To: Tom Schaurer **Date:** October 26, 2013

From: Michael Thornton, P.E. **File:**

Subject: UGB Expansion – Area A2 – Access to NW Highland Ave

This is an update to my previous technical memorandum dated June 22, 2013. This memorandum presents my findings, observations and conclusions generated during my development of a conceptual design of the subject proposal. My objective was to assist the City in evaluating the proposed construction of a street to access to the UGB Expansion Area A2 from NW Highland Ave. My observations and comments are based on my education, training and experience. I have performed a site visit, walked a portion of the alignment, prepared conceptual plans, profiles, and cross-sections, discussed the project with City staff, reviewed soil survey data, and reviewed the project with two other professional engineers.

Summary:

Given the assumptions, findings, observations and conclusions stated herein, I am of the opinion that the proposed street to serve UGB expansion area A2 would be significantly higher in construction costs as compared to typical street construction within the City of Grants Pass, and that the street connection to NW Highland is not feasible due to inadequate sight distance.

Assumptions/Findings:

1. **Area Topography:** The proposed street north of the UGB expansion crosses an area with moderate to steep natural ground slopes. The area also includes terraced cut slopes as a result of the interstate construction.
2. **Area Soil Conditions:** Based on observations of nearby excavations and the USDA soil web survey, the soils in the area consist of a shallow layer of sandy gravelly loam over weathered bedrock.
3. **Area Disturbance:** The conceptual plan disturbs at least two mini-storage structures and at least a portion of a third (about 14,000 sq ft total. Total land disturbance for the entire roadway is about 6 acres.
4. **Street Alignment:** The proposed street will generally parallel Interstate 5 (with the southerly right-of-way coinciding with the ODOT northerly right-of-way) and connect to NW Highland Ave immediately east of the overpass over I-5. This causes the proposed excavation and embankment catch points (top of cut and toe of fill) to occur within ODOT's right-of-way.
5. **Street Connection to Highland – Sight Distance:** The most likely point of the intersection of the proposed access and NW Highland is at or near the existing driveway to the mini-storage facility. The required sight distance for northbound drivers on Highland Road is dependent upon what speed we assume. There is a sign farther south indicating the end of a 45 mph speed zone for northbound travelers. For this type of roadway, in the absence of a posted speed, state law would prescribe 55mph. Using this speed, the design intersection sight distance would be 610 feet (of which the stopping sight distance component would be 495 feet). The available sight distance is approximately 340 feet in this direction.

6. **Street Classification and Geometry:** The proposed street will be a local collector with two travel lanes, two bike lanes, two parking lanes, curbs, gutters, two planter strips, and two sidewalks. The total street width (curb to curb) is 44 feet, with a right-of-way width of 70 feet, and a width of disturbed area (excavation and fill) ranging from 80 feet to100 feet.
7. **Street Length:** The conceptual design was prepared for a street approximately 3,000 feet in length, from NW Highland Drive to the approximate center of the proposed UGB expansion area.
8. **Street Grades:** The maximum allowable street grade is 12%. The conceptual design grades range from approximately 3% to 11%.
9. **Street Cut and Fill Slopes:** The conceptual design assumes steeps cut slopes (0.5H:1V) and steep fill slopes (1H:1V) in order to reduce the volume of excavation and embankment. Additional investigation is required to confirm that these values are reasonable.
10. **Street Excavation and Embankment:** The excavation for the proposed street is approximately 30,000 c.y. (mostly rock excavation) with approximately the same volume of embankment construction.

Observations/Conclusions:

1. **Area Topography:** The steep slopes and the undulating ground surface require a significant volume of street excavation and embankment as compared to construction on more gently sloping terrain.
2. **Area Soil Conditions:** The excavation of the weathered bedrock is one of the limiting factors with regards to construction cost. The cost of rock excavation as compared to typical roadway excavation is approximately 10 times as great.
3. **Area Disturbance:** The right-of-way procurement costs associated with the purchase of land and the disturbance of an existing business is beyond the scope of this memo.
4. **Street Alignment:** If ODOT does not allow the cut and fill catch points to fall within their right-of –way, the alignment will need to be moved father to the north. This will require additional right-of way acquisition.
5. **Street Connection to Highland – Sight Distance:** The apparent lack of adequate sight distance requires further study to determine if there is a solution. The current conclusion is that this street connection is not feasible due to inadequate sight distance. Moving the street connection further to the north will create additional issues of right-of way acquisition and additional street construction costs.
6. **Street Classification and Geometry:** The proposed City standard street width is not compatible to hillside road construction. A non-standard street geometry consisting of two travel lanes, two bike lanes, no parking lanes, curbs, gutters, no planter strips, and one sidewalk would reduce the total street width (curb to curb) to 30 feet, with a right-of-way of approximately 40 feet, and a disturbed area width of 50 feet to 70 feet. However, even with the reduced volume of excavation and embankment required for this non-standard street, the excavation and embankments costs will still be significantly greater than the construction of a standard street located in an area of mildly sloping terrain.
7. **Street Length:** The majority of the 3,000 feet of the conceptual street will be "off-site" construction. Meaning that no development will front directly on the proposed street. This adds a cost burden either to the owners of the development property or to the public funds required to develop the property.

8. **Street Grades:** Approximately half of the conceptual street has a grade of at least 10%. This generally is not compatible for a development area being served with a high percentage of truck traffic. The steeper slopes coupled with the distance required to access the interstate from the development property increases the truck travel time. An increased truck travel time results in increased operations costs, which reduces the desirability of the development property.
9. **Street Cut and Fill Slopes:** If further investigation determines that the cut and fill are too steep, the project costs will increase due to the increased excavation and embankment require.
10. **Street Excavation and Embankment:** As stated above, the amount of excavation and embankment of rock material for the conceptual design is considerable as compared to comparable street construction located on flatter terrain.

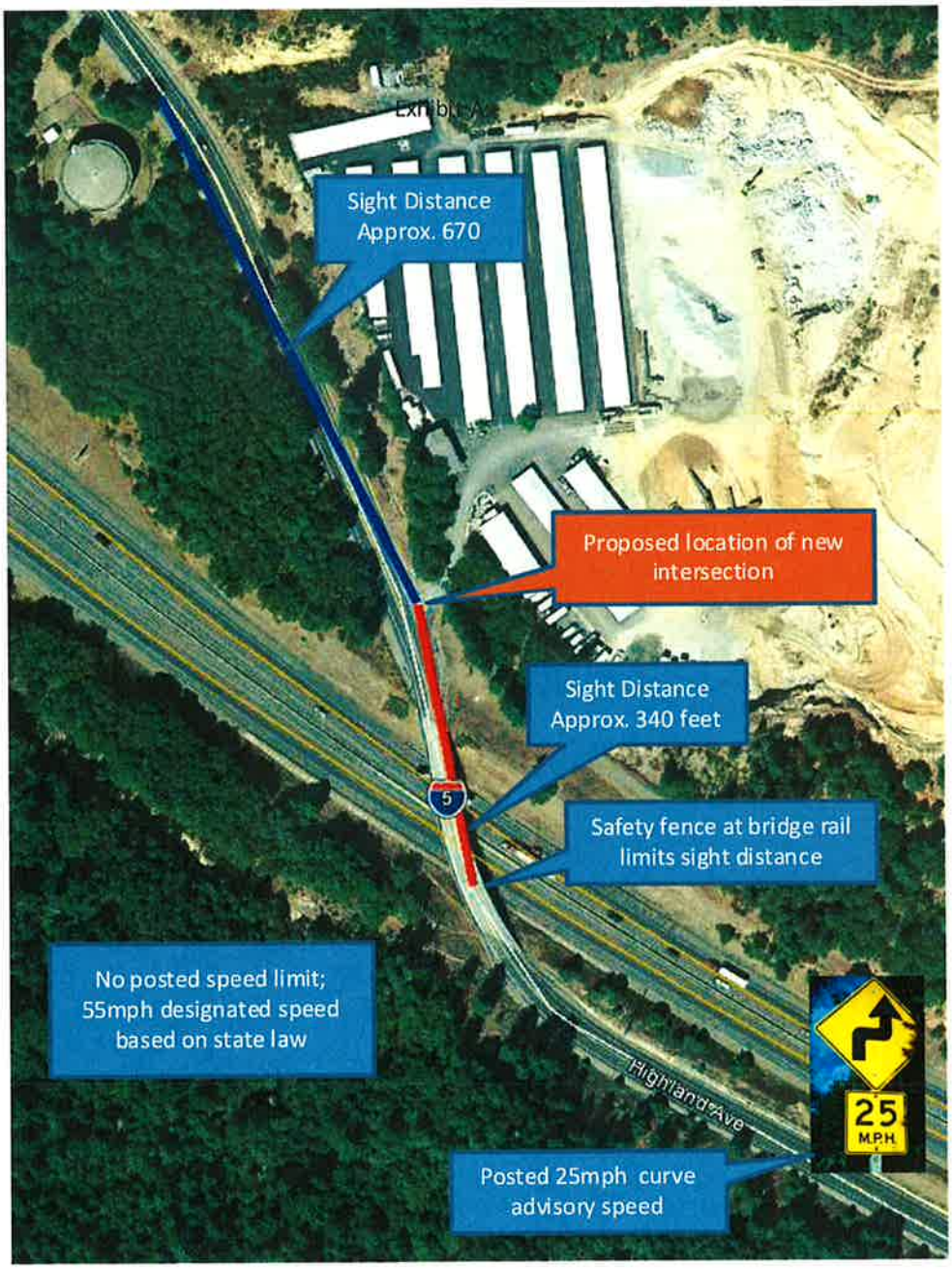


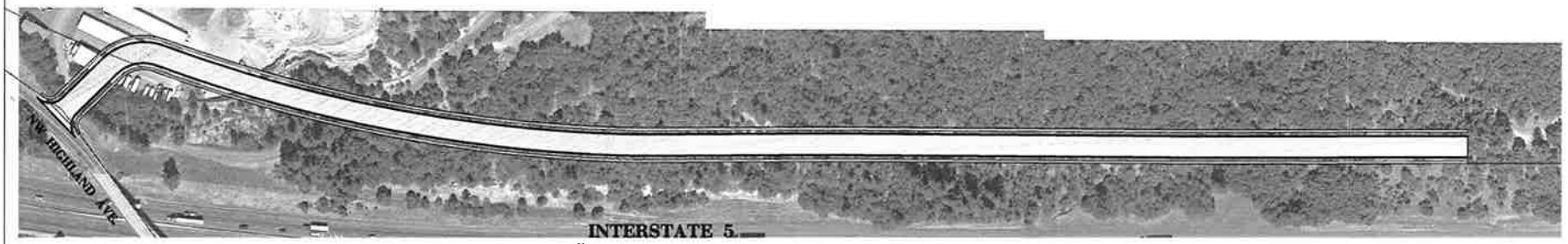
Exhibit A: Existing Site Conditions

NW HIGHLAND ACCESS - CONCEPTUAL STUDY

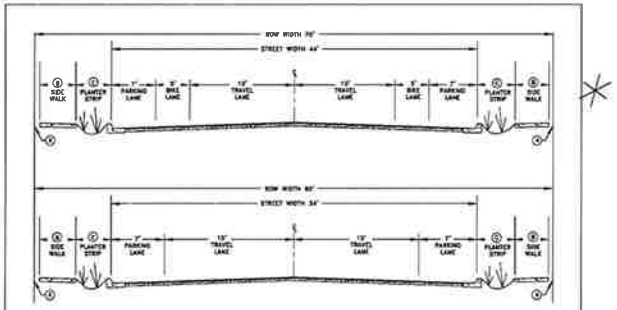
A LOCAL COLLECTOR STREET-UGB EXPANSION

LOCATED IN:

GRANTS PASS, JOSEPHINE COUNTY, OREGON



LOCATION MAP



NOTES:

(6) RIGHT OF WAY 6' BEHIND SIDEWALK

(5) SIDEWALKS: RESIDENTIAL 5', COMMERCIAL 8'

(5) PLANTER STRIPS: RESIDENTIAL 7.5', COMMERCIAL 7.5'

DISCLAIMER: THIS DRAWING REPRESENTS A TYPICAL STREET SECTION BASED ON THE GRANTS PASS DEVELOPMENT CODE AND MASTER TRANSPORTATION PLAN. PLEASE REFER TO THE DPDC AND MTP FOR SPECIFIC GUIDELINES

NO	DATE	INITIAL	REVISIONS
1	9-06	TWG	DRAWN
2	10-09	SLW	STD ZNG UPDATE
3	03-11	SLW	DISCLAIMER

CITY OF GRANTS PASS
PLANNING DIVISION
LOCAL COLLECTOR STREET SECTION
SCALE: NONE | DWG. NO. 152

1/1 TYPICAL STREET SECTION
ACCESS ROAD

SCHEDULE OF DRAWINGS

1	COVER SHEET
2	PLAN & PROFILE – ACCESS ROAD STA 0+00 – 10+00
3	PLAN & PROFILE – ACCESS ROAD STA 10+00 – 20+00
4	PLAN & PROFILE – ACCES ROAD STA 20+00 – 30+00
5	CROSS SECTIONS – STA 1+00 – 15+00
6	CROSS SECTIONS – STA 16+00 – 29+00

ABBREVIATIONS & SYMBOLS

A.C.	ASPHALTIC CONCRETE	MAX	MAXIMUM
B.C.	BACK OF CURB	MIN	MINIMUM
B.C.R.	BEGINNING OF CURB RETURN	M.H.	MANHOLE
C.I.	CURB INLET	℄	PROPERTY LINE
℄	CENTER LINE	PUE	PUBLIC UTILITY EASEMENT
CONC	CONCRETE	R/W	RIGHT-OF-WAY
D/W	DRIVEWAY	SS	SANITARY SEWER
E.C.R.	END OF CURB RETURN	SSL	SANITARY SEWER LATERAL
EL	ELEVATION	S/W	SIDEWALK
EXIST	EXISTING	STD	STANDARD
OG	ORIGINAL GRADE	SD	STORM DRAIN
FG	FINISH GRADE	SDL	STORM DRAIN LATERAL
FH	FIRE HYDRANT	TC	TOP OF CURB
INV	INVERT OF PIPE	WM	WATER METER
L/S	LANDSCAPING	WV	WATER VALVE

JOB NO. 13-056
FILE: BASEMAP.DWG

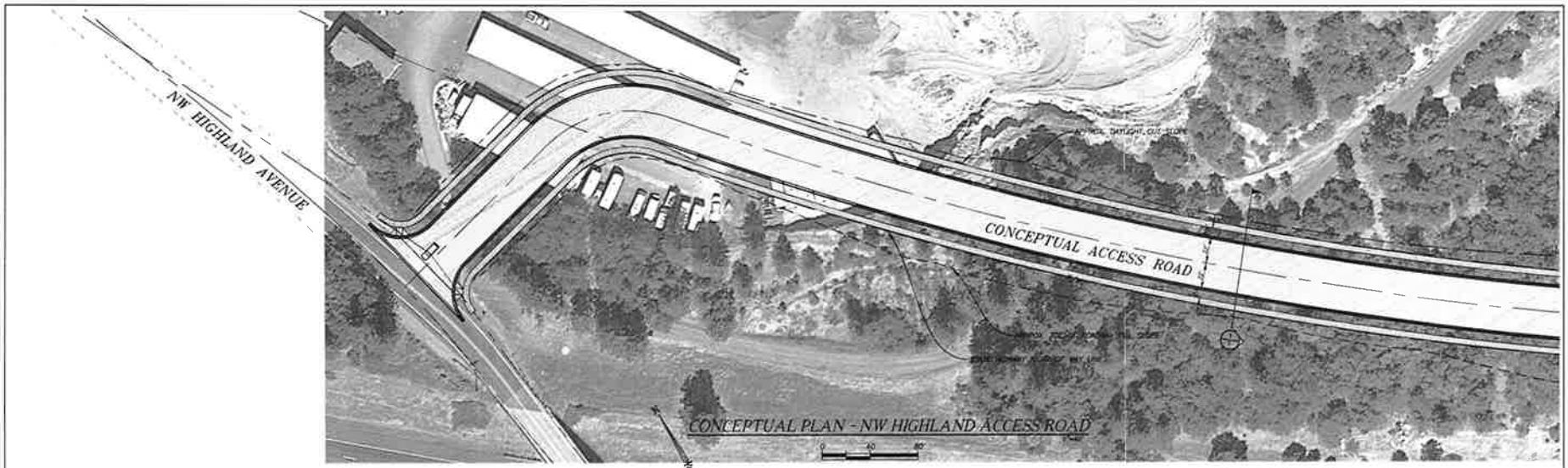
DRAWN	JP
DATE	9/6/2013
	REVISIONS

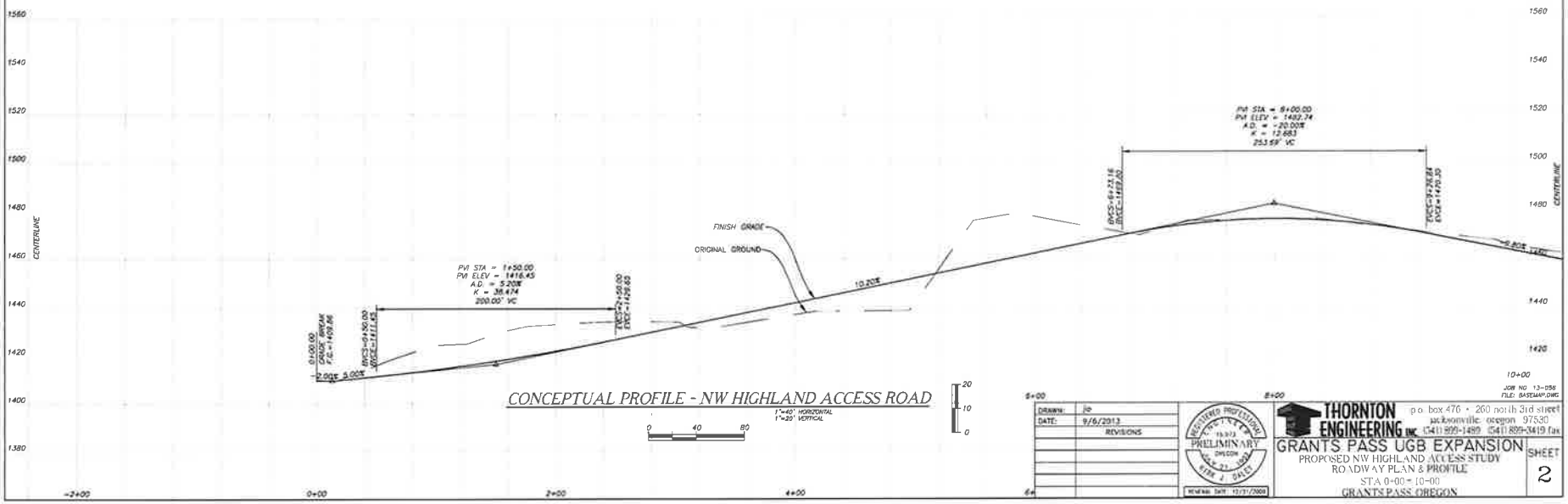
REGISTERED PROFESSIONAL ENGINEER
OREGON
PRELIMINARY
RENEWAL DATE: 12/31/2013

THORNTON ENGINEERING INC
p.o. box 476 • 260 north 3rd street
jacksonville, oregon 97530
(541) 899-1489 (541) 899-1419 fax

GRANTS PASS UGB EXPANSION
PROPOSED NW HIGHLAND ACCESS STUDY
COVER SHEET
GRANTS PASS, OREGON

SHEET 1





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DATE:	9/6/2013
	REVISIONS

REGISTERED PROFESSIONAL ENGINEER
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PRELIMINARY
RENEWAL DATE: 12/31/2009

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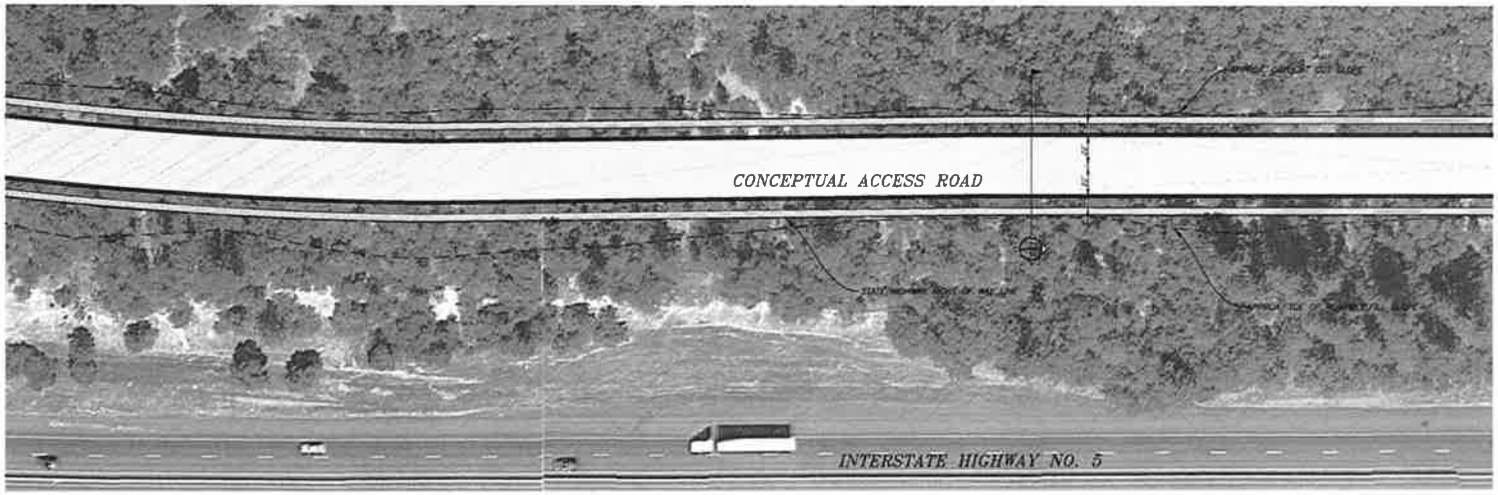
GRANTS PASS UGB EXPANSION
PROPOSED NW HIGHLAND ACCESS STUDY
ROADWAY PLAN & PROFILE
STA 0+00 - 10+00
GRANTS PASS, OREGON

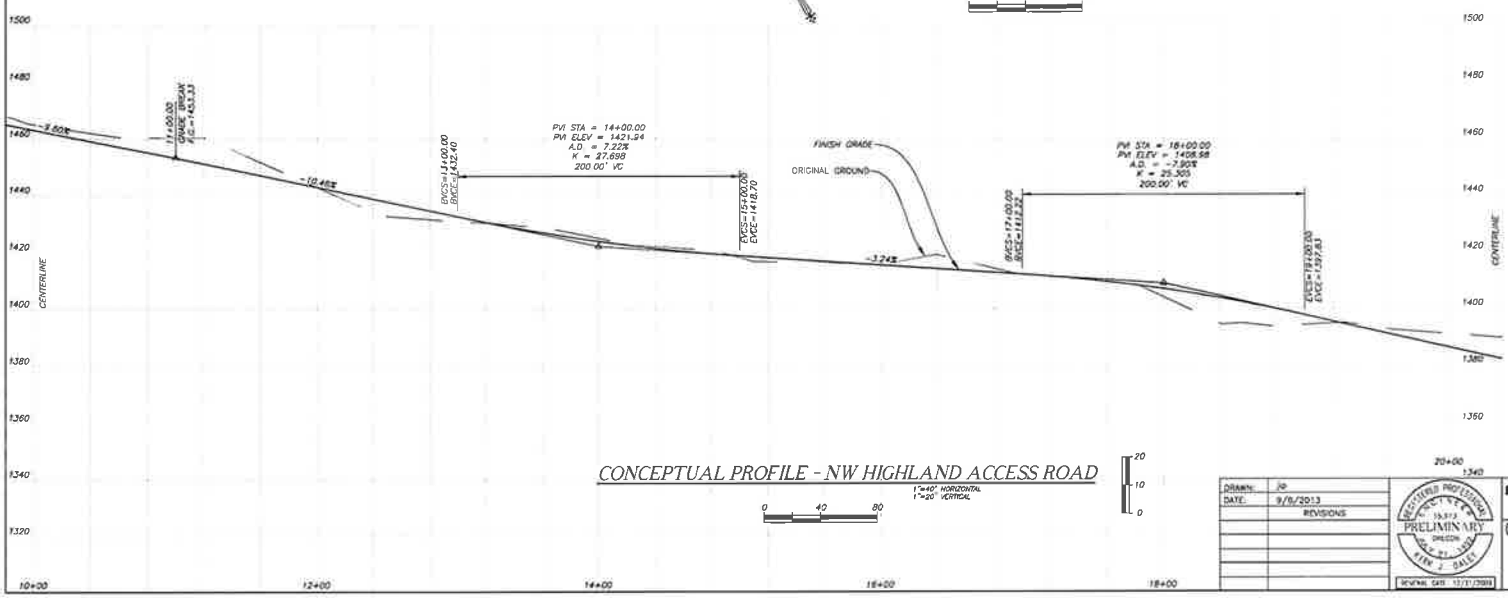
JOB NO. 13-056
FILE: BASEMAP.DWG

SHEET 2



CONCEPTUAL PLAN - NW HIGHLAND ACCESS ROAD

1"=40'



CONCEPTUAL PROFILE - NW HIGHLAND ACCESS ROAD

1"=40' HORIZONTAL
1"=20' VERTICAL

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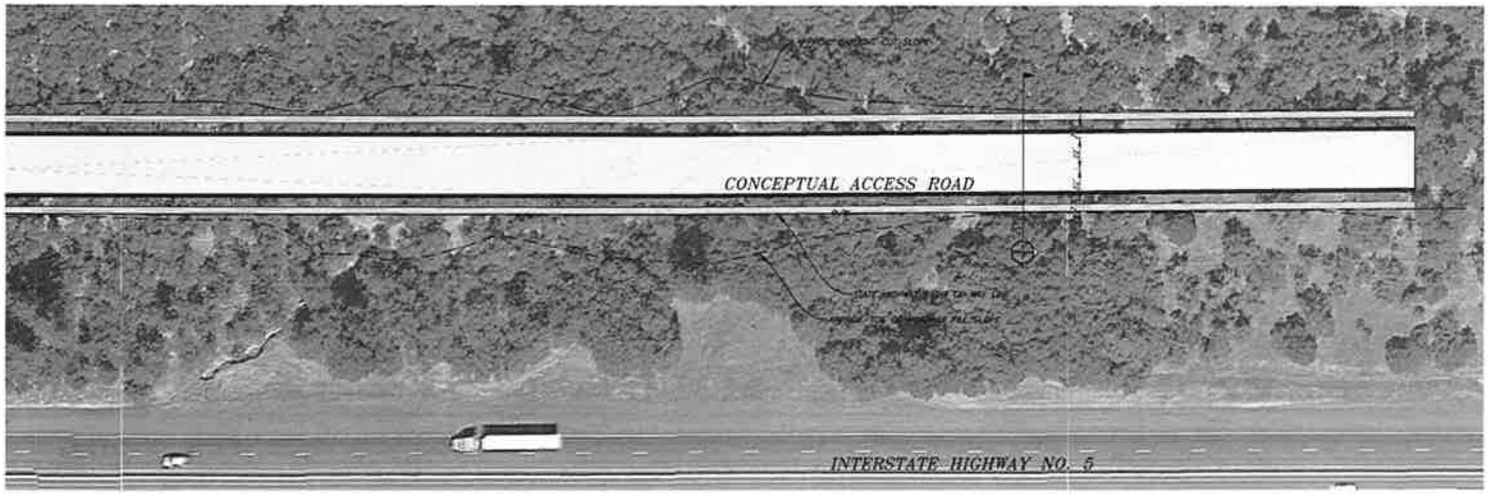
GRANTS PASS UGB EXPANSION

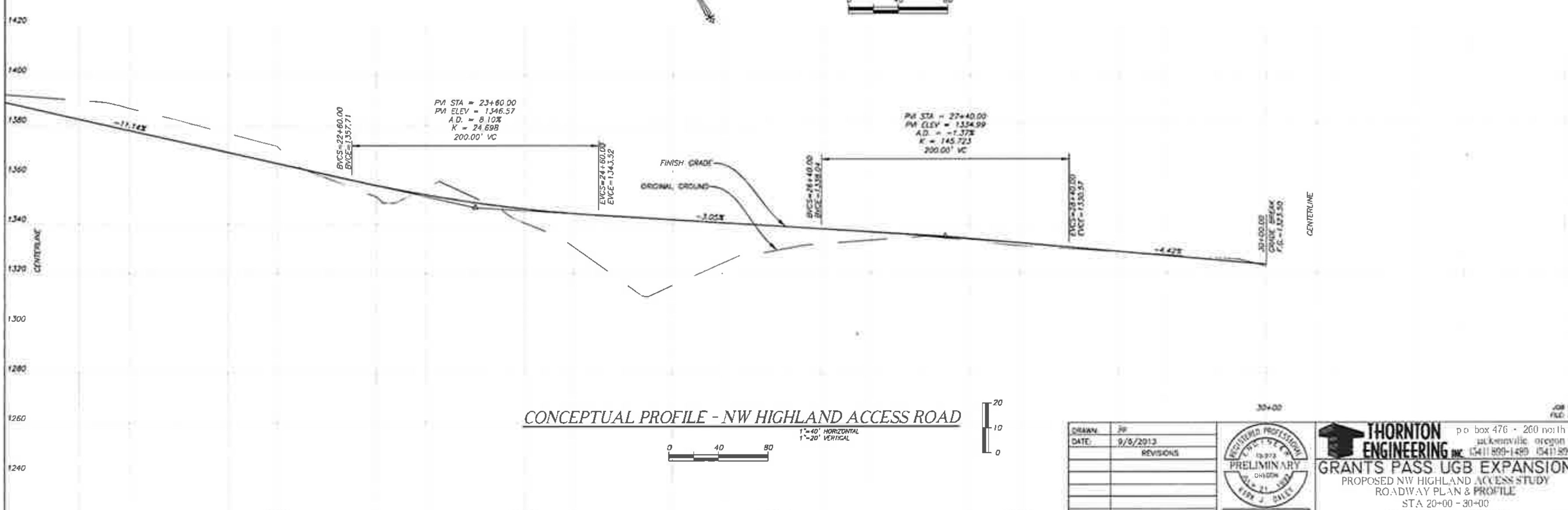
PROPOSED NW HIGHLAND ACCESS STUDY
ROADWAY PLAN & PROFILE
STA 10+00 - 20+00
GRANTS PASS, OREGON

SHEET 3



CONCEPTUAL PLAN - NW HIGHLAND ACCESS ROAD

1"=40'



CONCEPTUAL PROFILE - NW HIGHLAND ACCESS ROAD

1"=40' HORIZONTAL
1"=20' VERTICAL

DRAWN:	JF
DATE:	9/6/2013
	REVISIONS

REGISTERED PROFESSIONAL ENGINEER
PRELIMINARY
OREGON
KIRK J. DALEY
RENEWAL DATE: 12/31/2006

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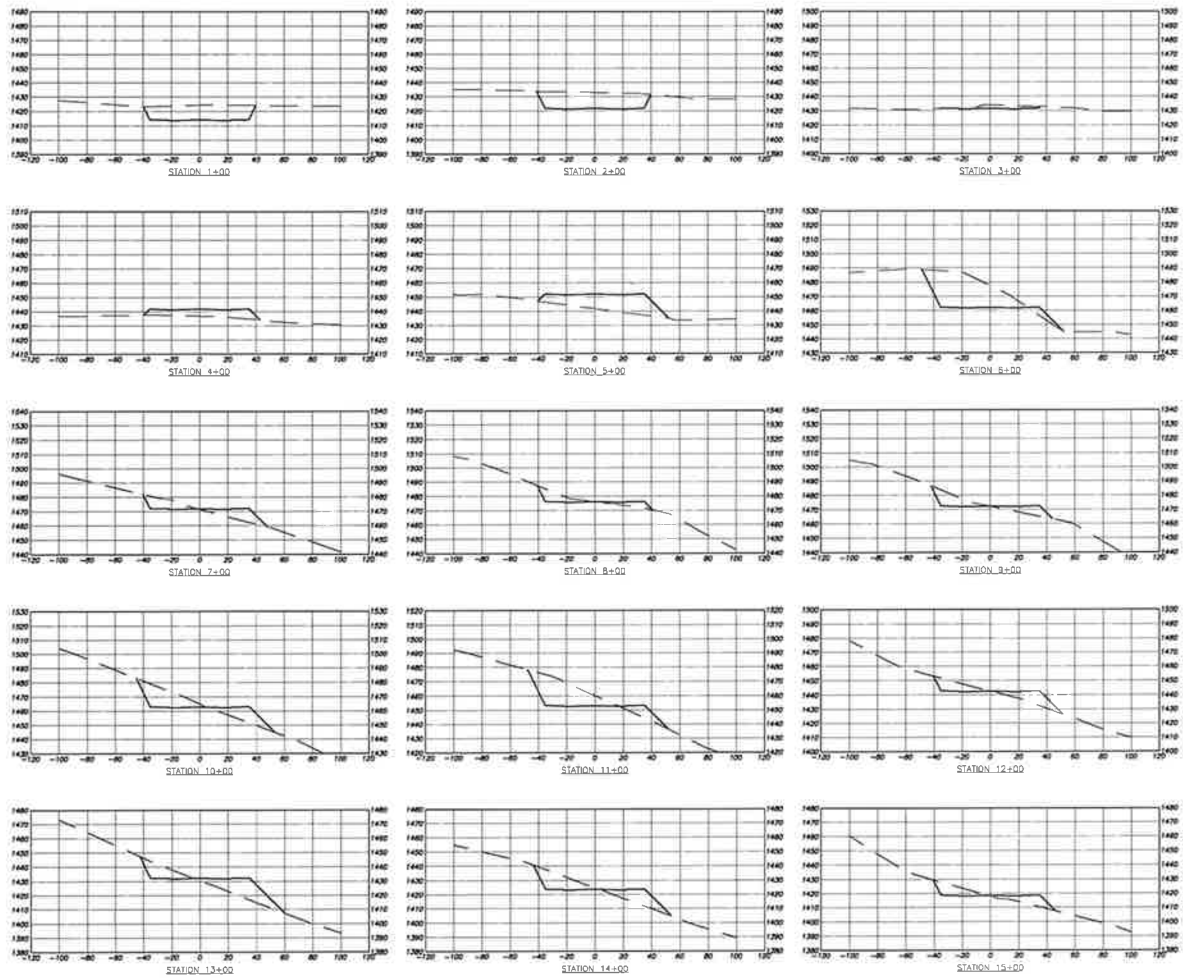
GRANTS PASS UGB EXPANSION
PROPOSED NW HIGHLAND ACCESS STUDY
ROADWAY PLAN & PROFILE
STA 20+00 - 30+00
GRANTS PASS OREGON

SHEET 4



LEGEND

— — ORIGINAL GROUND

——— FINISH GRADE

NOTES

1. Cut slopes are assumed to be in stable rock material and are shown at a 0.5H:1V slope in all cross sections.

2. Fill slopes are assumed to be constructed out of rock material placed at a 1H:1V slope.

3. No detailed site evaluation has been performed to evaluate the feasibility of the above assumptions. A thorough site evaluation by a geotechnical engineer will be required in order to determine adequate side slopes for final roadway design. The design presented herein is for planning purposes only.

CONCEPTUAL CROSS SECTIONS - NW HIGHLAND ACCESS ROAD

1"=40'

0 40 80

JOB NO. 13-058
FILE: BASEMAP.DWG

DRAWN:	JP
DATE:	9/6/2013
	REVISIONS

REGISTERED PROFESSIONAL ENGINEER 15,912 PRELIMINARY OREGON MAY 21, 1992 KIRK J. DALEY
RENEWAL DATE: 12/31/2008

THORNTON ENGINEERING INC.
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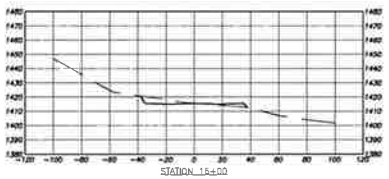
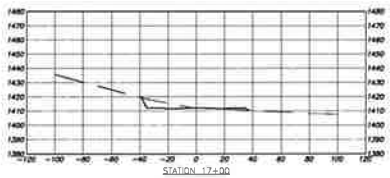
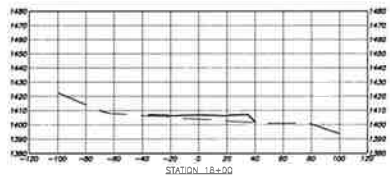
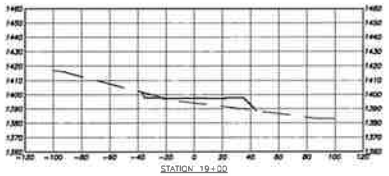
GRANTS PASS UGB EXPANSION
PROPOSED NW HIGHLAND ACCESS STUDY
CROSS SECTIONS
STA 1+00 - 15+00
GRANTS PASS, OREGON

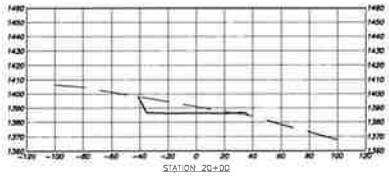
SHEET 5

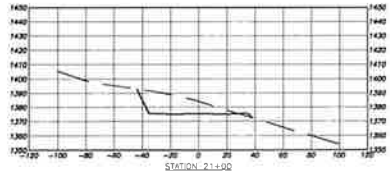


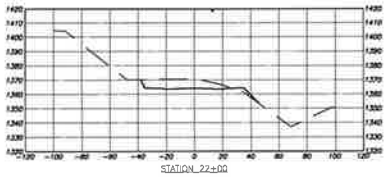


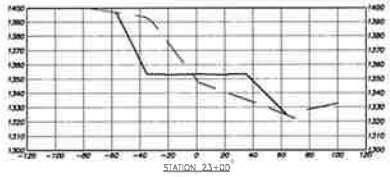


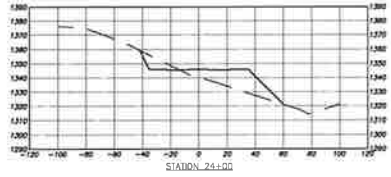


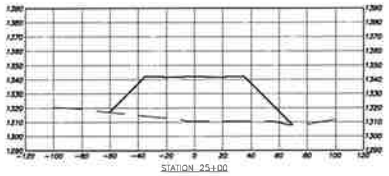


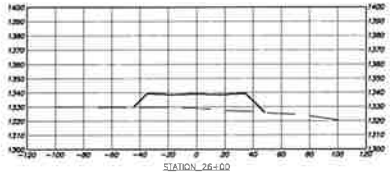


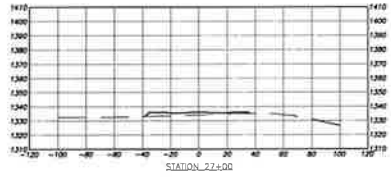


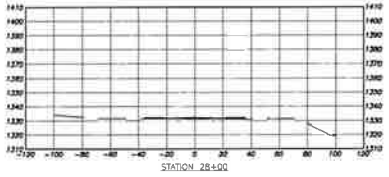


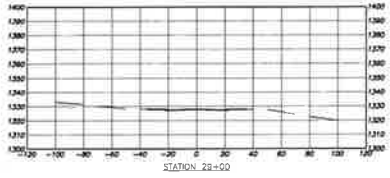












LEGEND

— — ORIGINAL GROUND

——— FINISH GRADE

NOTES

1. *Cut slopes are assumed to be in stable rock material and are shown at a 0.5H:1V slope in all cross sections.*

2. *Fill slopes are assumed to be constructed out of rock material placed at a 1H:1V slope.*

3. *No detailed site evaluation has been performed to evaluate the feasibility of the above assumptions. A thorough site evaluation by a geotechnical engineer will be required in order to determine adequate side slopes for final roadway design. The design presented herein is for planning purposes only.*

CONCEPTUAL CROSS SECTIONS - NW HIGHLAND ACCESS ROAD

1"=40'

0 40 80

JOB NO. 13-058
FILE: BASEMAP.DWG

DRAWN:	JP
DATE:	9/6/2013
	REVISIONS

OREGON REGISTERED PROFESSIONAL ENGINEER 15,973 PRELIMINARY RENEWAL DATE: 12/31/2013

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GRANTS PASS UGB EXPANSION

PROPOSED NW HIGHLAND ACCESS STUDY
CROSS SECTIONS
STA 16+00 - 29+00
GRANTS PASS OREGON

SHEET 6