Use	ITE Land Use Code	Land Use Size	Average Daily Trips	PM Peak Hour Trips		
				Enter	Exit	Total
Free Standing Discount Store	815	132,500 SF	7,584	331	331	662
Church	560	25,700 SF	234	7	7	14
Medical Dental Office	720	24,000 SF	766	22	59	81
Library	590	30,000 SF	1,631	105	114	219
Specialty Retail Center	814	78,000 SF	3,457	91	116	207
Residential Townhome	230	117 units	500	46	23	69
Apartments	210	327 units	2,062	125	67	192
City Park	411	1.06 acres	2	0	0	0
TOTAL New Trips			**16,236**	**727**	**717**	**1,444**

3.2 Trip Distribution

Trip distribution represents the forecast of where vehicle trips go to and come from within the study area. The distribution of new trips to and from the EGUV site was developed from the Puget Sound Regional Council (PSRC) travel demand model. The proposed EGUV land use was coded into the 2020 PSRC travel demand model and the distribution of trips to and from the zone representing the EGUV area to the surround street network was used as the basis of the trip distribution for primary purpose trips to and from the EGUV site. The trip distribution for primary purpose trips generated by the proposed EGUV development is summarized in Figure 4.

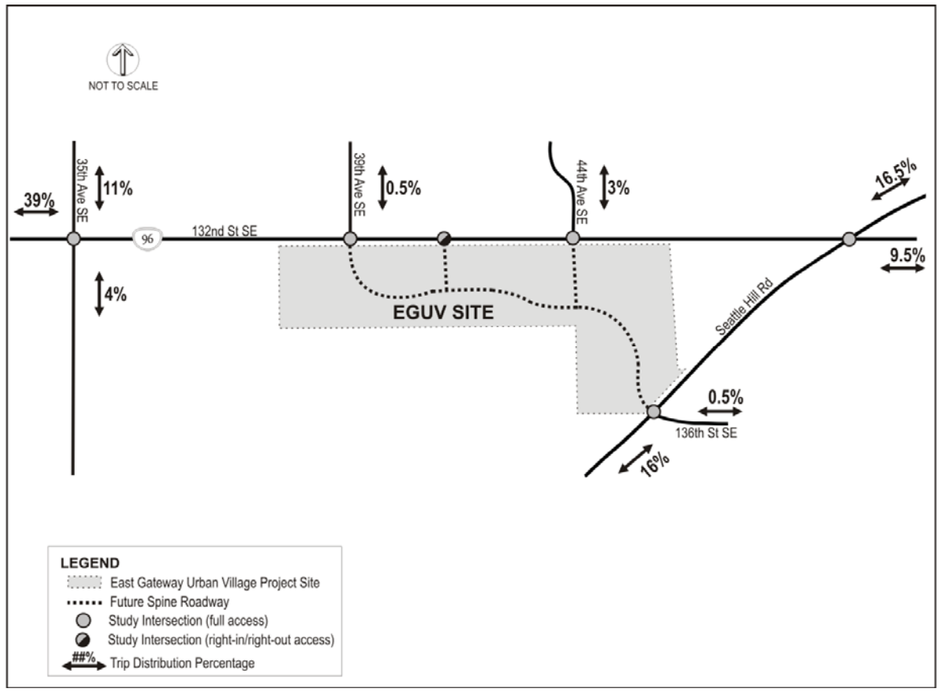

Figure 4: PM Peak Hour Trip Distribution of EGUV Site

3.3 Future Growth of Background Traffic

The average growth rate of traffic volumes without the proposed EGUV was calculated from the PSRC travel demand model for the streets within the study area. Based on the travel demand model, the traffic volumes are projected to grow at an annual average rate of approximately 2% per year. The existing traffic volumes were therefore projected out to 2020 conditions based on the average growth rate to establish future traffic conditions without the proposed EGUV development. The background traffic volumes are summarized in Figure 5.

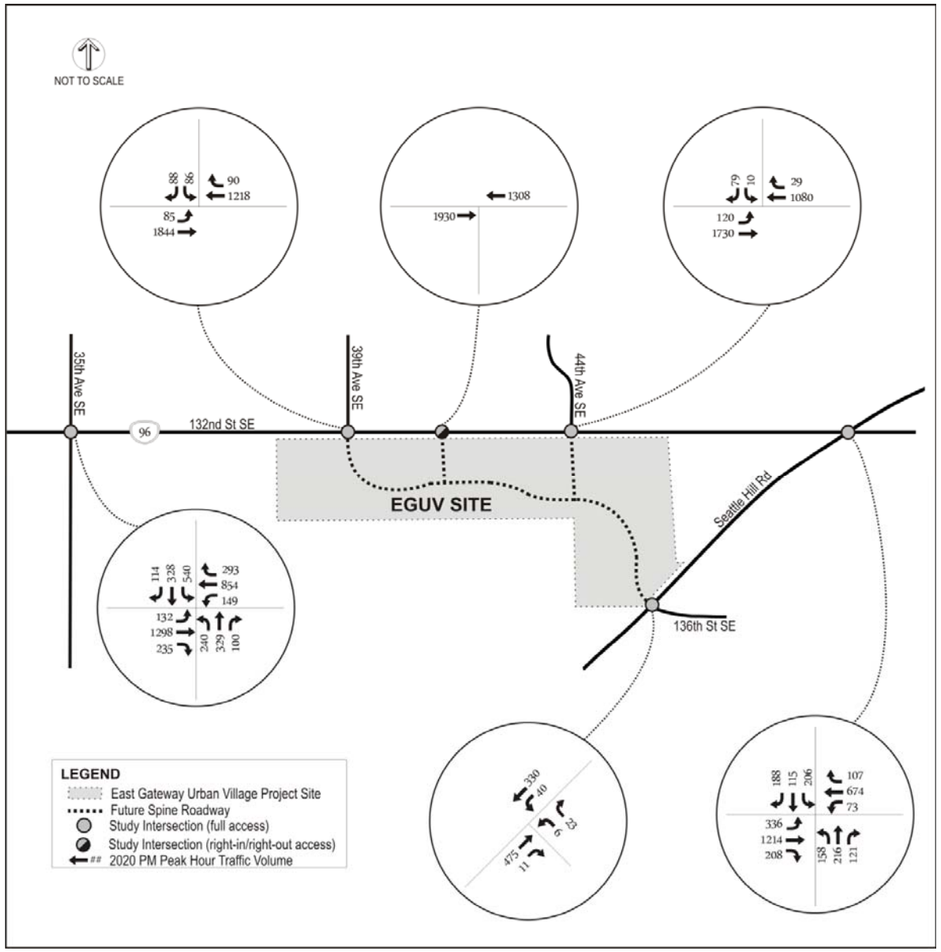

Figure 5: Future Baseline (2020) Turning Movement Volumes

3.4 Project Trip Assignment

The new trips generated by the proposed EGUV development were assigned to the surrounding street network based on the trip distribution shown in Figure 4. The projected traffic volumes generated by the proposed EGUV development are shown for each study intersection for the PM peak period in Figure 6. The resulting volumes of the future background turning movement counts plus the projected PM peak hour traffic volumes associated with the EGUV development are shown in Figure 7.

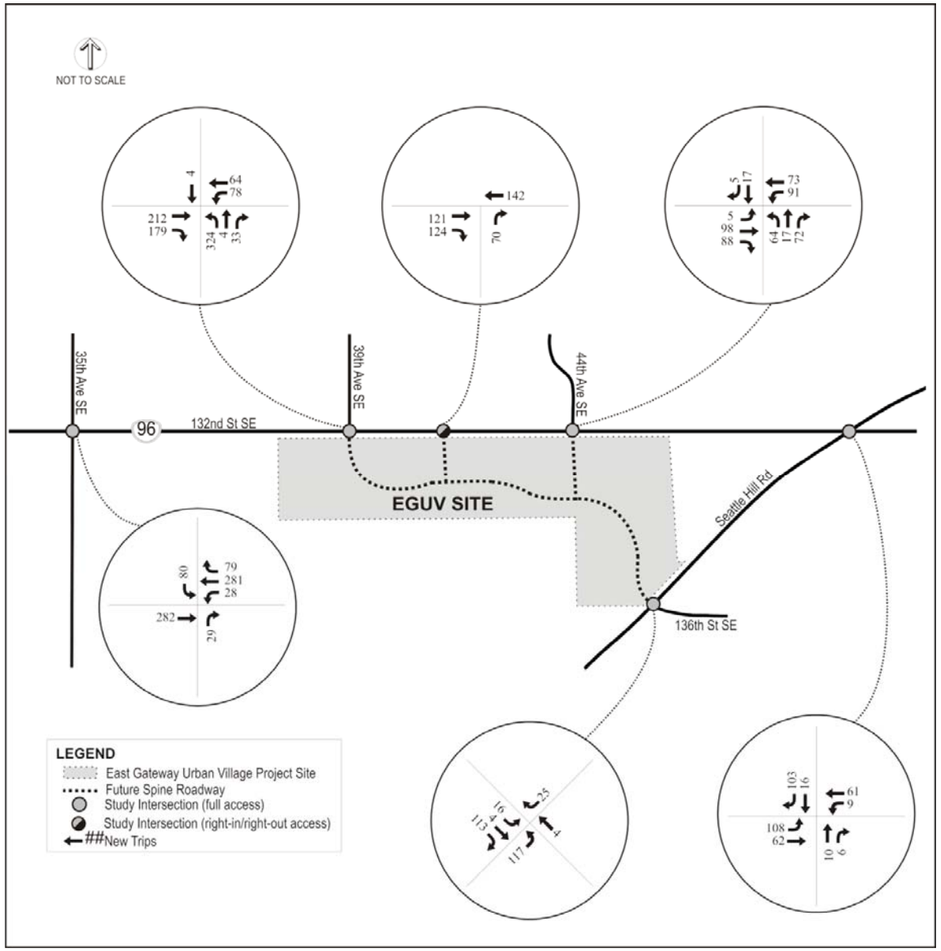

Figure 6: PM Peak Hour EGUV Trips

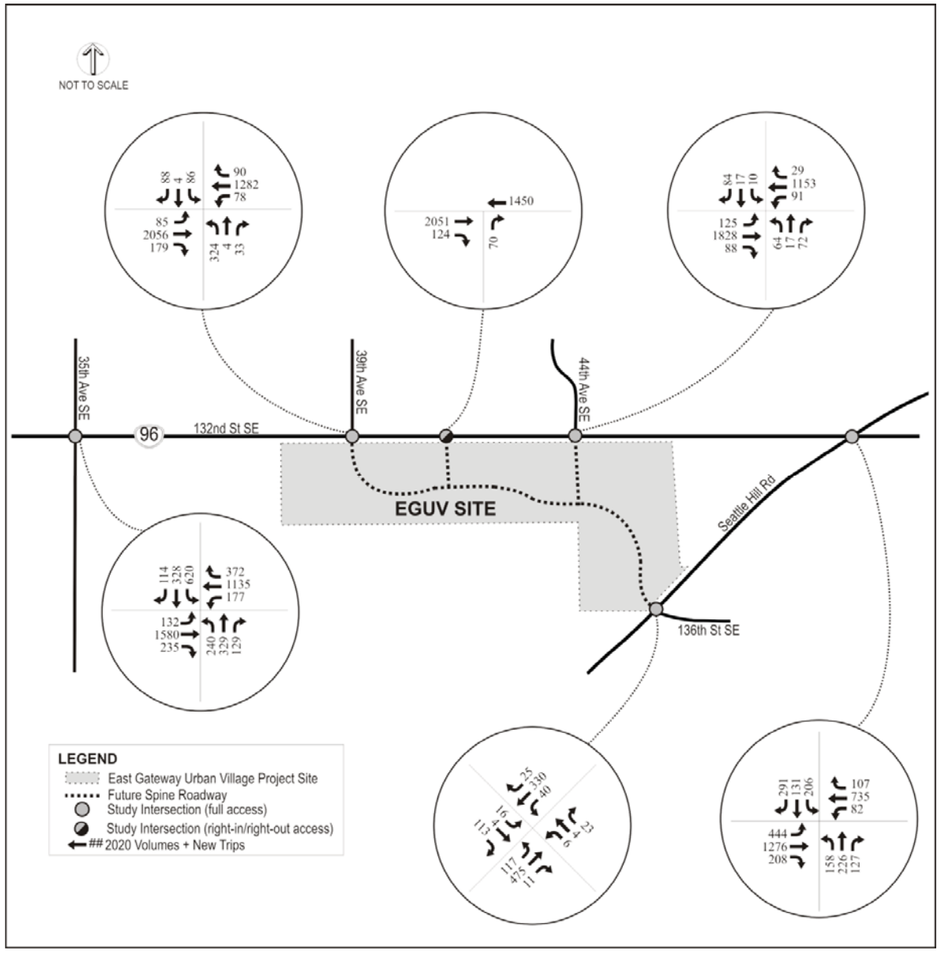

Figure 7: PM Peak Hour Future Baseline Plus EGUV Turning Movement Volumes

4 Transportation Impacts of EGUV Full Build-Out

This section reviews the impact of the full build-out of the proposed EGUV development on the study area transportation system. The analysis includes an evaluation of the operating conditions at study intersections including a signal warrant analysis, evaluation of signal phasing and coordination, queuing analysis, and recommended lane configuration at the proposed primary access point locations.

4.1 Signal Warrant Analysis

A signal warrant analysis was completed for the intersection of 132nd Street SE/44th Avenue SE based on the projected volumes from the EGUV development and the existing traffic volumes on 132nd Street SE. The signal warrant analysis was completed according to the *Manual on Uniform Traffic Control Devices, 2009 Edition* (MUTCD) signal warrant criteria for peak hour conditions. According to the MUTCD, the need for a traffic signal shall be considered if the total of both approaches on the major street exceeds 1,800 vehicles per hour and the minor street approach with two lanes carries more than 150 vehicles for one hour of an average day. The MUTCD further states that if the posted speed limit on the major street is greater than 40 mph (132nd Street SE is posted 45 mph) then the need for a traffic signal may be considered if the total of the major street approaches exceeds 1300 vehicles per hour and the minor street approach with two lanes carries more than 100 vehicles per hour. The existing total volume of both approaches on 132nd Street SE is approximately 2,470 vehicles in the PM peak hour and by year of opening it is projected to be 3,300 vehicles in the PM peak hour. Based on the EGUV development, the proposed 44th Avenue SE access point into the development area is projected to have 153 northbound vehicles during the PM peak hour, which meets the warrant for signalizing the intersection at this location. Without a traffic signal controlling the intersection, vehicles exiting the EGUV site would experience significant delay resulting in an intersection LOS F.

A signal warrant analysis was not completed for the intersection of Seattle Hill Road/136th Street SE as a roundabout is planned at that location to provide efficient intersection operations while contributing to an aesthetically appealing entrance to the EGUV.

4.2 Proposed Lane Geometry

The lane geometry at the intersection of 132nd Street SE/39th Avenue SE was based upon the signal plans developed by Snohomish County with input from the City of Mill Creek for this intersection. The signal design for this intersection accommodates a future four lane cross-section for the south leg of the intersection into the EGUV development. The south leg of the intersection would have one inbound travel lane and three outbound lanes. The turning movement configuration for northbound lanes out of the EGUV development has not been finalized. Given the high number of northbound left turns out of the EGUV at this location, two northbound left turn lanes are recommended at this access point. Since the south leg of the intersection is considerably wider than the north leg of the intersection, dedicating two lanes to left turning traffic and having the third lane operate as a northbound through/right lane creates some alignment issues since the northbound through movement would be offset by more than 12-ft from the receiving lane. The degree of offset between the northbound through lanes would likely create operational problems. In order to provide an improved alignment for the northbound through movement, while providing additional capacity for northbound left turns, the northbound approach

should be configured to have one dedicated left turn lane, a shared left/through lane, and a dedicated right turn lane. This configuration would require operating the signal split phase for the northbound and southbound movements.

The lane geometry of the 132nd Street SE/44th Avenue SE intersection has not been established. However, the south leg of 44th Avenue SE would likely have one lane into the site that is aligned with the edge of traveled-way with the southbound movement of the north leg of the intersection. This alignment would minimize the impacts to the existing church property. The northbound volumes out of the EGUV at 132nd Street SE/44th Avenue SE are significantly less than the projected volumes at the intersection of 132nd Street SE/39th Avenue SE. The right and left turn moments are closely balanced with a low through movement. A dedicated left turn pocket and shared through/right turn lane is recommended for the northbound approach to the 132nd Street SE/44th Avenue SE intersection. The north leg of the intersection currently has no pavement markings at the intersection, and operates as one lane northbound and southbound; however, the north leg of the intersection is 34-ft wide. In order to provide efficient intersection operations, it is recommended that the north leg retain one lane inbound and one lane outbound, but that pavement marking should be installed to provide a center island dividing the inbound and outbound movements and aligning the northbound and southbound through movements at the intersection.

132nd Street SE currently is a five lane facility with a two-way left turn lane. It is proposed that the two-way left turn lane would transition into a dedicated left turn pocket at the intersections with 39th Avenue SE and 44th Avenue SE. Conceptual sketches of the proposed lane geometry at the intersections of 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE are included in Figure 8 and Figure 9.

A roundabout is proposed at the intersection of the EGUV spine road, 136th Street Southeast, and Seattle Hill Road. Figure 10 depicts a conceptual layout for the roundabout. The inscribed circle for this single-lane roundabout is 130 feet with a circulating lane of 20 feet and a truck apron of 10 feet. The geometry will provide enough capacity for the projected traffic volumes at this intersection and accommodate a design vehicle of a WB-50. As shown in the figure, small amounts of additional right-of-way will likely need to be obtained, particularly in the north and west quadrants of the roundabout.

The right-in/right-out access point to 132nd Street between 39th Avenue SE and 44th Avenue SE should have one lane each direction. The northbound lane would be a dedicated right-turn only lane and the eastbound movements could be converted from two through lanes, to one through lane and one shared through/right turn lane.

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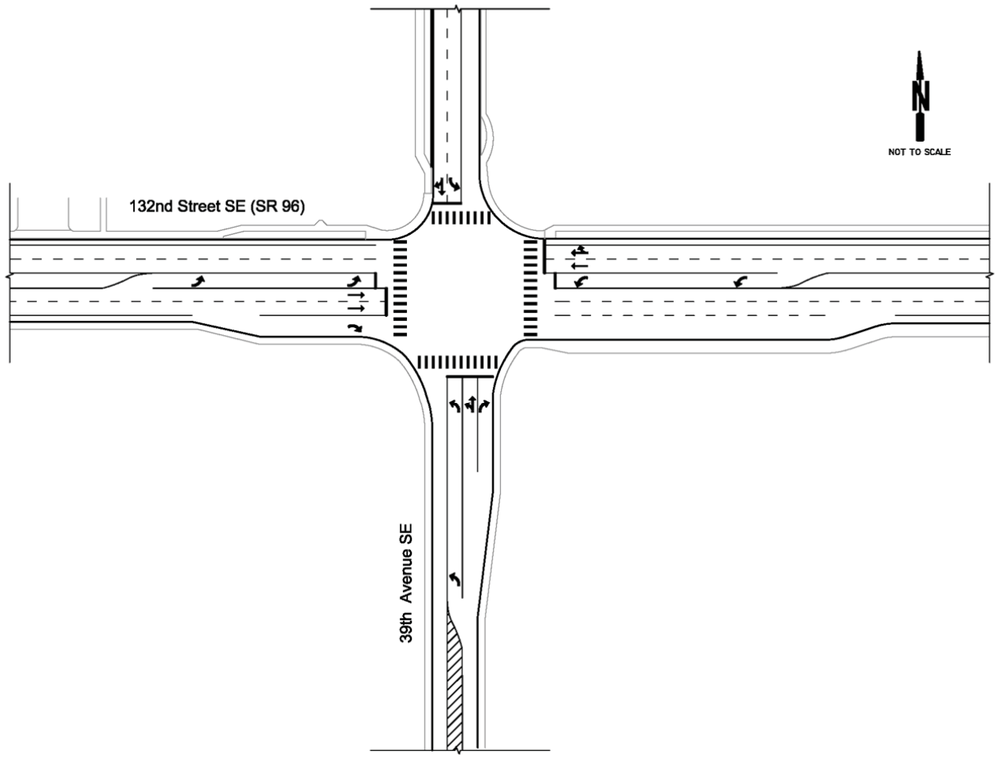

Figure 8: 132nd St SE/39th Ave SE Conceptual Lane Geometry

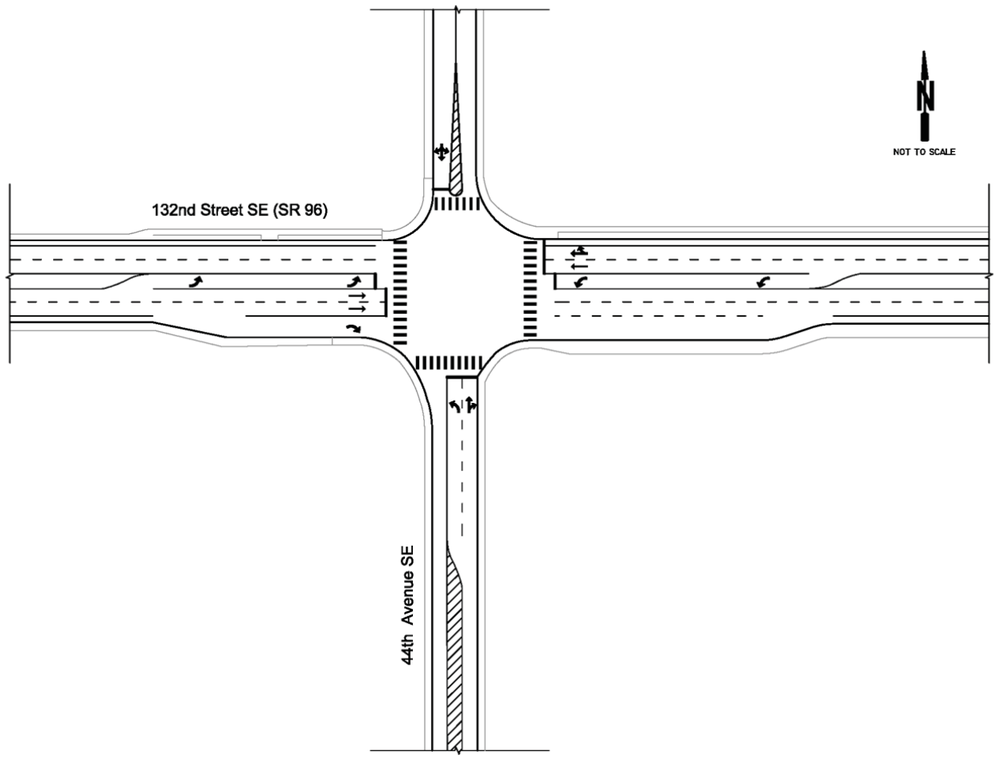

Figure 9: 132nd St SE/44th Ave SE Conceptual Lane Geometry

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Figure 10: Seattle Hill Road/Spine Road/136th St SE Conceptual Roundabout

4.3 Intersection Performance with EGUV Development

The PM peak hour turning movement volumes of the2020 baseline traffic plus EGUV site were used to evaluate the performance of the study intersections with the development of the EGUV. The intersection performance of the 2020 baseline conditions without the proposed development is summarized in Table 5.

Table 5: Future (2020) Baseline PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	E	68	1.07
132nd Street SE/39th Avenue SE	signalized	B	20	0.82
132nd Street SE/44th Avenue SE	unsignalized	B / C	1 / 18	-
132nd Street SE/Seattle Hill Road	signalized	D	52	0.94
Seattle Hill Road/136th Street SE	unsignalized	A / B	1 / 14	-

Note: For unsignalized intersections, the LOS and delay are reported for both the total intersection/minor street approach. V/C ratios are not defined for unsignalized intersections.

For the future conditions with the EGUV site, it was assumed that the intersection of 44th Avenue SE would be signalized and that the signals on 132nd Street SE would be coordinated between 35th Avenue SE and Seattle Hill Road. The proposed lane geometry as described in section 4.2 for each access point was used for the analysis. *Synchro* traffic analysis software was used to optimize the signal timing and calculate the LOS for the five study intersections on 132nd Street SE. The proposed roundabout at Seattle Hill Road/136th Street SE was evaluated using *SIDRA* traffic analysis software. The 2020 Baseline plus EGUV conditions are summarized in Table 6.

Table 6: Future Baseline plus EGUV Site Traffic PM Peak Hour LOS, Delay, and V/C Ratios

Intersection	Intersection Control	PM Peak Hour		
		LOS	Delay (sec/veh)	V/C Ratio
132nd Street SE/35th Avenue SE	signalized	F	105	1.30
132nd Street SE/39th Avenue SE	signalized	D	49	1.10
132nd Street SE/RIRO Access point	unsignalized	A / B	0 / 14	-
132nd Street SE/44th Avenue SE	signalized	B	18	0.91
132nd Street SE/Seattle Hill Road	signalized	D	55	1.06
Seattle Hill Road/136th Street SE	roundabout	-	-	0.50

The continuous flow of traffic at the proposed single lane roundabout will minimize delays, and will satisfactorily handle traffic operations without increasing the number of lanes at the intersection. The safety benefits of the roundabout include geometry that removes the most severe intersection collisions. For example, there are no head-on, right-angle, or T-bone collisions at a roundabout. In addition, the slower speeds necessary to maneuver through the roundabout reduce the severity of any possible collisions.

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4.4 Queuing Analysis

A queuing analysis of the 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE intersections was completed based upon the proposed lane geometry and signalization of the intersections. The 95th percentile queue lengths for the northbound approach turning movements out of the proposed development and the eastbound and westbound turning movements on 132nd Street SE are summarized in Table 7.

Table 7: Queue Lengths at EGUV Signalized Access Points

Intersection	95th Percentile Queue Length (feet)				
	NBL	NBR	EBL	EBR	WBL
132nd Street SE/39th Avenue SE	175	60	180	110	185
132nd Street SE/44th Avenue SE	125	115	190	70	220

5 Mitigation Measures for EGUV Full Build-Out

This section outlines the mitigations to address the impacts of the full build-out of the EGUV on the surrounding street system.

5.1 Access Control

As shown in Figure 1, at full build-out the only access points to the EGUV on 132nd Street SE shall be two signalized intersections, one at 39th Avenue SE and another at 44th Avenue SE and one right-in/right-out (RIRO) intersection at approximately 41st Ave SE. Additionally, the only access point to the EGUV on Seattle Hill Road shall be a roundabout at 136th Street SE.

With the signalization of the intersection at 44th Avenue SE, access control measures shall be installed on 132nd Street SE to improve operations. The access control measures could include the installation of a raised median, c-curb, or other median treatments to be determined by WSDOT for 132nd Street SE between 35th Avenue SE, 39th Avenue SE, 44th Avenue SE, and Seattle Hill Road. Any interim and existing access points between 39th and 44th Avenues SE shall be closed at the time that the spine road opens. The intersections of 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE shall be designed to accommodate U-turns.

5.2 Lane Geometry

The access points at 39th Avenue SE and 44th Avenue SE from the EGUV to 132nd Street SE shall have three outbound lanes in the northbound direction with a dedicated northbound left turn lane, shared left/through lane, and right turn pocket. Additionally, the existing two-way left turn lane on 132nd Street SE shall be converted into left-turn pockets at the 39th Avenue SE and 44th Avenue SE intersections. The dedicated left and right turn pockets for the northbound, eastbound and westbound approaches shall be designed to accommodate the queue lengths projected with the full build-out of the EGUV. The 39th Avenue SE and 44th Avenue SE intersections shall also be designed to accommodate U-turns and bus pull outs on the far side of the intersection in the eastbound direction.

The access point from the EGUV at Seattle Hill Road/136th Street SE shall be a single lane roundabout. The splitter island geometry provides flexibility in the design to accommodate a variety of existing roadway sections. If a center left turn lane is constructed on Seattle Hill Road, the roundabout geometry can be seamlessly integrated into this configuration.

5.3 Traffic Signal Interconnect

When the intersection of 132nd Street SE/44th Avenue SE is signalized, the signals at 35th Avenue SE, 39th Avenue SE, 44th Avenue SE, and Seattle Hill Road shall all be interconnected and coordinated to improve the traffic flow through the corridor. There is currently a missing link in the existing traffic signal interconnect on 132nd Street SE between 25th Avenue SE and 35th Avenue that shall be constructed to provide the communications link from the WSDOT traffic management center to the corridor. Traffic signal interconnect shall be installed between 25th Avenue SE and Seattle Hill Road.

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Several alternatives exist for completing the interconnect between the signals: Underground interconnect (conduit); aerial interconnect; or wireless interconnect. Underground hardwire interconnect shall be considered for the portion of 132nd Street SE adjacent to the EGUV if any sidewalk or frontage improvement will be constructed as a part of the development. Underground hardwire interconnect would require trenching and new conduit. Aerial interconnect using the utility poles on the north side of 132nd Street SE would save on construction costs but may require agreements with the utilities that own the poles. Alternatively, wireless communication between the intersections would also be cost effective and would be a viable alternative due to the clear line of sight between the intersections.

5.4 Spine Road Intersection Spacing and Driveway Widths

The intersection and curb-cut spacing along the spine road within the EGUV development will be developed as the properties within the development are finalized. Each development shall be allowed one two-way access point or two one-way access points per 500-feet of property frontage to the spine road. Access points to the spine road shall have a minimum spacing of 150-feet between the nearest edges of two adjacent access points. Whenever possible, access points shall be placed directly opposite each other. If this alignment is not possible, then the access points on opposite sides of the spine road shall be separated by a minimum of 75-feet.

Shared access points are encouraged for adjacent developments. Shared access points shall have a minimum width of 36-feet and shall have a minimum of two outbound lanes and one inbound lane to the development. Sole access points shall have a minimum width of 24-feet with one outbound and one inbound lane to the development.

6 Mitigation Measures for Interim Conditions

This section outlines the mitigations to address the impacts of the EGUV in the interim condition prior to full build-out of the EGUV on the surrounding street system.

6.1 Access Control

The portion of 132nd Street SE adjacent to the EGUV is classified by WSDOT as a Class 3 facility for access control. According to the WSDOT Highway Classification Description Table, Class 3 facilities balance mobility and access in areas with less than maximum build-out. The minimum spacing of access points for a Class 3 facility is 330-ft, and only one access is allowed to contiguous parcels under the same ownership. Joint access points are preferred for the whole development area where possible.

Any development adjacent to 132nd Street SE that is approved and constructed prior to the construction of the EGUV spine roadway may request access to 132nd Street SE for the interim conditions until the spine road is constructed. Access points to 132nd Street SE shall meet WSDOT access control requirements. New access points are also subject to the provisions outlined in this document, and joint access points shall be installed for adjacent developments where possible. The City of Mill Creek must review and approve the need and location of any new access point to 132nd St SE from a parcel within the EGUV prior to installation.

As the EGUV area develops, the City of Mill Creek recognizes that land use adjacent to 132nd Street SE will no longer meet the WSDOT definition of "less than maximum build-out" that defines a Class 3 facility, and access control measures shall be installed on 132nd Street SE adjacent to the EGUV site. Access control measures shall be installed on 132nd Street SE once the EGUV spine roadway is constructed between 39th Avenue SE and 44th Avenue SE and the intersection of 132nd Street SE/44th Avenue SE is signalized. The access control measures could include median, c-curb, or other treatment as identified by WSDOT to be installed on 132nd Street SE between the intersections of 35th Avenue SE, 39th Avenue SE, 44th Avenue SE and Seattle Hill Road. All temporary access points to 132nd Street SE granted to EGUV developments within the interim conditions shall be closed when the spine road is constructed. The signalized intersections of 39th Avenue SE and 44th Avenue SE shall be designed to accommodate U-turn movements, and shall be the full-access points from 132nd Street SE to the EGUV development.

Snohomish County does not have an established roadway classification for access control for Seattle Hill Road, but a new intersection to a County facility should meet the design criteria established in the most current version of the Snohomish County's Engineering Design and Development Standards, or the version of the standards to which the development is vested. Access to parcels adjacent to Seattle Hill Road shall be permitted temporary access according to the Snohomish County standards in the interim conditions until the spine road is constructed between 44th Avenue NE and Seattle Hill Road. Once the spine road is constructed between 44th Avenue SE and Seattle Hill Road, all temporary access points shall be closed and the roundabout at Seattle Hill Road/136th Street SE shall serve as the access point to the EGUV development from Seattle Hill Road.

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6.2 Traffic Signal Interconnect

Traffic signal interconnect described in Section 5.3 shall be required on 132nd Street SE at the point when the intersections of 132nd Street SE/39th Avenue SE and 132nd Street SE/44th Avenue SE are signalized. If signals are installed at these two intersections prior to the full build-out of the EGUV, then traffic signal interconnect shall also be installed during the interim conditions.

Technical Appendix:
Developer Requirements for Traffic Impact Analyses
City of Mill Creek
East Gateway Urban Village Update

This document summarizes the requirements for conducting a traffic impact analyses for a proposed development within the City of Mill Creek East Gateway Urban Village (EGUV) with respect to trip generation, internal capture and pass-by trips, and trip distribution to and from the EGUV. The EGUV is "intended to accommodate pedestrian-oriented mixed use commercial, office, residential and public uses" that conform to the master development plan. These developer requirements are tailored to address those land uses that comply with the vision and requirements of the EGUV.

TRIP GENERATION

The Mill Creek Municipal Code (17.19) identifies the following as principal land uses within the EGUV:

- Retail sales and services except automotive, boat, and recreational vehicle sales,
- Eating and drinking establishments (drive-through service prohibited)
- Banks, financial and professional services,
- Medium and high density residential (in low- and mid-rise buildings)
- Business and professional offices
- Personal services, dry cleaners, salons, etc.,
- Medical and dental clinics and offices,
- Parking structures,
- Commercial day care,
- Craft shops and galleries,
- Public buildings, facilities/utilities
- Transit facilities/stops,
- Hotels and motels,
- Open space, parks and plazas,
- Religious facilities
- Theaters, performing arts uses, and
- Other uses consistent with the purposes of the district.

Additionally, the designation of the EGUV as a Planned Urban Village (PUV) limits a single commercial use to a maximum ground floor area of 130,000 square feet and establishes maximum height requirements. The maximum height allowed within the EGUV is four stories (not to exceed 50 feet), except for mixed use residential buildings, which have a maximum height of five stories (not to exceed 60 feet) provided that the maximum height shall be three stories (not to exceed 35 feet) for building constructed adjacent to single-family homes.

The ITE *Trip Generation* report was utilized to establish the trip generation rates or regression equation appropriate for potential land uses within the EGUV. These rates and regression equations are summarized in Table A-1 and Table A-2.

Developers may propose trip generation rates different than those published in the ITE *Trip Generation* report if they are supported by recent studies of comparable or identical land uses and match the conditions present at the EGUV site. The City will evaluate the studies that support a different rate and make a determination of the appropriate rate to be used where more recent data supports rates different than those published by ITE.

Internal Capture

Internal capture refers to trips made within a multi-use development containing offices, retail and residential uses where a portion of the trips generated by one land use would originate and be destined to other land uses within the same site, particularly where the trip can be made by walking. At full build-out, there is the potential that the EGUV could generate some internal trips so that a portion of total trips captured within the site that would not result in new vehicular trips on 132nd Street SE or Seattle Hill Road.

Internal trip capture rates vary significantly depending on type of development and the proximity and accessibility to other surrounding land uses. Because of the uncertainty and great variability of internal trip capture rates and the lack of reliable detailed data that reflects the actual EGUV site conditions and land uses, the use of internal trip capture rates will not be allowed by a proponent of any development within the EGUV except as specified herein:

- Any reductions in trips to account for internal capture shall be calculated only for the proposed development with respect to its proposed land use and its relationship to itself and the existing land uses present within the EGUV site at the time of the applicant's application.
- Should a proponent desire to utilize internal trip capture rates when calculating the trip generation for their project, the proponent shall complete an internal trip capture analysis in conformance with the methodology and rates described in the Multi-Use Development (Section 7) of the ITE *Trip Generation Handbook*, *2nd Edition*. This analysis shall explain and describe how the internal trip capture rates and conditions described in the *ITE Trip Generation Handbook* compare to the actual site and land use conditions present at the EGUV site and the rationale used to select and apply the *ITE Trip Generation Handbook* rates to the proposed development.
- The values used in the calculation shall reflect actual existing land use present at the time of the new development; the proponent can not assume that additional future development will occur on the EGUV site.

Pass-by Trips

Pass-by trips are those trips into a site from vehicles that were already traveling over the roadway adjacent to the site and stop into the development as a part of their overall trip. Pass-by trips do not add new trips to the roadway adjacent to the site, but instead shift traffic from through movements to turning movements at the site driveways. Primary trips add new traffic volumes on the streets and roadway network adjacent to the development.

There is limited information available on pass-by percentages from ITE. ITE *Trip Generation Handbook* included average pass-by percentages for only 16 of the 53 potential land uses summarized in Tables A-1 and A-2. The ITE average pass-by rates for the PM peak period is summarized in Table A-1 for those land uses where data is available. For other land uses, the developer may conduct independent studies that demonstrate the pass-by percentage for the land uses proposed. If no pass-by data is available either

from ITE or independent studies, then no pass-by trips shall be allocated to the proposed land use and all trips shall be assigned to the roadway network as primary purpose trips. Any pass-by studies performed by the proponent shall meet the requirements in the Recommended Data Collection Procedures (Section 5.6) of the ITE *Trip Generation Handbook, 2nd Edition*.

Trip Distribution

Trip distribution represents the forecast of where vehicle trips go to and come from within the study area. The distribution of new trips to and from the EGUV site was developed from the Puget Sound Regional Council (PSRC) travel demand model. The proposed EGUV land use was coded into the 2020 PSRC travel demand model and the distribution of trips to and from the zone representing the EGUV area to the surrounding street network was used as the basis of the trip distribution for primary purpose trips to and from the EGUV site.

While the overall trip distribution to the surrounding street network is the same for all sites within the EGUV, the distribution of trips to the EGUV primary access point varies depending on the location of the individual parcel within the EGUV area. The trip distribution at access points for primary purpose trips generated by the proposed EGUV development is summarized for the following groups of parcels within the EGUV:

- Penny Creek Partners
- Mollgaard, Rim, and 132nd Street Land Development
- Advent Church
- Nash
- Dunn and east end parcels along Seattle Hill Road

Graphics showing the primary trip distribution for each of the EGUV subareas are included in Figures A-1 to A-5 at the end of the technical appendix. The trip distributions presented in Figures A-1 to A-5 shall be used for assigning the PM Peak Hour primary purpose trips generated by the proposed development to the surrounding roadway network.

The pass-by trip distribution was based on the forecasted traffic volumes on 132nd Street SE from the 2020 PSRC travel demand model for those trips that were not originating from or destined to the zone representing the EGUV area. The pass-by trip distribution on 132nd Street SE is 59% eastbound and 41% westbound. If any pass-by trips are calculated for the proposed site, the pass-by trips shall be subtracted from the total trip generation after any reductions due to internal capture have been applied and prior to assigning the primary trips to the site.

Table A-1: PM Peak Hour Trip Generation Rate/Regression Equation, and Pass-by Percentage

Land Use	ITE #	PM Peak Hour of Adj Street (4-6pm)		Distribution		Pass-by Rates
		Rate/Regression	Unit	Enter	Exit	
Residential						
Apartment	220	T=0.55(x)+17.65	/Unit	65%	35%	-
Low-Rise Apartment	221	Ln(T)=0.88Ln(x)+0.16	/Unit	65%	35%	-
Mid-Rise Apartment (3-10 floors)	223	T=0.48(x)-11.07	/Unit	58%	42%	-
Residential Condominium/Townhouse	230	Ln(T)=0.82Ln(x)+0.32	/Unit	67%	33%	-
Low-Rise Residential Condominium/Townhouse	231	0.78	/Unit	58%	42%	-
Lodging						
Hotel	310	0.59	/Room	53%	47%	-
Motel	320	0.47	/Room	54%	46%	-
Recreational						
Live Theater	441	0.02	/Seat	50%	50%	-
Movie Theater w/o Matinee	443	0.07	/Seat	75%	25%	-
Movie Theater w/ Matinee	444	0.07	/Seat	39%	61%	-
Multiplex Movie Theater	445	0. 08	/Seat	60%	40%	-
Institutional						
Church	560	0.66	/1000 SF GFA	52%	48%	-
Day Care Center	565	13.18	/1000 SF GFA	47%	53%	-
Library	590	7.3	/1000 SF GFA	48%	52%	-
Office						
General Office Building	710	T=1.12(x)+78.81	/1000 SF GFA	17%	83%	-
Corporate Headquarters Building	714	Ln(T)=0.87Ln(x)+1.01	/1000 SF GFA	10%	90%	-
Single Tenant Office Building	715	T=1.52(x)+34.88	/1000 SF GFA	15%	85%	-
Medical-Dental Office Building	720	Ln(T)=0.93Ln(x)+1.47	/1000 SF GFA	27%	73%	-
Research and Development Center	760	Ln(T)=0.83Ln(x)+1.06	/1000 SF GFA	15%	85%	-

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Table A-1 (cont.): PM Peak Hour Trip Generation Rate/Regression Equation, and Pass-by Percentage

Land Use	ITE #	PM Peak Hour of Adj Street (4-6pm)		Distribution		Pass-by Rates
		Rate/Regression	Unit	Enter	Exit	
Retail						
Building Materials and Lumber store	812	Ln(T)=1.16Ln(x)+1.10	/1000 SF GFA	47%	53%	-
Free-Standing Discount Superstore	813	4.16	/1000 SF GLA*	50%	50%	31%
Specialty Retail Center	814	T=2.40(x)+21.48	/1000 SF GLA*	44%	56%	-
Free-Standing Discount Store	815	5	/1000 SF GFA	50%	50%	18%
Hardware/Paint Store	816	T=3.31(x)+27.59	/1000 SF GFA	47%	53%	26%
Automobile Parts Sales	843	T=7.87(x)-14.86	/1000 SF GFA	49%	51%	43%
Tire Store	848	4.15	/1000 SF GFA	43%	57%	28%
Supermarket	850	Ln(T)=0.79Ln(x)+3.20	/1000 SF GFA	51%	49%	36%
Convenience Market (Open 24 Hours)	851	52.41	/1000 SF GFA	51%	49%	61%
Convenience Market (Open 15-16 Hours)	852	34.57	/1000 SF GFA	49%	51%	-
Convenience Market w/ Gasoline Pumps	853	60.61	/1000 SF GFA	50%	50%	66%
Sporting Goods Store	861	3.10	/1000 SF GFA	47%	53%	-
Home Improvement Superstore	862	2.37	/1000 SF GFA	48%	52%	48%
Electronics Superstore	863	4.50	/1000 SF GFA	49%	51%	40%
Toy/Children's Superstore	864	4.99	/1000 SF GFA	50%	50%	-
Baby Superstore	865	1.82	/1000 SF GFA	50%	50%	-
Pet Supply Superstore	866	3.38	/1000 SF GFA	50%	50%	-
Office Supply Superstore	867	3.40	/1000 SF GFA	53%	47%	-
Book Superstore	868	19.53	/1000 SF GFA	52%	48%	-
Bed and Linin Superstore	872	2.22	/1000 SF GFA	41%	59%	-
Apparel Store	876	3.83	/1000 SF GFA	50%	50%	-
Arts and Craft Store	879	6.21	/1000 SF GFA	46%	54%	-
Pharmacy/Drugstore w/o Drive-Through Window	880	8.42	/1000 SF GFA	50%	50%	53%
Pharmacy/Drugstore w/ Drive-Through Window	881	8.62	/1000 SF GFA	49%	51%	49%
Furniture Store	890	0.46	/1000 SF GFA	45%	55%	53%
Video Rental Store	896	Ln(T)=0.93Ln(x)+2.61	/1000 SF GFA	46%	54%	-

Services						
Walk-in Bank	911	42.02	/1000 SF GFA	50%	50%	-
Drive-in Bank	912	45.74	/1000 SF GFA	50%	50%	47%
Quality Restaurant	931	7.49	/1000 SF GFA	67%	33%	44%
High-Turnover (Sit-Down) Restaurant	932	10.92	/1000 SF GFA	61%	39%	43%
Drinking Place	936	11.34	/1000 SF GFA	66%	34%	-
Quick Lubrication Vehicle Shop	941	5.19	/Servicing Positions	55%	45%	-
Gasoline/Service Station	944	13.87	/Vehicle Fueling Positions	50%	50%	42%
Gasoline/Service Station w/ Convenience Market	945	13.38	/Vehicle Fueling Positions	50%	50%	56%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Table A-2: Average Weekday Daily Trip Generation Rate/Regression Equation, and Pass-by Percentage

Land Use	ITE #	Average Weekday		Distribution	
		Rate/Regression	Unit	Enter	Exit
Residential					
Apartment	220	T=6.01(x)+150.35	/Unit	50%	50%
Low-Rise Apartment	221	T=5.12(x)+387.53	/Unit	50%	50%
Mid-Rise Apartment (3-10 floors)	223	No Daily Data Available			
Residential Condominium/Townhouse	230	Ln(T)=0.85Ln(x)+2.55	/Unit	50%	50%
Low-Rise Residential Condominium/Townhouse	231	No Daily Data Available			
Lodging					
Hotel	310	T=8.95(x)-373.16	/Room	50%	50%
Motel	320	Ln(T)=0.92Ln(x)+2.11	/Room	50%	50%
Recreational					
City Park	411	1.59	/Acre	50%	50%
Live Theater	441	No Daily Data Available			
Movie Theater w/o Matinee	443	1.76	/Seat	50%	50%
Movie Theater w/ Matinee	444	No Daily Data Available			
Multiplex Movie Theater	445	No Daily Data Available			

Institutional					
Church	560	9.11	/1000 SF GFA	50%	50%
Day Care Center	565	79.26	/1000 SF GFA	50%	50%
Library	590	Ln(T)=0.69Ln(x)+5.05	/1000 SF GFA	50%	50%
Office					
General Office Building	710	Ln(T)=0.77Ln(x)+3.65	/1000 SF GFA	50%	50%
Corporate Headquarters Building	714	Ln(T)=0.97Ln(x)+2.23	/1000 SF GFA	50%	50%
Single Tenant Office Building	715	11.57	/1000 SF GFA	50%	50%
Medical-Dental Office Building	720	T=40.89(x)-214.97	/1000 SF GFA	50%	50%
Research and Development Center	760	8.11	/1000 SF GFA	50%	50%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

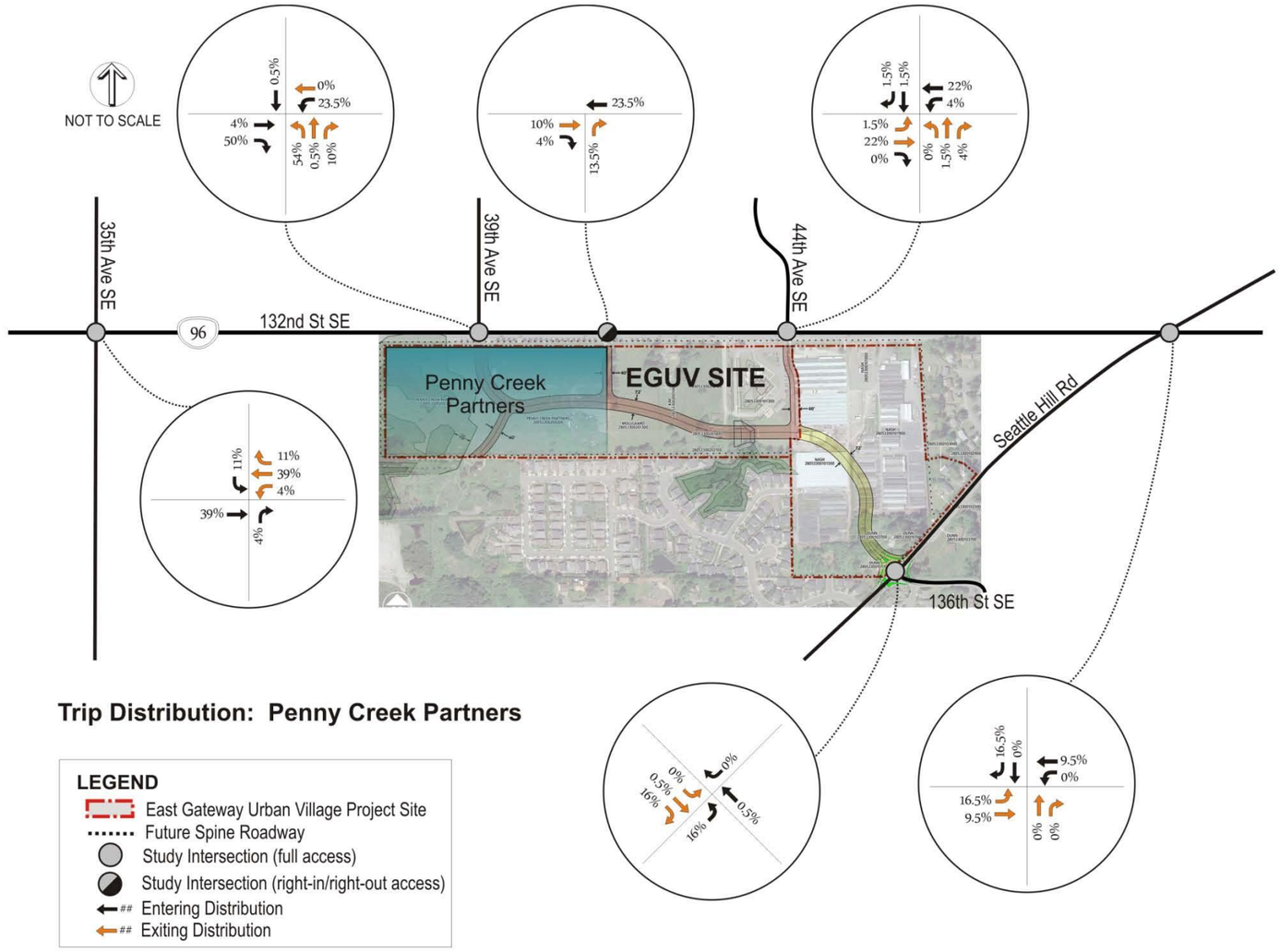
Table A-2 (cont.): Average Weekday Daily Trip Generation Rate/Regression Equation, and Pass-by Percentage

Land Use	ITE #	Average Weekday		Distribution	
		Rate/Regression	Unit	Enter	Exit
Retail					
Building Materials and Lumber store	812	T=38.51(x)+61.48	/1000 SF GFA	50%	50%
Free-Standing Discount Superstore	813	53.13	/1000 SF GLA*	50%	50%
Specialty Retail Center	814	44.32	/1000 SF GLA*	50%	50%
Free-Standing Discount Store	815	57.24	/1000 SF GFA	50%	50%
Hardware/Paint Store	816	51.29	/1000 SF GFA	50%	50%
Automobile Parts Sales	843	T=81.02(x)-150.75	/1000 SF GFA	50%	50%
Tire Store	848	24.87	/1000 SF GFA	50%	50%
Supermarket	850	102.24	/1000 SF GFA	50%	50%
Convenience Market (Open 24 Hours)	851	737.99	/1000 SF GFA	50%	50%
Convenience Market (Open 15-16 Hours)	852	No Daily Data Available			
Convenience Market with Gasoline Pumps	853	845.6	/1000 SF GFA	50%	50%
Sporting Goods Store	861	No Daily Data Available			
Home Improvement Store	862	29.80	/1000 SF GFA	50%	50%
Electronics Superstore	863	45. 04	/1000 SF GFA	50%	50%
Toy/Children's Superstore	864	No Daily Data Available			
Baby Superstore	865	No Daily Data Available			
Pet Supply Superstore	866	No Daily Data Available			
Office Supply Superstore	867	No Daily Data Available			
Book Superstore	868	No Daily Data Available			
Bed and Linin Superstore	872	No Daily Data Available			
Apparel Store	876	66.4	/1000 SF GFA	50%	50%
Arts and Craft Store	879	56.55	/1000 SF GFA	50%	50%
Pharmacy/Drugstore w/o Drive-Through Window	880	90.06	/1000 SF GFA	50%	50%
Pharmacy/Drugstore w/Drive-Through Window	881	88.16	/1000 SF GFA	50%	50%
Furniture Store	890	5.06	/1000 SF GFA	50%	50%
Video Rental Store	896				

Services					
Walk-in Bank	911	156.48	/1000 SF GFA	50%	50%
Drive-in Bank	912	246.49	/1000 SF GFA	50%	50%
Quality Restaurant	931	89.95	/1000 SF GFA	50%	50%
High-Turnover (Sit-Down) Restaurant	932	127.15	/1000 SF GFA	50%	50%
Drinking Place	936	No Daily Data Available			
Quick Lubrication Vehicle Shop	941	40	/Servicing Positions	50%	50%
Gasoline/Service Station	944	168.56	/Vehicle Fueling Positions	50%	50%
Gasoline/Service Station w/ Convenience Market	945	162.78	/Vehicle Fueling Positions	50%	50%

Trip Generation Rates/Regression and Average Pass by Rates per *ITE Trip Generation, 8th Edition*

Figure A-1: PM Peak Hour Primary Trip Distribution - Penny Creek Partner parcels

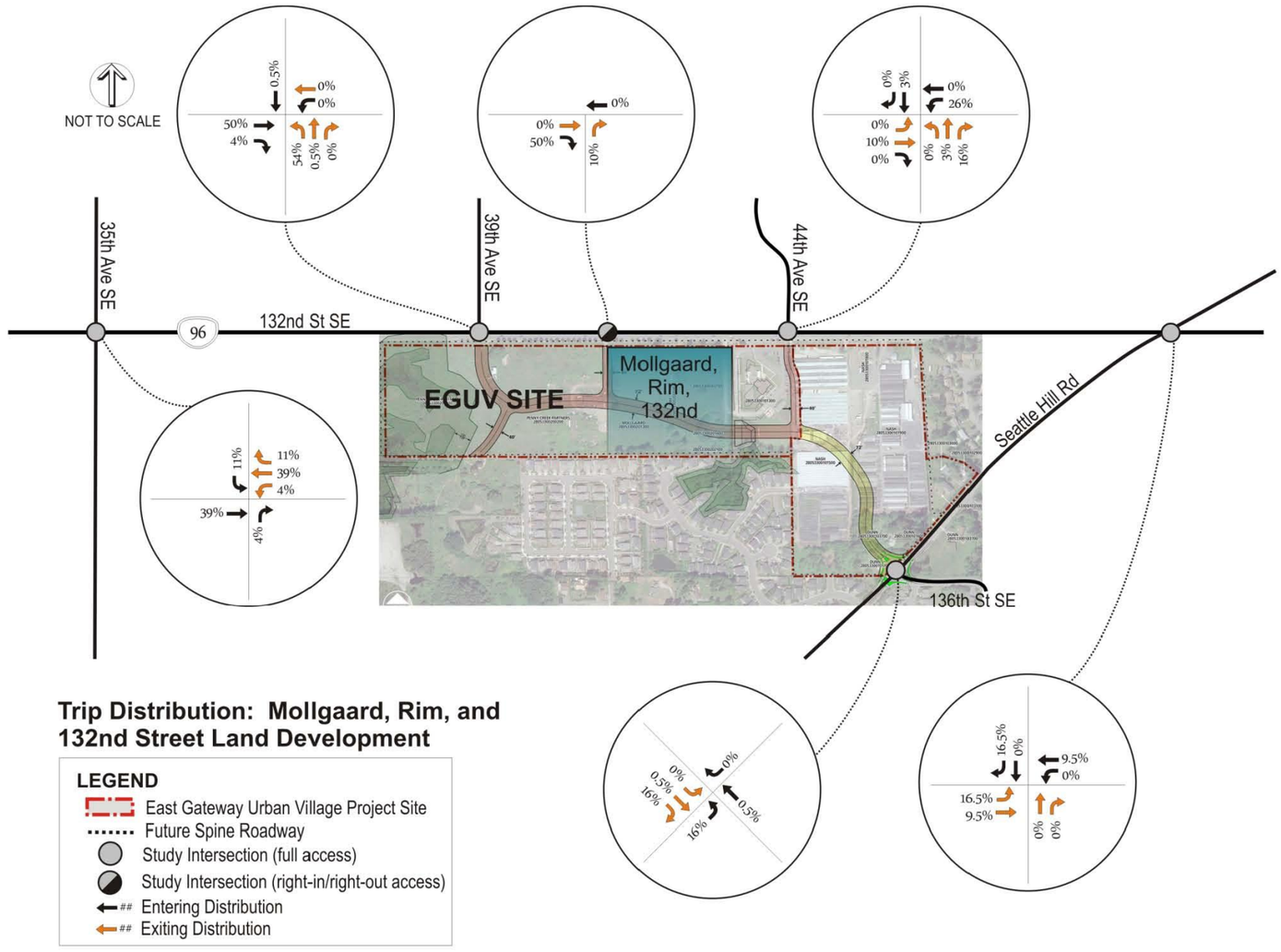


Trip Distribution: Penny Creek Partners

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-2: PM Peak Hour Primary Trip Distribution - Mollgaard, Rim, and 132nd Street Land Development parcels

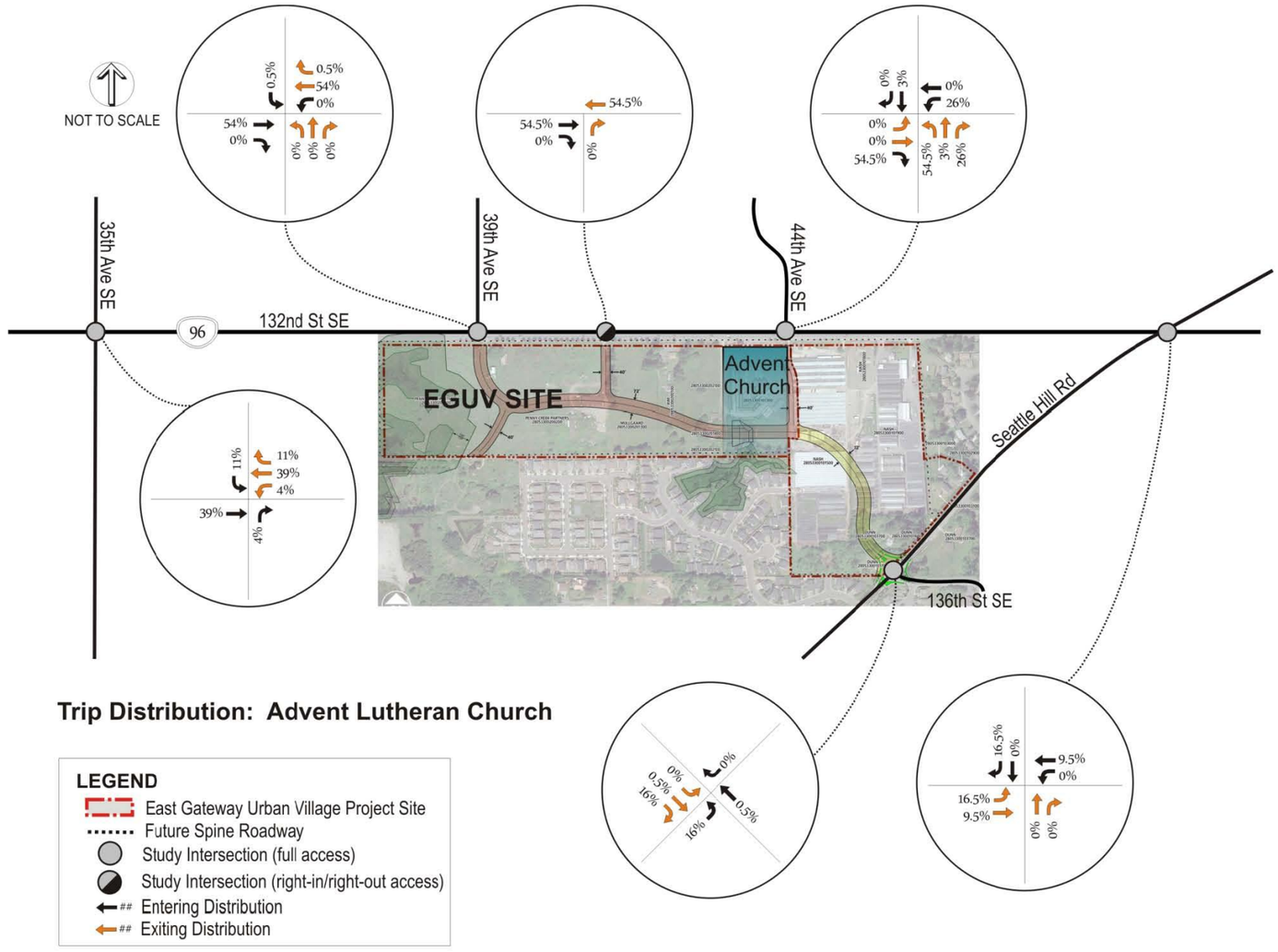


Trip Distribution: Mollgaard, Rim, and 132nd Street Land Development

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-3: PM Peak Hour Primary Trip Distribution - Advent Lutheran Church parcels

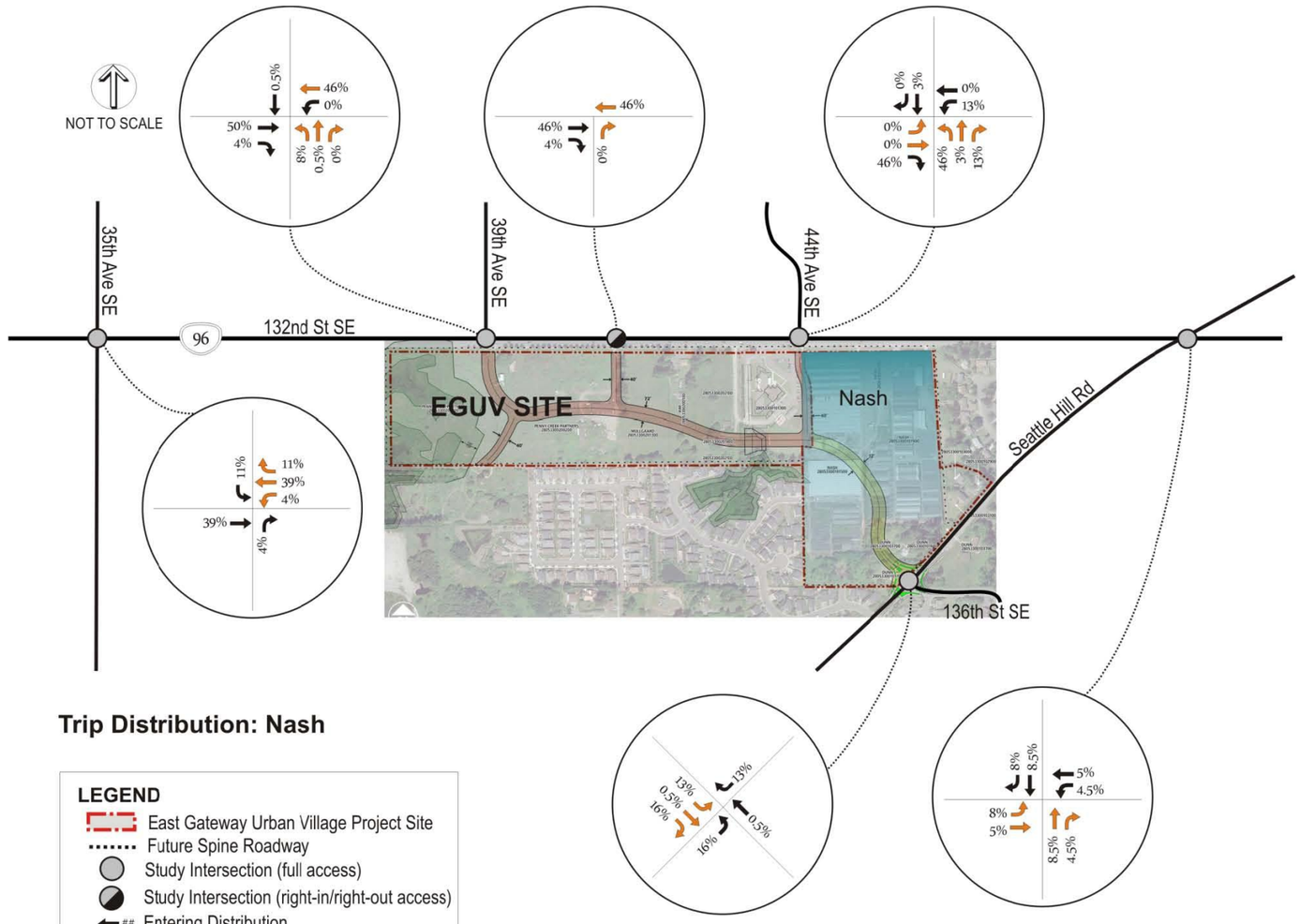


Trip Distribution: Advent Lutheran Church

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-4: PM Peak Hour Primary Trip Distribution - Nash parcels



Trip Distribution: Nash

LEGEND

- East Gateway Urban Village Project Site
- Future Spine Roadway
- Study Intersection (full access)
- Study Intersection (right-in/right-out access)
- ## Entering Distribution
- ## Exiting Distribution

Figure A-5: PM Peak Hour Primary Trip Distribution - Dunn and East End parcels