CITY OF OREGON CITY

Community Development Department, 320 Warner Milne Road,
P.O. Box 3040, Oregon City, OR 97045, (503) 657-0891
www.ci.oregon-city.or.us

APPEAL OF A LAND USE DECISION

FILE # AP 16-02 (of File #) DP 16-03 DATE: 11/22/16

NAME: Weston York TELEPHONE #: 503-656-1631

ADDRESS: 1500 Division Street, Oregon City, OR 97045

ADDRESS OR PROPERTY DESCRIPTION (T/R/S) OF SUBJECT PROPERTY:

Providence Willamette Falls Medical Center

SUBJECT OF APPEAL: NOTICE OF DECISION DATE: 11/9 /16 For File #: DP 16-03

The undersigned hereby appeal(s) the decision of the Director

concerning the subject case. The decision to approve X deny ____ the application was made at the meeting held on not applicable.

REASONS FOR APPEAL: Please include a statement identifying which approval criteria are violated by the decision and an explanation of how those criteria are violated, or stating how the decision is otherwise in violation of applicable law. Please see Chapter 17.50 of Oregon City Municipal Code for Administration & Procedures concerning Appeals.

Please see the attached letter.

FILING FEE PAID: _____ DATE PAID: _____ RECEIPT NO.: _____

Property Owner Signature

Providence Willamette Medical Center
Address
1500 Division Street, Oregon City, OR 97045

Weston York, Senior Construction Manager
Property Owner Signature

Address

****SIGNATURES REQUIRED IF APPLICABLE****

Signature

Address

_____ Contract Purchaser _____ Lessee _____ Prospective Purchaser

PERKINSCOIE

1120 NW Couch Street
10th Floor
Portland, OR 97209-4128

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November 22, 2016

Michael C. Robinson
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D. +1.503.727.2264
F. +1.503.346.2264

VIA HAND DELIVERY

Ms. Laura Terway, Director
City of Oregon City Community Development Department
221 Molalla Ave, Suite 200
Oregon City, OR 97045

Re: Appeal of City of Oregon City File DP 16-03, Detailed Development Plan

Dear Ms. Terway:

This office represents the Applicant and Appellant. This letter and its enclosures constitute an appeal of City of Oregon City File DP 16-03.

The requirements for an appeal of a Type II decision in Oregon City Municipal Code ("OCMC") 17.50.190.B.-.D are satisfied as explained below.

1. OCMC 17.50.190.B. Requirement.

This appeal is timely received in writing by the Planning Division within fourteen (14) calendar days from the date notice of the challenged decision was provided to those entitled to notice. The City of Oregon City (the "City") provided notice of the written decision to those entitled to notice on November 9, 2016. Fourteen (14) calendar days after November 9, 2016 is November 23, 2016.

2. OCMC 17.50.190.C.1-.5. Requirements.

A. The completed and signed Appeal form is attached (**Exhibit 1**).

B. The appealed City Planning file number is "DP 16-03: Detailed Development Plan".

C. The date the City rendered the decision to be appealed was November 9, 2016.

D. The only Appellant is Providence Willamette Falls Medical Center. Its mailing address is 1500 Division Street, Oregon City, Oregon 97045.

E. The Appellant has an interest in the matter and standing to appeal because it was the Applicant and it received written notice of the decision.

F. The required appeal fee of $250.00 is included (**Exhibit 2**, "Oregon City 2016 Planning Fee Schedule effective January 1, 2016"). The fee for an appeal of an administrative decision is $250.00.

3. Bases for Appeal of Detailed Development Plan ("DDP") Condition of Approval 1.

A. The condition is inconsistent with OCMC 12.04.180, "Street Design", because "full depth pavement restoration" is not a requirement (Finding 15 for OCMC 17.62.050 at DDP decision pages 20 and 21).

B. Full depth pavement restoration is a pre-existing deficiency not caused by the Applicant and therefore not the responsibility of the Applicant.

C. There is no nexus between the impacts of the Applicant's approved DDP and Condition of Approval 1. The evidence demonstrates that the Applicant satisfies the relevant requirements for street improvements.

D. The condition of approval is inconsistent with CP 11-01, Condition of Approval 5, because 16th Street is not conditioned therein with full pavement restoration.

E. OCMC 17.65.060.B.1 and 2 are not satisfied by the condition.

4. Basis for Appeal of DDP Condition of Approval 5.

A. Replacement of undersized pipes and other downstream capacity issues are a pre-existing deficiency not caused by the Applicant and therefore not the responsibility of the Applicant.

B. There is no nexus between the impacts of the Applicant's approved DDP and Condition of Approval 5.

C. No evidence supports the City's imposition of the condition of approval.

D. The Applicant's obligation under this condition is unclear and therefore the Applicant does not have notice of the extent of its requirement or obligation under this condition.

E. OCMC 17.65.060.B.1 and 2 are not satisfied by the condition.

5. Proposed Relief.

The Appellant's relief is to either revise the conditions of approval as explained above or agree on an appropriate level of City contributions through Transportation System Development Charge ("SDC") Credits for the improvements unrelated to the DDP approved impacts.

6. Conclusion.

Providence wishes to emphasis its commitment to being a partner with the City and its neighbors. Providence does not take lightly the filing of this appeal but wishes to use this appeal as an opportunity to discuss the two (2) conditions of approval and, to either modify the conditions or reach an agreement on an appropriate City financial participation for non-Providence impacts. Providence notes that it has agreed with every other condition of approval and suggestion made by the City and views this appeal primarily as an opportunity to have a substantive discussion about the two (2) conditions of approval.

I am the Applicant's representative in addition to Mr. York. Please provide me with copies of all correspondence, notices, and decisions regarding this appeal.

Very truly yours,

Michael C. Robinson

MCR:rsr
Enclosures

cc: Mr. Russ Reinhard (via email) (w/ encl.)
Mr. Weston York (via email) (w/ encl.)
Mr. Jeff West (via email) (w/ encl.)
Mr. Samuel Dutton (via email) (w/ encl.)

tyler
TECHNOLOGIES

City of Oregon City
Permit Receipt
RECEIPT NUMBER 00034563

Account Number: 017998 **Date:** 11/22/2016

Applicant: PROVIDENCE HEALTH & SERVICES -

Type: check # 2061130

Permit Number	Fee Description	Amount
AP-16-0002	4106 Appeal Fee	250.00
	Total:	$250.00

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February 27, 2017

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VIA EMAIL

Ms. Laura Terway, Director
City of Oregon City Community Development Department
221 Molalla Ave, Suite 200
Oregon City, OR 97045

Re: Appeal of City of Oregon City File DP 16-03, Detailed Development Plan Appeal

Dear Ms. Terway:

This office represents the Applicant and Appellant, Providence Health & Services - Oregon ("Providence').

Providence filed an appeal of the Director's decision in Oregon City File No. DP 16-03 on November 22, 2016. Since that time, Providence and City staff have been working diligently to resolve Providence's concerns about two (2) conditions of approval. Providence and the City have now reached an agreement that Conditions of Approval 1 and 5 should be revised as shown below.

Proposed revised Condition of Approval 1 shall read as follows:

> **"Right of Way improvements to be as follows: (DS)**
>
> **a. Division Street: 4' wide dedication to provide 34' ROW from Centerline. Improvement shall be from centerline: 26-ft wide to face of curb with 0.5-ft curb, 7-ft wide sidewalk and 0.5-ft monument strip. Tree wells to be provided with minimum dimensions of 3-ft X 6-ft adjacent to curb. Improvements will also include street lights, street trees, and undergrounding of utilities per City standards. A striping plan for Division Street shall be submitted. Full depth street section reconstruction, proposed to extend 10 feet beyond centerline, will need to be modified to extend to the edge of adjacent travel lane, per the City's Pavement Cut Standards.**
>
> **b. 15th Street: Improvements will include 6-ft wide sidewalk placed 0.5-ft from right of way. Improvements will also include street lights, street trees, and undergrounding of utilities per**

standards. 15th Street will be signed as a bike route. Full depth street section reconstruction, proposed to extend 10 feet beyond centerline, will need to be modified to extend to the edge of adjacent travel lane, per the City's Pavement Cut Standards.

c. 16th Street: Improvements will include 5-ft wide sidewalk placed 0.5-ft from right of way. Improvements will also include street lights, street trees, and undergrounding of utilities per standards. Full depth street section reconstruction, proposed to extend 10 feet beyond centerline, will need to be modified to extend to the edge of adjacent travel lane, per the City's Pavement Cut Standards.

d. Prior to occupancy, the applicant shall provide pavement patching adequate to accommodate traffic loads, and patching shall be maintained in good condition until permanent full pavement restoration is completed per subsections a, b, and c of this condition, per the City's pavement standards, and per recommendations of the January 19, 2017 report by GeoDesign, Inc. Full pavement restoration shall be completed by October 31, 2018."

Proposed revised Condition of Approval 5 shall read as follows:

"Final stormwater report shall be submitted with public facilities construction plans and shall respond to identified downstream capacity issues through compliance with any of the solutions authorized by the Oregon City Stormwater Grading Design Standards, dated 2015, which may include, but are not limited to, replacement of undersized pipes or on-site detention and maximum infiltration so as not to contribute any additional flows."

If the City Commission grants the appeal by modifying the Director's decision to include these two (2) conditions of approval, Providence's concerns that caused it to file the appeal will have been resolved.

I have attached two (2) documents to this letter. **Exhibit 1** is a memorandum from Mr. Weston York to Ms. Wendy Marshall, originally dated February 8, 2017 and revised February 24, 2017 in which Mr. York answered questions posed by Ms. Marshall. **Exhibit 2** is a memorandum

from GeoDesign, Inc., dated January 19, 2017, in which GeoDesign recommended certain pavement improvements for 15th Street and 16th Street. These two (2) exhibits demonstrate that it is feasible to satisfy proposed revised Condition of Approval 1.

Proposed revised Condition of Approval 5 responds to Providence's concern that there be a "rational nexus" between the impacts of the Applicant's stormwater discharge and the requirements to address the stormwater discharge. Proposed revised Condition of Approval 5 adequately addresses this issue.

The Applicant respectfully requests that the Planning Department recommend that the City Commission grant Providence's appeal to the extent of modifying the Director's decision to include proposed revised Conditions of Approval 1 and 5.

Very truly yours,

Michael C. Robinson

MCR:rsr
Enclosures

cc: Mr. Russ Reinhard (via email) (w/ encls.)
Mr. Weston York (via email) (w/ encls.)
Mr. Jeff West (via email) (w/ encls.)
Mr. Josh Koberg (via email) (w/ encls.)
Mr. John Lewis (via email) (w/ encls.)
Ms. Wendy Marshall (via email) (w/ encls.)
Ms. Carrie Richter (via email) (w/ encls.)

LEGEND

- EXISTING SIDEWALK POTENTIALLY SAVED
- PROPOSED NEW CURB LINE
- PHASE 1 - PROPOSED SAWCUT AND PAVEMENT RESTORATION
- PHASE 2 - PROPOSED SAWCUT AND PAVEMENT RESTORATION
- PHASE 2 - MILL DOWN (GRIND) AND RE-PAVE 2" OF PHASE 1 PAVEMENT AT TIME OF PHASE 2 PAVING TO CREATE A SEAMLESS FINAL PAVED STREET SURFACE

EXISTING 4' SIDEWALK DOES NOT MEET CITY STREET SECTION (6')

PROPOSED SAWCUT LINE

PAVEMENT RESTORATION AREA

PROPOSED SIDEWALK

PROPOSED DRIVEWAY

PROPOSED CURB AND GUTTER

15TH ST

EXISTING 4' SIDEWALK DOES NOT MEET CITY STREET SECTION (6')

PROPOSED BUILDING
FFE=272.00

PROPOSED CURB AND GUTTER

PROPOSED 6' BIKE LANE

PAVEMENT RESTORATION AREA

DIVISION ST

PROPOSED DRIVEWAY

PROPOSED SIDEWALK

PAVEMENT RESTORATION AREA

PROPOSED CURB REPAIR

16TH ST

PROPOSED SAWCUT LINE

PROPOSED 6' BIKE LANE

SEE DIVISION ST, 15TH ST AND 16TH ST TYPICAL SECTION ON FOLLOWING SHEETS

SCALE IN FEET: 20 0 20 40

REV	DATE	DESCRIPTION	BY
		REVISIONS	

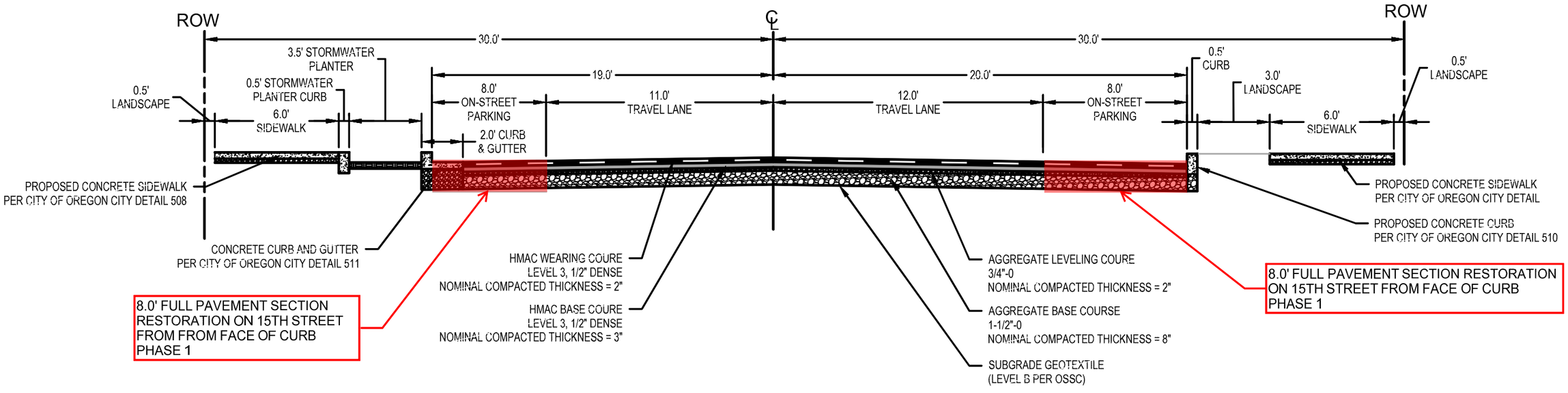
DOWL
WWW.DOWL.COM
720 SW Washington Street, #750
Portland, Oregon 97205
971-280-8641

PROVIDENCE MOB OREGON CITY
OREGON CITY, OREGON

STREET RESTORATION EXHIBIT

PROJECT 14211-01
DATE 02/24/2017

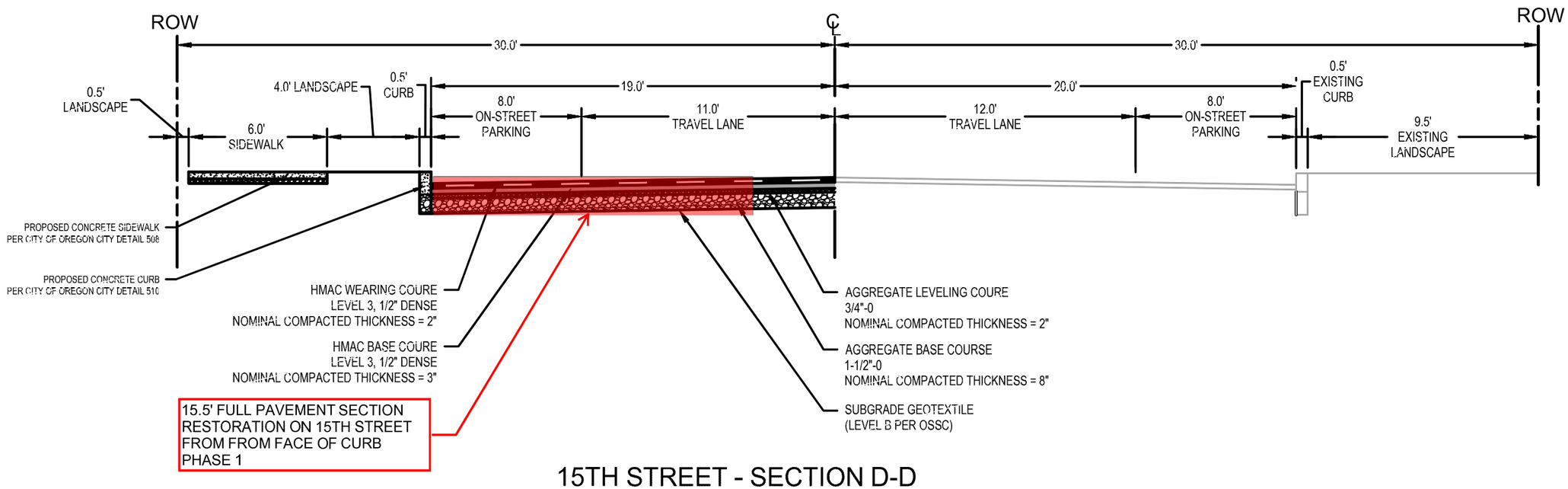
SHEET
EX 1.0



15TH STREET - SECTION C-C

SCALE: NTS

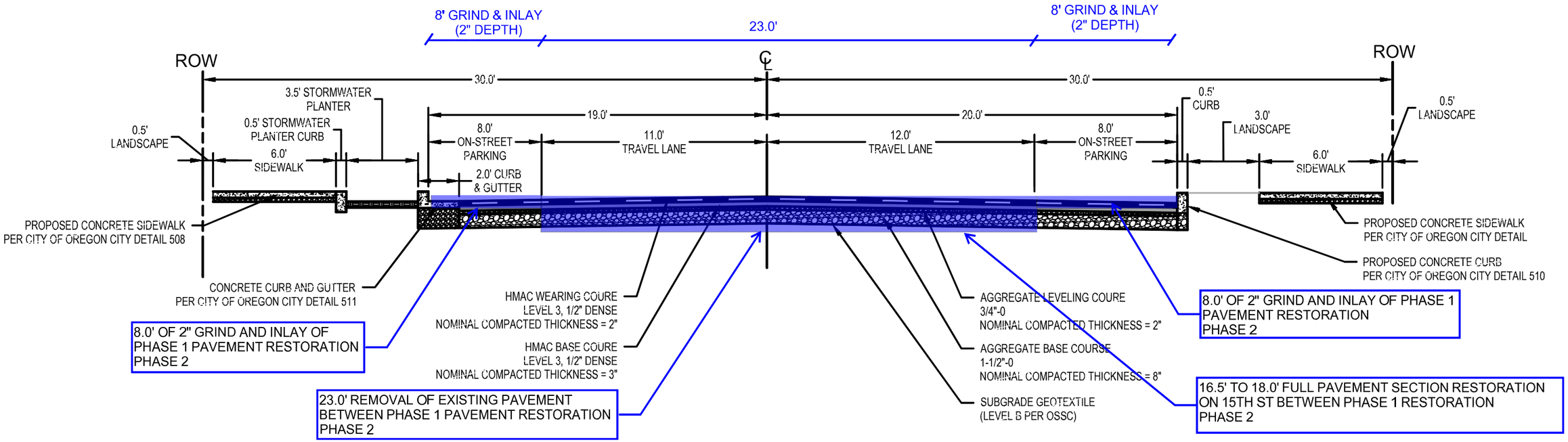
*DRIVEWAY FROM STA: 23+04.52 TO 23+80.07



15TH STREET - SECTION D-D

SCALE: NTS

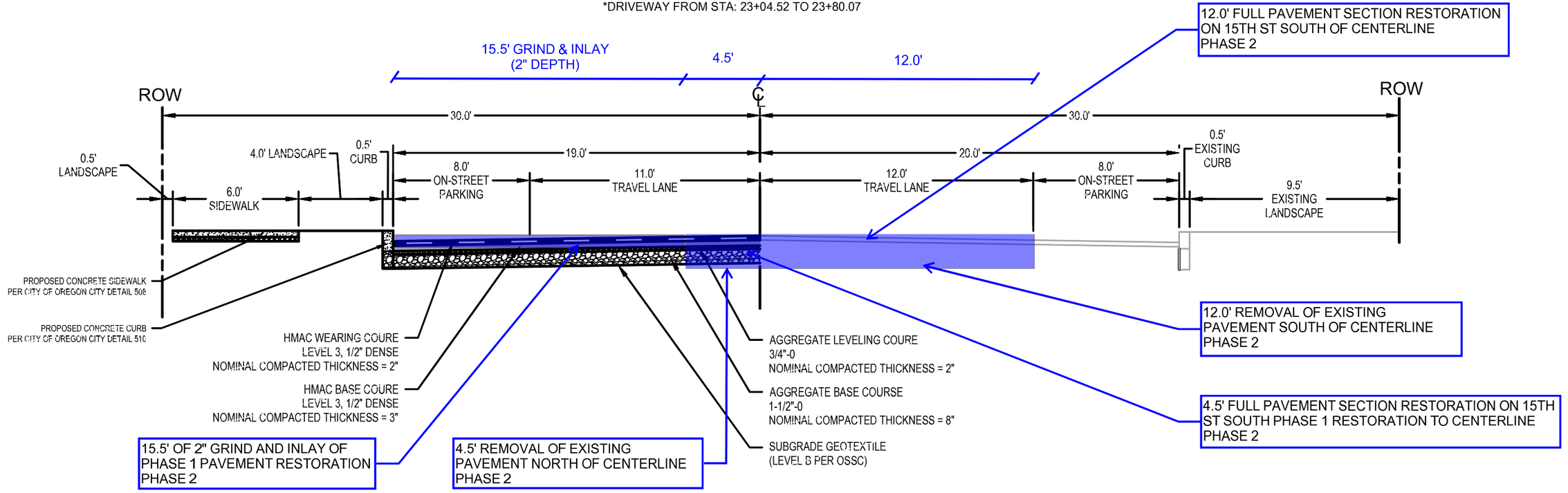
*DRIVEWAY FROM STA: 21+51.62 TO 22+28.31



15TH STREET - SECTION C-C

SCALE: NTS

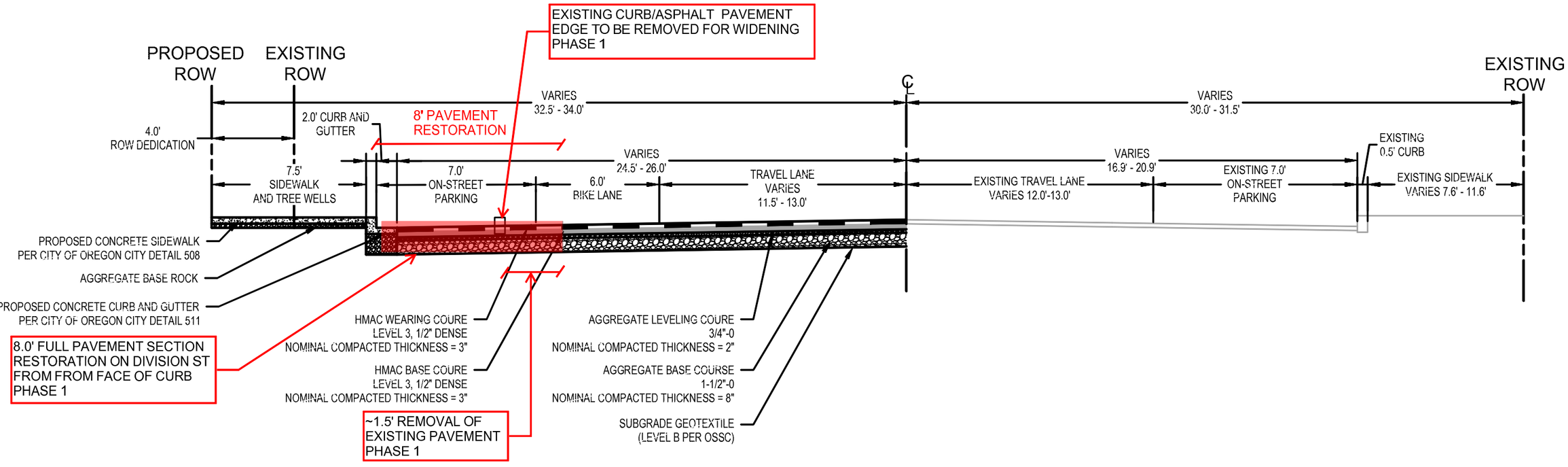
*DRIVEWAY FROM STA: 23+04.52 TO 23+80.07



15TH STREET - SECTION D-D

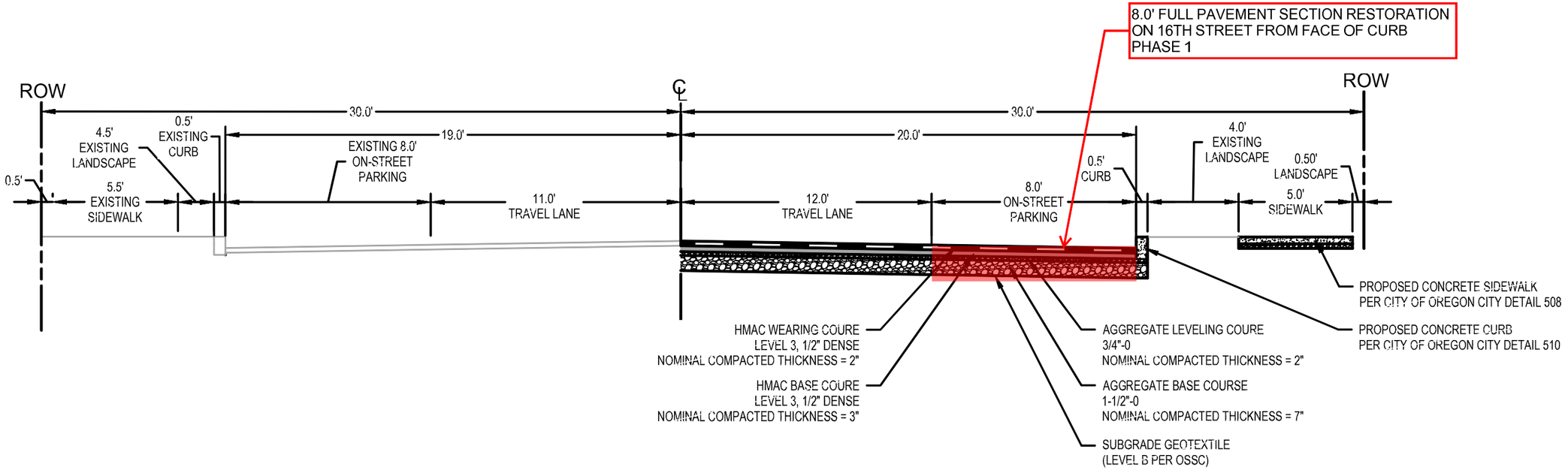
SCALE: NTS

*DRIVEWAY FROM STA: 21+51.62 TO 22+28.31



DIVISION STREET - SECTION A-A

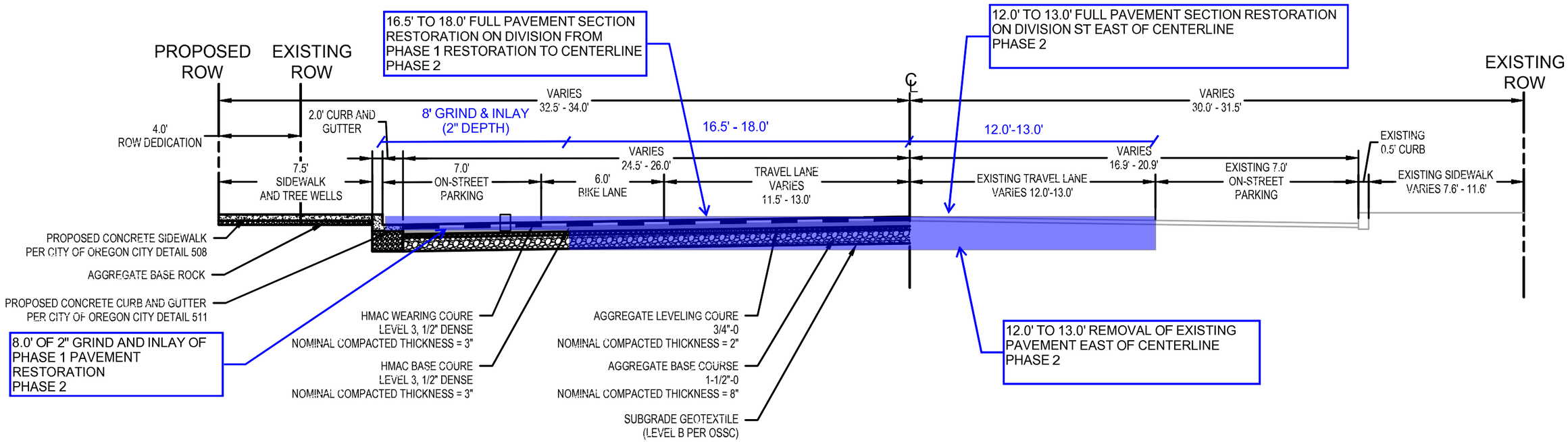
SCALE: NTS



16TH STREET - SECTION B-B

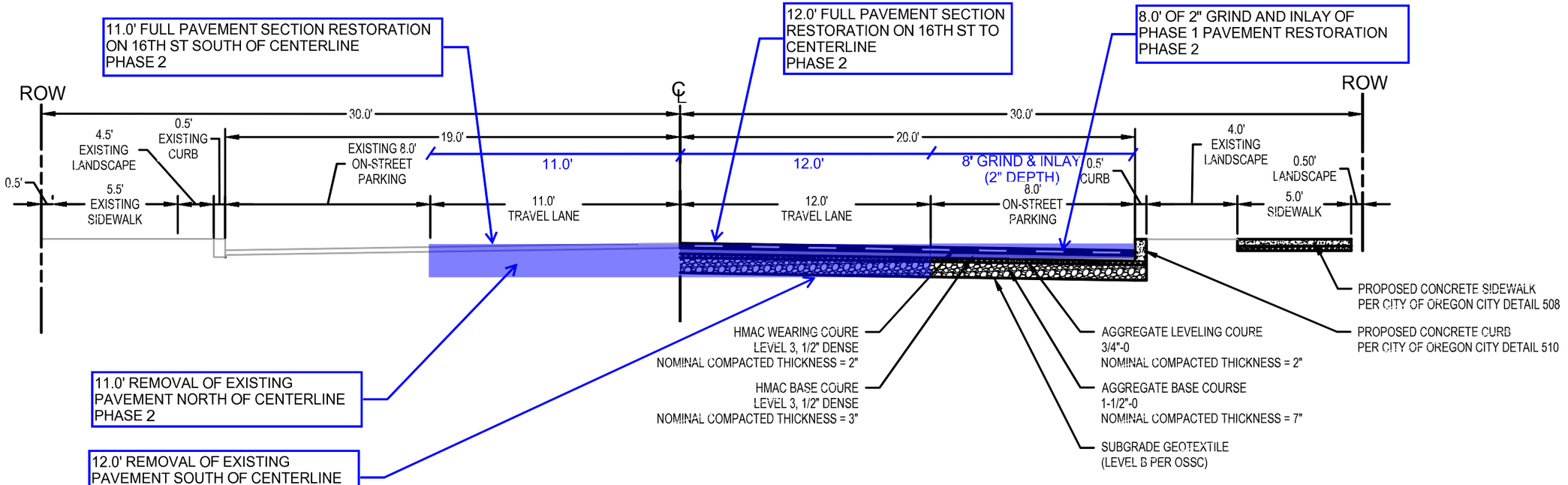
SCALE: NTS

*DRIVEWAY FROM STA: 30+00.60 TO 30+72.05



DIVISION STREET - SECTION A-A

SCALE: NTS



16TH STREET - SECTION B-B

SCALE: NTS

*DRIVEWAY FROM STA: 30+00.60 TO 30+72.05

Providence Willamette Falls – Medical Office Building

Summary of Street Paving Investigation and Pavement Recommendations

Street Name	GeoDesign Pavement Recommendation		Existing Pavement Core #1		Existing Pavement Core #2		Existing Pavement Core #2	
	AC Thickness	Aggregate Base Thickness	AC Thickness	Aggregate Base Thickness	AC Thickness	Aggregate Base Thickness	AC Thickness	Aggregate Base Thickness
Division St	**6"**	**10"**	9.5"	Not Applicable*	8.3"	10.8"	7.5"	2.5"
15th Street	**5"**	**10"**	4.5"	9.5"	3.5"	10.5"	-	-
16th Street	**5"**	**9"**	4.5"	5.5"	3.8"	8.5"	-	-

Note: Information Contained in Summary Table taken from "Off-Site Pavement Recommendations - Revised" dated 1/19/17 by GeoDesign, Inc

*Encountered possible Utility Trench Backfill: terminated in gravel at a depth of 2’ below ground surface

Memo

Providence Health & Services, Providence Willamette Falls Medical Center

To: Wendy Marshall, Development Projects Manager, City of Oregon City

From: Weston York, Senior Construction Manager, PH&S

CC: Mike Robinson, Attorney, Perkins Coie

Date: 2/8/17, *Revised 2/24/17*

Re: **PH&S RESPONSE TO DDP APPEAL (City of Oregon City File No. A-16-02)**

Wendy,

Below are responses to your email dated 1/10/17 *(original comments shown in italics),* with PH&S responses in **bold**.

Regarding timeline:

1. *When do you anticipate completion of the building, ready for occupancy? Please consult with Mike Roberts, the building official, for a realistic date, as it is often further out than the applicant anticipates.*
   We are targeting building occupancy in March 2018, contingent upon receiving the building permit by early April 2017. It is important to note that the full street paving restoration work will not be complete at the time of building occupancy. We will provide adequate temporary patching at the time of occupancy. Please confirm this is acceptable.

2. *You are anticipating completion of the full restoration by October 2018, which is less than 2 years away. Once you allow for public improvement plan review process, construction of all other public improvements, and building permit review, I believe this timeline coincides strongly with construction of this phase. During our meeting of December 5, my understanding was the desire to defer pavement restoration until 2021. Please clarify what you are requesting.*
   The 2021 comment was in regards to completion of the overall Willamette Falls Master Plan scope. PH&S is specifically requesting to complete the street restoration work noted in the DDP conditions by October 31, 2018.

Regarding Geotech report:

3. *Please compile a summary table of the existing asphalt and base aggregate depths alongside the recommended sections. I recommend using Table 2 on p. 4 of the Geotech report, and adding the existing info that appears in narrative form on p. 2. This way everyone will have easy access to a comparison without having to read through the report.*

Please see the attached .pdf document "2017.01.19_PWF_GeoDesign Report", Page 2, "Table 1. Existing Pavement Thickness" and Page 4, "Table 3. Recommended Pavement Sections" for updated information.

The introduction of the Geotech report erroneously notes that 15th Street is on the north side, whereas 16th Street is on the north side. Please confirm whether this is a typo, or whether the data in the report is also in error.
This was a typo and has been revised. Please see the attached .pdf document "2017.01.19_PWF_GeoDesign Report", Page 1, "Introduction" for updated information.

Regarding Pavement Restoration Standards and the City's Requirement:

4. *Clarification of definitions: the attached pavement cut standards define "full depth" as top of AC to top of base aggregate. The "full depth" restoration required by condition of approval, which is under scrutiny includes the base aggregate layer.*
   Please see the attached .pdf document "2017.01.19_PWF_GeoDesign Report" for updated information.

5. *The proposal for minimum pavement patching for 2017 (pink areas on the Timeline Sketches), does not meet our minimum pavement patching standards. In particular, refer to the below highlighted sections regarding dimensional requirements. Longitudinal patches have to be at least 8 feet wide, patches within 30 feet of each other need to be combined into one, and a patch needs to extend to the nearest lane line, so as not to result in a seam within the wheel path.*
   See attached .pdf document "MOB Street Paving and Paving Sections 2017-02-24" for specific phasing of the work. The 2017 and 2018 references have been removed, with the only milestone for completion being October 31, 2018. For the section on 15th Avenue, we have updated the work to meet the 8' minimum requirement. We are asking for a one-year exemption for the gap between this line and the edge of the bike line, as we will be coming back the following year to complete the full section of road improvements. Please review and advise if this is acceptable.

6. *The full restoration to be completed in 2018 (blue areas on the Timeline Sketches) is shown 10 feet beyond centerline. As stated previously, and shown on the attached Proposed Street Restoration Exhibit, the City is only requiring you to provide the restoration to the centerline (except where the development fronts both sides of 15th Street, where it is required from curb to curb).*
   PH&S is detailing the street improvement work to comply with the 2021 Master Plan agreement that we have with the City of Oregon City. The Master Plan requires PH&S to repave to the lines indicated on the section drawings, not to the centerline. See attached .pdf document "MOB Street Paving and Paving Sections 2017-02-24" for extent of pavement restoration.

7. *Once you adjust the patching limits to meet the City's minimum pavement patch standards, and adjust the full depth restoration to only go to the centerline, the difference in scope between the City's required improvement and the applicant's proposed improvement becomes very small.*
   See attached .pdf document "MOB Street Paving and Paving Sections 2017-02-24" for extent of pavement restoration. Please review for compliance with the City's required improvements.

Lastly, Revised Stormwater Condition:

Carrie has proposed to revise Condition 5 from this:

- *Final stormwater report shall be submitted with public facilities construction plans, and shall fully address replacement of undersized pipes and other downstream capacity issues in accordance with Oregon City Stormwater Grading Design Standards, dated 2015. (DS)*

To this:

- *Final stormwater report shall be submitted with public facilities construction plans and shall respond to identified downstream capacity issues through compliance with any of the solutions authorized by the Oregon City Stormwater Grading Design Standards, dated 2015, which may include, but are not limited to, replacement of undersized pipes or on-site detention and maximum infiltration so as not to contribute any additional flows.*

I concur with Carrie's recommended revision in the language.

PH&S is agreement that this revised stormwater language is acceptable.

END OF MEMO

GEODESIGN INC

Memorandum

To:	Samuel Dutton	From:	Reed S. Kistler, P.E. and Shawn M. Dimke, P.E., G.E.
Company:	Providence Health & Services	Date:	January 19, 2017
Address:	4400 NE Halsey, Building 2, Suite 190 Portland, OR 97213		

cc:	Josh Kolberg, PKA Architects (via email only) Jeff Shoemaker, DOWL (via email only)

GDI Project:	Providence-63-04
RE:	Off-Site Pavement Recommendations - Revised Willamette Falls West MOB 1505 Division Street Oregon City, Oregon

INTRODUCTION

GeoDesign, Inc. is pleased to submit this revised memorandum of our pavement evaluation and design for the portions of Division Street, 15th Street, and 16th Street that are adjacent to the planned Willamette Falls West Medical Office Building (MOB) to be located at 1505 Division Street in Oregon City, Oregon. Revisions to this memorandum include the addition of a table of the existing pavement thicknesses encountered in our explorations and our recommendations for the use of recycled asphalt concrete (AC) material as aggregate base. We completed a geotechnical engineering report[1] for the site on December 2, 2015; however, off-site pavement conditions were not included. We understand that full-depth pavement replacement is required for a 36-foot-wide section of Division Street roughly between 15th Street and 16th Street, a 36-foot-wide section of 15th Street bordering the south of the site, and most of 16th Street on the north side of the site. Figure 1 shows the site relative to existing topographic and physical features. This memorandum provides pavement recommendations for the reconstruction of these roadway segments.

SITE CONDITIONS

16th Street and both 15th Street and Division Street, within the limits identified above, are classified as local and collector streets, respectively. Site conditions applicable to our pavement design are provided below. We understand that sections of these roads will not be widened as part of planned improvements.

[1] GeoDesign, Inc. *Report of Geotechnical Engineering Services; Willamette Falls West MOB; 1505 Division Street; Oregon City, Oregon,* dated December 2, 2015. GeoDesign Project: Providence-63-01

SURFACE CONDITIONS

Division Street, 15th Street, and 16th Street are two-lane roads surfaced with AC adjacent to the Willamette Falls MOB site. Division Street slopes gently to the north and 15th Street and 16th Street are relatively flat in this area.

SUBSURFACE CONDITIONS

We completed seven pavement core borings (C-1 through C-7) to depths ranging from 2.0 to 3.5 feet below ground surface (BGS) on December 13, 2016. The pavement cores were located in the south, east, and westbound travel lanes of Division Street, 15th Street, and 16th Street, respectively. The approximate locations of our explorations are shown on Figure 2. A more detailed description of the exploration program, the exploration logs, photographs of the pavement core locations and cores, and the results of laboratory testing are presented in Attachment A.

Existing AC thicknesses at the core locations ranged from 7.5 to 9.5 inches for Division Street, 3.5 to 4.5 inches for 15th Street, and 3.8 to 4.5 inches for 16th Street. Existing aggregate base thicknesses varied at each core location ranging from 2.5 to 10.8 inches. Findings from our subsurface explorations of the existing pavement thickness are summarized in Table 1.

Table 1. Existing Pavement Thickness

Boring	Street Name	Thickness (inches)	
		AC	Aggregate Base
C-1	15th Street	4.5	9.5
C-2	15th Street	3.5	10.5
C-3	Division Street	9.5	Not applicable[1]
C-4	Division Street	8.3	10.8
C-5	Division Street	7.5	2.5
C-6	16th Street	4.5	5.5
C-7	16th Street	3.8	8.3

1. Encountered possible utility trench backfill; terminated in gravel at a depth of 2.0 feet BGS.

Soil conditions underlying the aggregate base are generally comprised of stiff to very stiff silt with sand to the maximum depth explored. Standard penetration test (SPT) blow counts for the subgrade varied from 9 to 18 blows per foot. Laboratory testing conducted on selected soil samples indicate in situ moisture content ranging from 19 to 36 at the time of our explorations.

DCP TESTING

We completed seven dynamic cone penetrometer (DCP) tests as part of our subsurface investigation on December 13, 2016. The DCP tests were completed at each core location. We conducted the

DCP tests in accordance with ASTM D 6951. We recorded penetration depth of the cone for each blow of the hammer and terminated testing near the end of rod length. The summarized DCP test results are presented in Attachment B.

PAVEMENT DESIGN

The standards used for pavement design are listed below:

- ODOT Pavement Design Guide, ODOT (August 2011), herein referred to as the ODOT guide
- Guide for Design of Pavement Structures, AASHTO (1993), herein referred to as the AASHTO guide

We estimated the subgrade resilient modulus value based on the DCP testing and findings from our subsurface explorations. We estimated traffic loading based on information provided on the City of Oregon City's 2014 Interactive Traffic Count Map[2]. Descriptions of our input parameters and our recommended pavement design are summarized below.

ESAL CALCULATIONS

Quality Counts, LLC collected vehicle classification count information over a 24-hour period for Division Street, 15th Street, and 16th Street in the fall of 2014. They obtained baseline classification counts in both directions of traffic. We used the conversion factors and methods recommended in the ODOT guide to calculate the construction-year equivalent single-axle load (ESAL) for each vehicle class. We expanded the construction-year ESALs throughout the design period using 2.0 percent annual growth in traffic. Calculated 20-year ESALs are provided in Table 2. Average counts and our calculation sheets are presented in Attachment C.

Table 2. Design 20-Year ESALs

Street Name	20-Year ESALs
Division Street	520,000
15th Street	229,000
16th Street	198,000

SUBGRADE RESILIENT MODULUS

We calculated subgrade resilient moduli for each region of data with relatively constant slope on the plot of summarized DCP test data presented in Attachment B. We recommend a subgrade resilient modulus of 5,800 pounds per square inch (psi) for design purposes. This value is based on the approximate average of the results for the subgrade derived from the DCP tests.

[2] Traffic Counts 2014, City of Oregon City, Oregon City, Oregon
https://maps.orcity.org/Html5Viewer_2_7_1/Index.html?configBase=https://maps.orcity.org/Geocortex/Essentials/REST/sites/TrafficCounts2014/viewers/html5_TrafficCounts2014/virtualdirectory/Resources/Config/Default
accessed December 2016

REQUIRED STRUCTURAL NUMBER FOR NEW AC PAVEMENT

We calculated a required structural number of 3.51, 3.07, and 3.00 for Division Street, 15th Street, and 16th Street, respectively. The calculated structural numbers for new pavement were based on the 20-year design ESAL values shown in Table 2, a subgrade resilient modulus value 5,800 psi, an aggregate base resilient modulus of 20,000 psi as recommended in the ODOT guide, and the other design parameters discussed in the following section of this memorandum. Our calculation sheets are presented in Attachment D.

OTHER DESIGN PARAMETERS

Other pavement design parameters used in our analysis are summarized as follows:

- A reliability of 90 percent for the road section
- An overall standard deviation value of 0.49
- Initial and terminal serviceability values of 4.2 and 2.5, respectively
- A structural layer coefficient of 0.42 for new AC, 0.10 for new aggregate base, and 0.07 for recycled AC subbase

CONSTRUCTION RECOMMENDATIONS

NEW SECTIONS

Our recommendations for the reconstructed pavement sections of Division Street, 15th Street, and 16th Street adjacent to the proposed MOB are provided in Table 3. The materials should conform to the specifications presented in the "Pavement Materials" section of this memorandum.

Table 3. Recommended Pavement Sections

Street Name	AC Thickness[1] (inches)	Aggregate Base Thickness[1,2] (inches)
Division Street	6.0	10.0
15th Street	5.0	10.0
16th Street	5.0	9.0

1. Recommended minimum thickness
2. Recycled AC may be used in place of aggregate base if it is capped with an additional 3-inch or greater layer of aggregate base.

Subgrade should consist of undisturbed material that, based on proof rolling or foundation probing, indicates (at a minimum) medium stiff, fine-grained soil or medium dense, granular material. If soft or unsuitable subgrade material is encountered, over-excavation for an increased aggregate base will be required. If wet and sensitive, fine-grained subgrade soil exists, subgrade evaluation should be performed by probing with a foundation probe rather than proof rolling. If construction will be conducted during the wet season or during wet weather, the base rock section may need to be increased (typically approximately 6 inches) to protect the subgrade from disturbance during construction.

PAVEMENT MATERIALS

A submittal should be made for each pavement material prior to the start of paving operations. Each submittal should include the test information necessary to evaluate the degree to which the properties of the materials comply with the properties that were recommended or specified. The geotechnical engineer and other appropriate members of the design team should review each submittal.

Aggregate Base

Imported granular material used as aggregate base should be clean, crushed rock or crushed gravel and sand that are dense-graded. The aggregate base should meet the gradation defined in Oregon Standard Specifications for Construction - 2015 (OSSC) 00641 (Aggregate Subbase, Base, and Shoulders), with the exception that the aggregate has less than 5 percent by dry weight passing the U.S. Standard No. 200 sieve, a maximum particle size of 1½ inches, and at least two mechanically fractured faces. The aggregate base should be compacted to not less than 95 percent of the maximum dry density, as determined by AASHTO T 99.

Recycled AC Material

Recycled AC and crushed rock material can be used as aggregate base provided the AC is broken to a maximum particle size of 1½ inches, is well graded with less than 12 percent by dry weight passing the U.S. Standard No. 200 sieve, and the planned section is capped with an additional minimum 3-inch thick layer of imported granular material. The recycled AC material should be compacted to not less than 95 percent of the maximum dry density, as determined by AASHTO T 99.

AC

The AC should be Level 3, ½-inch dense asphalt concrete pavement (ACP) according to OSSC 00744 (Asphalt Concrete Pavement) and compacted to at least 92 percent of the moving average maximum density. Minimum lift thickness is 2.0 inches and maximum lift thickness is 3.0 inches for ½-inch ACP. Deviations outside the minimum and maximum lift thicknesses should be discussed and accepted by the design team. Asphalt binder should be performance graded and conform to PG 64-22. Warm mix asphalt additive or process can be used with approval from local jurisdictions.

Subgrade Geotextile

The subgrade geotextile should conform to OSSC 00350 (Geosynthetic Installation). The geotextile should have a Level "B" certification. A minimum initial aggregate base lift of 6 inches is required over geotextiles.

OBSERVATION OF CONSTRUCTION

Satisfactory earthwork and pavement performance depends to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during the

subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to determine if subsurface conditions change significantly from those anticipated.

LIMITATIONS

We have prepared this memorandum for use by Providence Health & Services and the design and construction team for the proposed project. The memorandum can be used for bidding or estimating purposes, but our memorandum, conclusions, and interpretations should not be construed as warranty of the subsurface conditions and are not applicable to other sites.

Exploration observations indicate soil conditions and pavement conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect soil strata, pavement, or water level variations that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, re-evaluation will be necessary.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our memorandum for consideration in design. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time the memorandum was prepared. No warranty, express or implied, should be understood.

RSK:SMD:kt
Attachments
One copy submitted (via email only)
Document ID: Providence-63-04-011917-geom-rev.docx

FIGURES

GEODESIGN INC 9450 SW Commerce Circle - Suite 300 Wilsonville OR 97070 503.968.8787 www.geodesigninc.com	PROVIDENCE-63-04	**VICINITY MAP**	
	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	**FIGURE 1**

Printed By: aday | Print Date: 1/3/2017 11:35:26 AM
File Name: J:\M-R\Providence\Providence-63\Providence-63-04\Figures\CAD\Providence-63-04-VM01.dwg | Layout: FIGURE 1

LEGEND:

C-1◉ PAVEMENT CORE

N

0 60 120

(SCALE IN FEET)

SITE PLAN BASED ON AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH PRO®, DECEMBER 28, 2016

GEODESIGN INC 9450 SW Commerce Circle - Suite 300 Wilsonville OR 97070 503.968.8787 www.geodesigninc.com	PROVIDENCE-63-04	SITE PLAN
	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR
		FIGURE 2

Printed By: aday | Print Date: 1/3/2017 11:35:28 AM
File Name: J:\M-R\Providence\Providence-63\Providence-63-04\Figures\CAD\Providence-63-04-SP01.dwg | Layout: FIGURE 2

ATTACHMENT A

ATTACHMENT A

FIELD EXPLORATIONS

GENERAL

Subsurface conditions at the site were explored by completing seven pavement core borings (C-1 through C-7) to depths ranging from 2.0 and 3.5 feet BGS. Drilling services were provided by Dan J. Fischer Excavating, Inc. of Forest Grove, Oregon, on December 13, 2016. The explorations were observed by a member of our geology staff. The exploration logs are presented in this attachment.

The locations of the explorations were determined in the field by pacing from existing site features. This information should be considered accurate to the degree implied by the methods used.

SOIL SAMPLING

Soil samples were obtained from the explorations by conducting SPTs in general conformance with ASTM D 1586. The sampler was driven with a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler 1 foot, or as otherwise indicated, into the soil is shown adjacent to the sample symbols on the exploration logs. Disturbed samples were obtained from the split barrel for subsequent classification and index testing. Sampling methods and sampling intervals are shown on the exploration logs.

We understand that calibration of the SPT used by Dan J. Fischer Excavating, Inc. has not been completed. The SPT blow counts completed by Dan J. Fischer Excavating, Inc. were conducted using two wraps around the cathead.

SOIL CLASSIFICATION

We obtained representative samples of the various soil encountered in the explorations for geotechnical laboratory testing. The soil samples were classified in accordance with the "Exploration Key" (Table A-1) and "Soil Classification System" (Table A-2), which are presented in this attachment. The exploration logs indicate the depths at which the soils or their characteristics change, although the change actually could be gradual. If the change occurred between sample locations, the depth was interpreted. Classifications are shown on the exploration logs.

LABORATORY TESTING

CLASSIFICATION

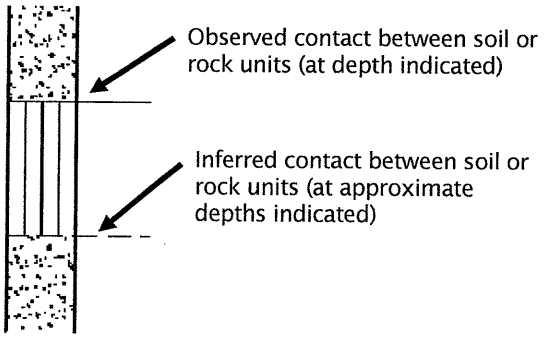
The soil samples were classified in the laboratory to confirm field classifications. The laboratory classifications are shown on the exploration logs if those classifications differed from the field classifications.

MOISTURE CONTENT

We determined the natural moisture content of selected samples in general accordance with ASTM D 2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The test results are presented in this attachment.

SYMBOL	SAMPLING DESCRIPTION
	Location of sample obtained in general accordance with ASTM D 1586 Standard Penetration Test with recovery
	Location of sample obtained using thin-wall Shelby tube or Geoprobe® sampler in general accordance with ASTM D 1587 with recovery
	Location of sample obtained using Dames & Moore sampler and 300-pound hammer or pushed with recovery
	Location of sample obtained using Dames & Moore and 140-pound hammer or pushed with recovery
	Location of sample obtained using 3-inch-O.D. California split-spoon sampler and 140-pound hammer
	Location of grab sample
	Rock coring interval
	Water level during drilling
	Water level taken on date shown

Graphic Log of Soil and Rock Types



GEOTECHNICAL TESTING EXPLANATIONS

ATT	Atterberg Limits	PP	Pocket Penetrometer
CBR	California Bearing Ratio	P200	Percent Passing U.S. Standard No. 200 Sieve
CON	Consolidation		
DD	Dry Density	RES	Resilient Modulus
DS	Direct Shear	SIEV	Sieve Gradation
HYD	Hydrometer Gradation	TOR	Torvane
MC	Moisture Content	UC	Unconfined Compressive Strength
MD	Moisture-Density Relationship	VS	Vane Shear
OC	Organic Content	kPa	Kilopascal
P	Pushed Sample		

ENVIRONMENTAL TESTING EXPLANATIONS

CA	Sample Submitted for Chemical Analysis	ND	Not Detected
P	Pushed Sample	NS	No Visible Sheen
PID	Photoionization Detector Headspace Analysis	SS	Slight Sheen
		MS	Moderate Sheen
ppm	Parts per Million	HS	Heavy Sheen

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EXPLORATION KEY

TABLE A-1

RELATIVE DENSITY - COARSE-GRAINED SOILS

Relative Density	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)
Very Loose	0 - 4	0 - 11	0 - 4
Loose	4 - 10	11 - 26	4 - 10
Medium Dense	10 - 30	26 - 74	10 - 30
Dense	30 - 50	74 - 120	30 - 47
Very Dense	More than 50	More than 120	More than 47

CONSISTENCY - FINE-GRAINED SOILS

Consistency	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)	Unconfined Compressive Strength (tsf)
Very Soft	Less than 2	Less than 3	Less than 2	Less than 0.25
Soft	2 - 4	3 - 6	2 - 5	0.25 - 0.50
Medium Stiff	4 - 8	6 - 12	5 - 9	0.50 - 1.0
Stiff	8 - 15	12 - 25	9 - 19	1.0 - 2.0
Very Stiff	15 - 30	25 - 65	19 - 31	2.0 - 4.0
Hard	More than 30	More than 65	More than 31	More than 4.0

PRIMARY SOIL DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS (more than 50% retained on No. 200 sieve)	GRAVEL (more than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVELS (< 5% fines)	GW or GP	GRAVEL
		GRAVEL WITH FINES (≥ 5% and ≤ 12% fines)	GW-GM or GP-GM	GRAVEL with silt
			GW-GC or GP-GC	GRAVEL with clay
		GRAVELS WITH FINES (> 12% fines)	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND (50% or more of coarse fraction passing No. 4 sieve)	CLEAN SANDS (<5% fines)	SW or SP	SAND
		SANDS WITH FINES (≥ 5% and ≤ 12% fines)	SW-SM or SP-SM	SAND with silt
			SW-SC or SP-SC	SAND with clay
		SANDS WITH FINES (> 12% fines)	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS (50% or more passing No. 200 sieve)	SILT AND CLAY	Liquid limit less than 50	ML	SILT
			CL	CLAY
			CL-ML	silty CLAY
			OL	ORGANIC SILT or ORGANIC CLAY
		Liquid limit 50 or greater	MH	SILT
			CH	CLAY
			OH	ORGANIC SILT or ORGANIC CLAY
HIGHLY ORGANIC SOILS			PT	PEAT

MOISTURE CLASSIFICATION

Term	Field Test
dry	very low moisture, dry to touch
moist	damp, without visible moisture
wet	visible free water, usually saturated

ADDITIONAL CONSTITUENTS

Secondary granular components or other materials such as organics, man-made debris, etc.

Percent	Silt and Clay In: Fine-Grained Soils	Silt and Clay In: Coarse-Grained Soils	Percent	Sand and Gravel In: Fine-Grained Soils	Sand and Gravel In: Coarse-Grained Soils
< 5	trace	trace	< 5	trace	trace
5 - 12	minor	with	5 - 15	minor	minor
> 12	some	silty/clayey	15 - 30	with	with
			> 30	sandy/gravelly	Indicate %

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SOIL CLASSIFICATION SYSTEM

TABLE A-2

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT %	COMMENTS
C-1							
0.0		ASPHALT CONCRETE (4.5 inches).				0 50 100	
		AGGREGATE BASE; subrounded (9.5 inches).	0.4				DCP test at 8.0 inches.
		Stiff, brown-gray with orange mottled SILT with sand (ML), some clay; moist.	1.2			14 ●	
2.5							
		Exploration completed at a depth of 3.0 feet.	3.0				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5							
C-2						0 50 100	
0.0		ASPHALT CONCRETE (3.5 inches).				0 50 100	
		AGGREGATE BASE (10.5 inches).	0.3				DCP test at 6.0 inches.
		Stiff, light brown with orange mottled SILT with sand (ML), trace clay; moist, sand is fine.	1.2			9 ●	
2.5							
		Exploration completed at a depth of 3.5 feet.	3.5				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5						0 50 100	

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 12/13/16

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

BORING LOG - 2 PER PAGE PROVIDENCE-63-04-C1_7.GPJ GEODESIGN.GDT PRINT DATE: 1/3/17:RC:KT

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PROVIDENCE-63-04 | **BORING**

JANUARY 2017 | WILLAMETTE FALLS WEST MOB OREGON CITY, OR | **FIGURE A-1**

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT %	COMMENTS
C-3						0 50 100	
0.0		ASPHALT CONCRETE (9.5 inches).					DCP test at 10.0 inches.
		Medium dense, brown-gray GRAVEL with sand (GP), trace silt; moist - **FILL.**	0.8		☒		Possible utility trench backfill below asphalt concrete.
2.5		Exploration terminated at a depth of 2.0 feet due to possible utility conflict.	2.0				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5							
C-4						0 50 100	
0.0		ASPHALT CONCRETE (8.3 inches).				0 50 100	
		AGGREGATE BASE (10.8 inches).	0.7		☒		DCP test at 10.0 inches.
		Stiff, light brown-gray SILT with sand (ML), trace clay; moist, sand is fine.	1.6				
2.5		Medium dense, light brown, silty SAND (SM); moist, fine.	3.0			▲13 ●	
		Exploration completed at a depth of 3.5 feet.	3.5				CORE DETAILS: No patch observed. No crack on core.
5.0		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
7.5							
						0 50 100	

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 12/13/16

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

BORING LOG - 2 PER PAGE PROVIDENCE-63-04-C1_7.GPJ GEODESIGN.GDT PRINT DATE: 1/3/17:RC:KT

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PROVIDENCE-63-04

BORING (continued)

JANUARY 2017

WILLAMETTE FALLS WEST MOB
OREGON CITY, OR

FIGURE A-2

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT %	COMMENTS
C-5						0 50 100	
0.0		ASPHALT CONCRETE (7.5 inches).					
		AGGREGATE BASE (2.5 inches).	0.7		⊠		DCP test at 9.0 inches.
		Very stiff, brown to light gray SILT with sand (ML), trace clay; moist, sand is fine.	0.8			18	
2.5		Exploration completed at a depth of 2.5 feet.	2.5				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5							
C-6						0 50 100	
0.0		ASPHALT CONCRETE (4.5 inches).					
		AGGREGATE BASE (5.5 inches).	0.4		⊠		DCP test at 10.0 inches.
		Stiff to very stiff, light brown-gray SILT with sand (ML), trace clay; moist, sand is fine.	0.8			15	
2.5		Exploration completed at a depth of 3.5 feet.	3.5				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5							

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 12/13/16

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

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BORING (continued)

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WILLAMETTE FALLS WEST MOB
OREGON CITY, OR

FIGURE A-3

BORING LOG - 2 PER PAGE PROVIDENCE-63-04-C1_7.GPJ GEODESIGN.GDT PRINT DATE: 1/3/17:RC:KT

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT %	COMMENTS
C-7							
0.0		ASPHALT CONCRETE (3.8 inches).	0.3			0 50 100	DCP test at 5.0 inches.
		AGGREGATE BASE with cobbles; subrounded (8.3 inches).	1.0				
		Stiff, light brown-orange to light gray SILT with sand (ML), trace clay; moist, sand is fine.				14	
2.5							
		Exploration completed at a depth of 3.0 feet.	3.0				CORE DETAILS: No patch observed. No crack on core.
		Hammer efficiency factor is unknown. SPT completed using two wraps with a cathead.					
5.0							
7.5						0 50 100	

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: JGH COMPLETED: 12/13/16

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

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BORING (continued)

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WILLAMETTE FALLS WEST MOB
OREGON CITY, OR

FIGURE A-4

BORING LOG - 2 PER PAGE PROVIDENCE-63-04-C1_7.GPJ GEODESIGN.GDT PRINT DATE: 1/3/17:RC:KT

CORE LOCATION C-1.

CORE C-1.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	FIGURE A-5

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CORE LOCATION C-2.

CORE C-2.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	**FIGURE A-6**

CORE LOCATION C-3.

CORE C-3.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	FIGURE A-7

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CORE LOCATION C-4.

CORE C-4.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	FIGURE A-8

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CORE LOCATION C-5.

CORE C-5.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	**FIGURE A-9**

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CORE LOCATION C-6.

CORE C-6.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	**FIGURE A-10**

CORE LOCATION C-7.

CORE C-7.

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	JANUARY 2017	WILLAMETTE FALLS WEST MOB OREGON CITY, OR	**FIGURE A-11**

SAMPLE INFORMATION			MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
C-1	1.5		29							
C-2	2.0		36							
C-4	2.0		23							
C-5	1.0		19							
C-6	2.0		29							
C-7	1.5		25							

LAB SUMMARY PROVIDENCE-63-04-C1_7.GPJ GEODESIGN.GDT PRINT DATE: 1/3/17:KT

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PROVIDENCE-63-04

SUMMARY OF LABORATORY DATA

JANUARY 2017

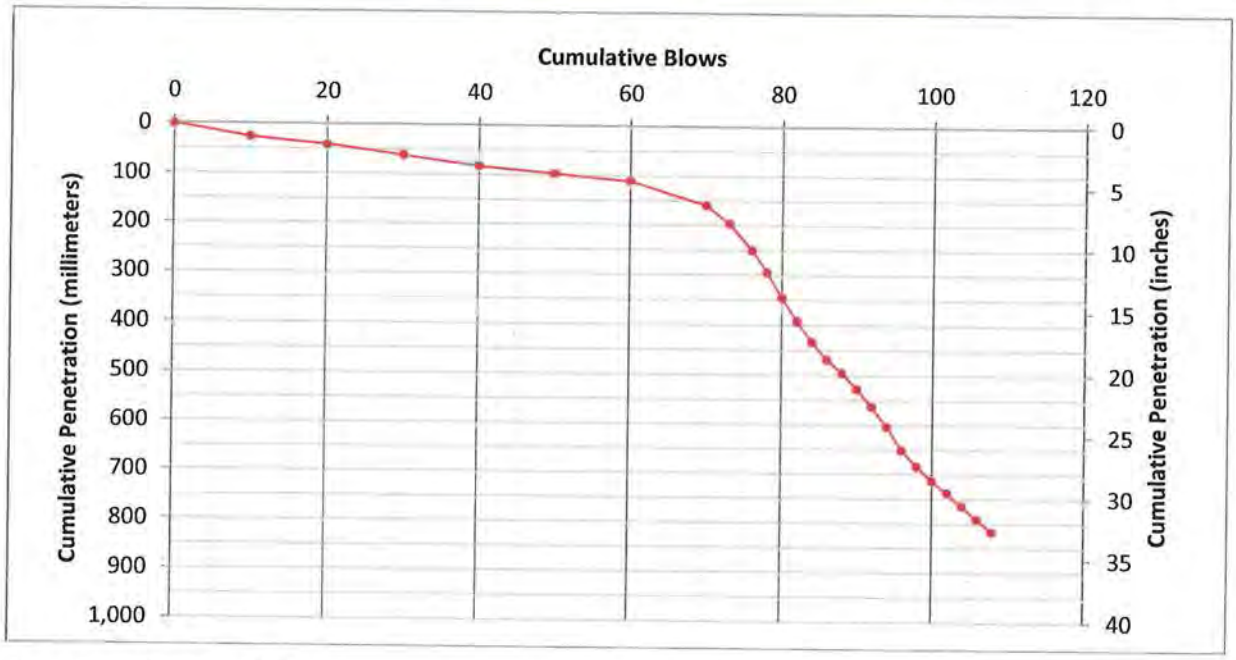
WILLAMETTE FALLS WEST MOB
OREGON CITY, OR

FIGURE A-12

ATTACHMENT B

DYNAMIC CONE PENETROMETER RESULTS - BORING C-1

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	1.8	0.62	24,000
2	Subgrade below AC and aggregate base	17.9	0.35	5,600
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

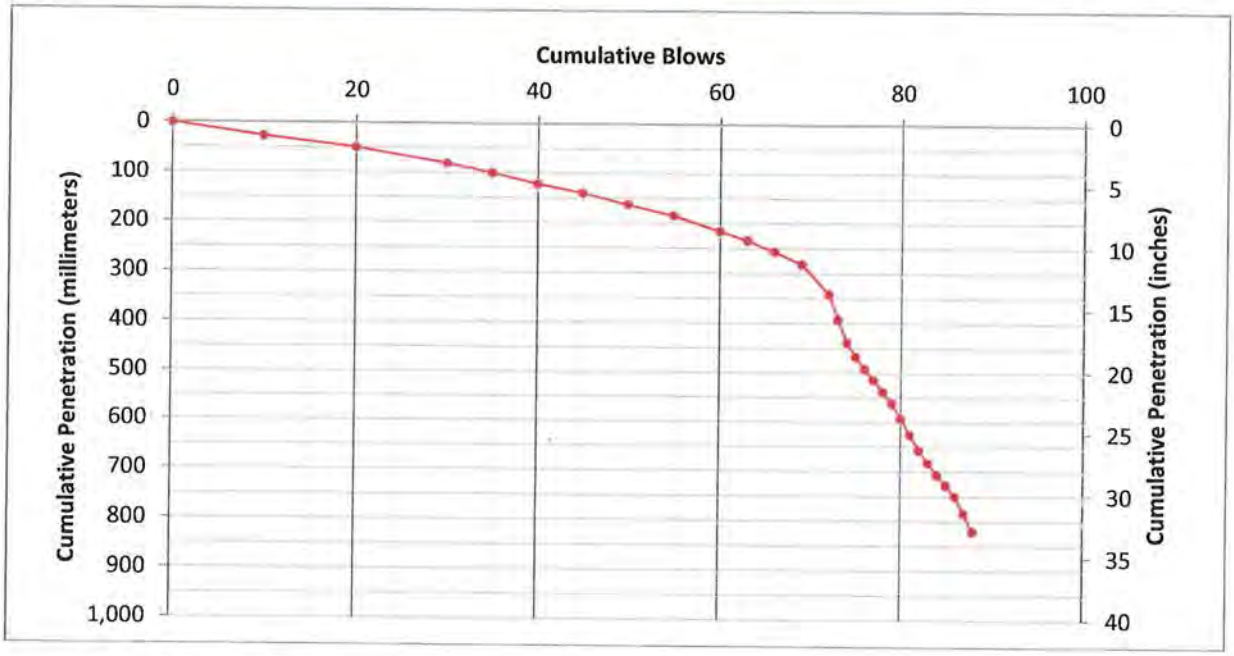
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-2

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	4.0	0.62	17,700
2	Subgrade below AC and aggregate base	28.0	0.35	4,700
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

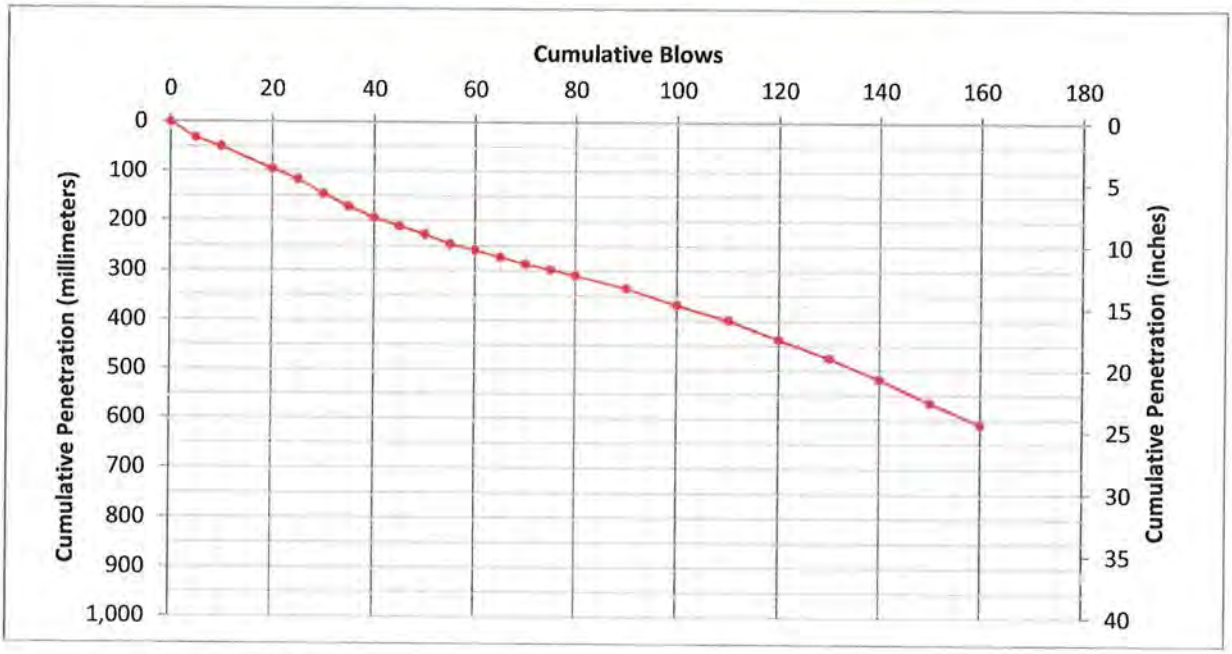
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-3

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	4.8	0.62	16,500
2	Aggregate base or subbase below AC	3.3	0.62	19,000
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

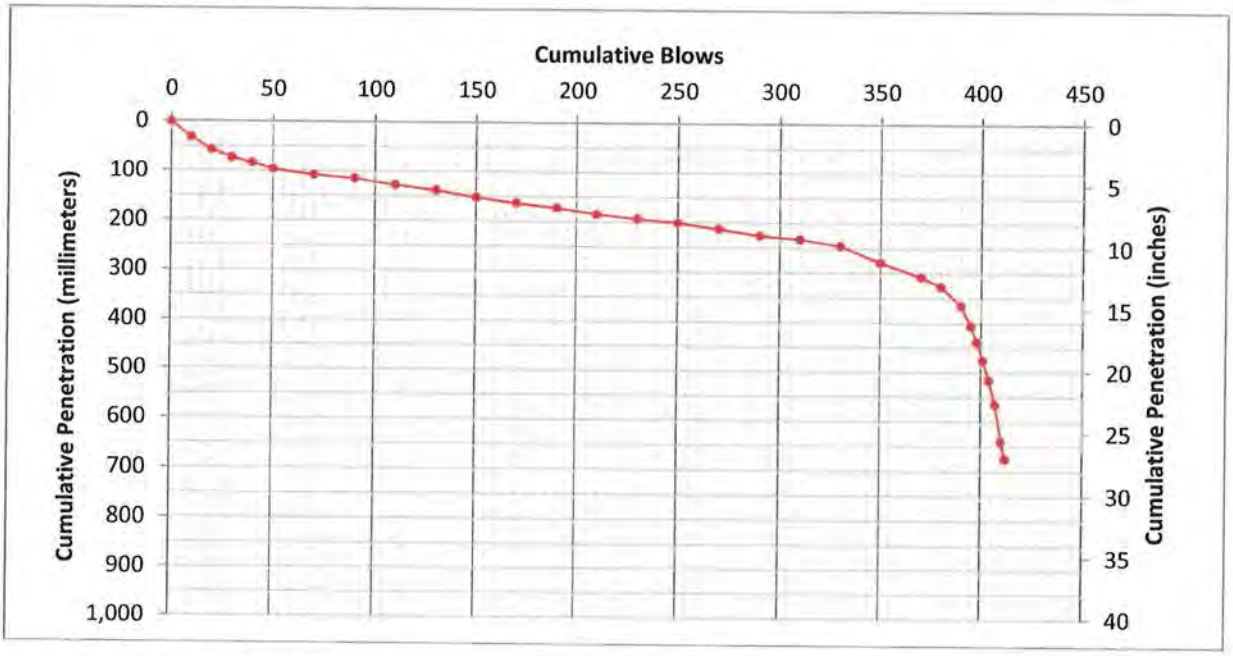
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-4

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	0.6	0.62	37,600
2	Subgrade below AC and aggregate base	14.3	0.35	6,100
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

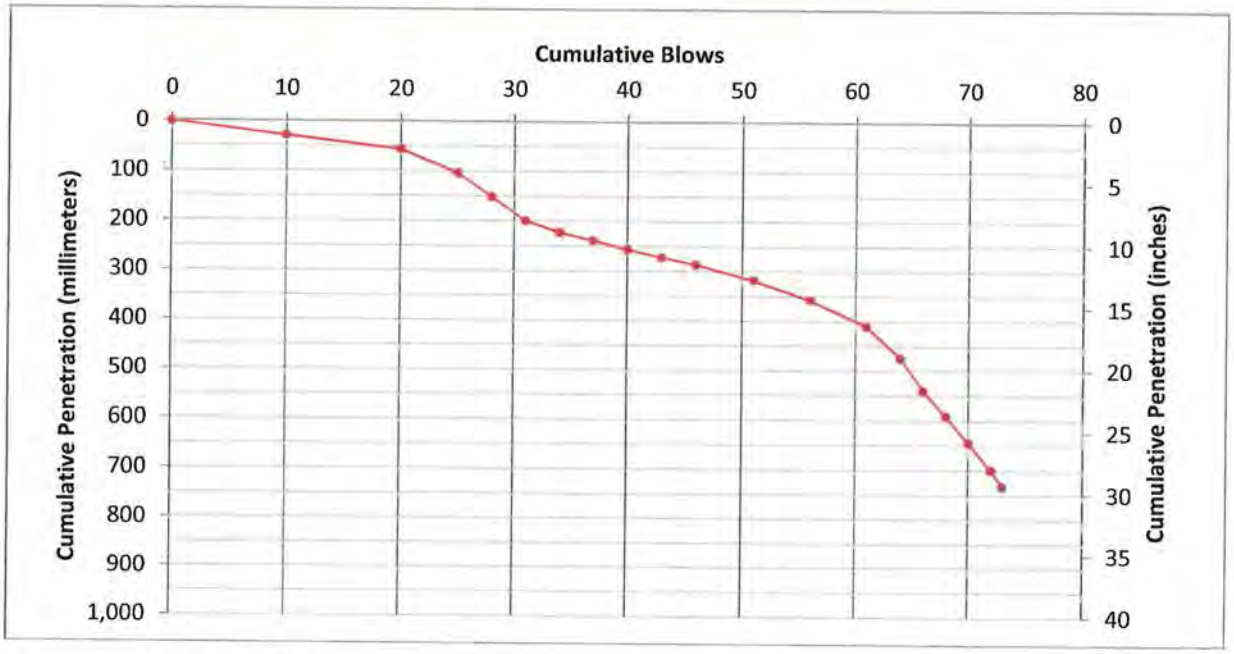
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-5

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	2.8	0.62	20,300
2	Subgrade below AC and aggregate base	7.5	0.35	7,800
3	Subgrade below AC and aggregate base	15.3	0.35	5,900



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

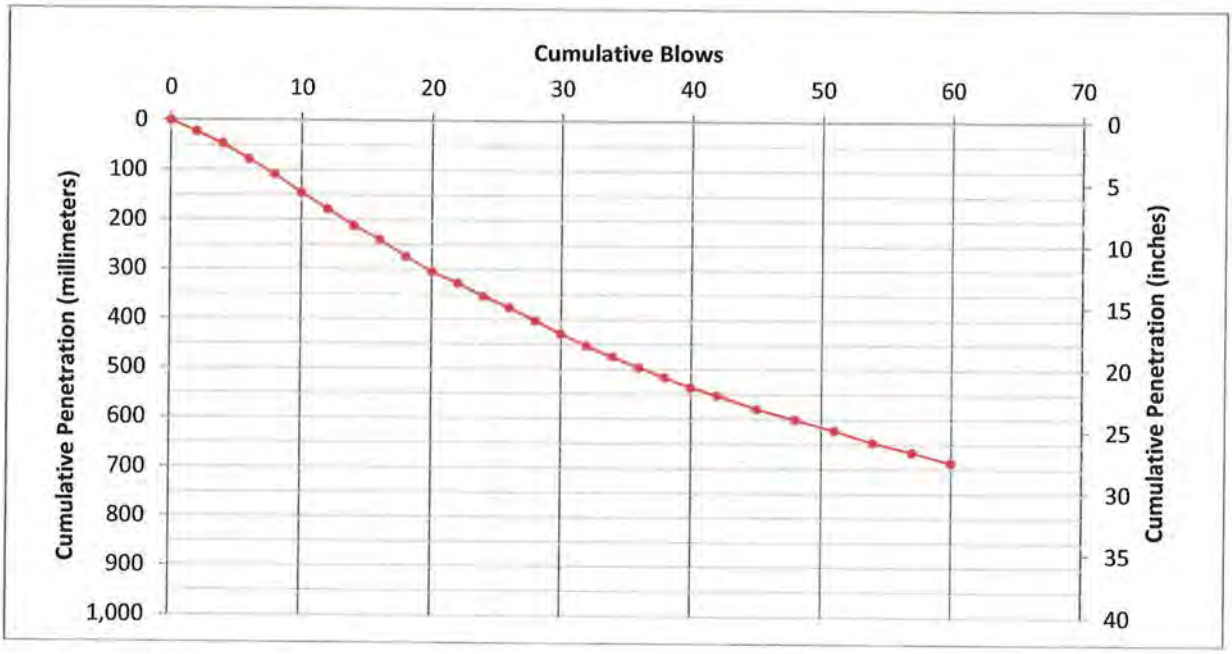
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-6

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Subgrade below AC and aggregate base	15.6	0.35	5,900
2	Subgrade below AC and aggregate base	9.4	0.35	7,200
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

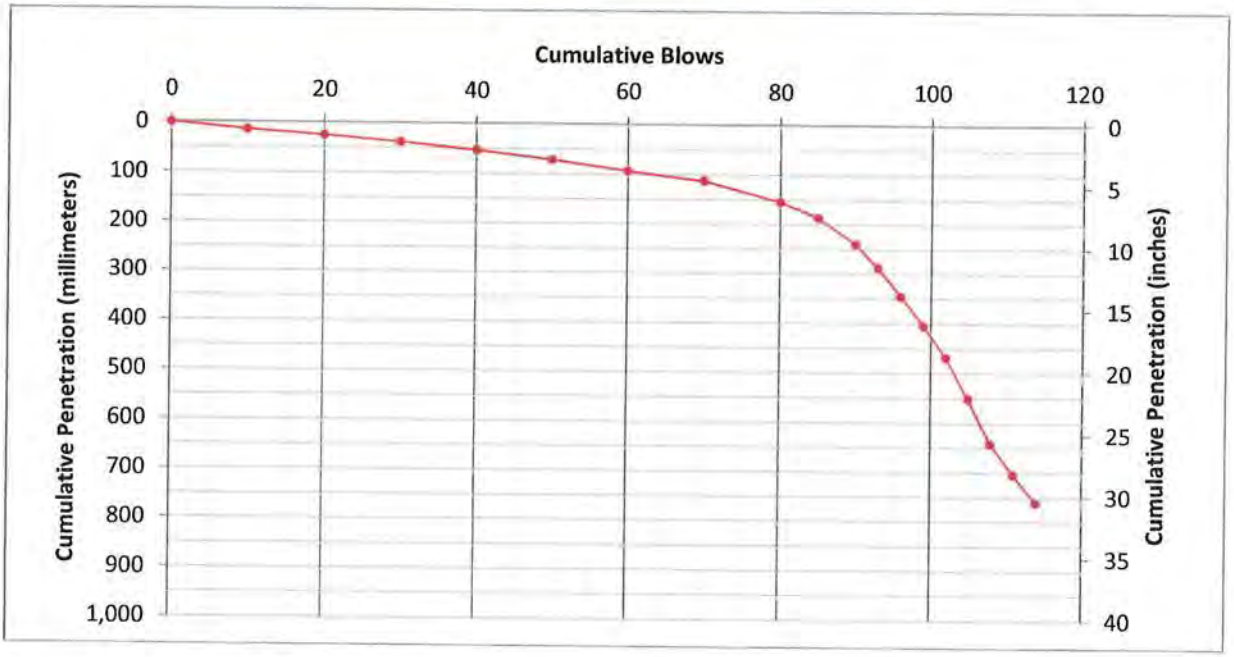
References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

DYNAMIC CONE PENETROMETER RESULTS - BORING C-7

Layer	Layer Type and Location	Slope (mm/blow)	C_f	M_R (psi)
1	Aggregate base or subbase below AC	1.8	0.62	24,200
2	Subgrade below AC and aggregate base	22.7	0.35	5,100
3			---	---



$M_R = C_f \times 49023 \times S^{-0.39}$

M_R = resilient modulus (pounds per square inch)

C_f = conversion coefficient

S = slope (millimeters per blow)

References:

ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, April 2011.

Jianzhou Chen, Mustaque Hossain, and Todd M. LaTorella, "Use of Falling Weight Deflectometer and Dynamic Cone Penetrometer in Pavement Evaluation," *Paper No. 99-1007*, Transportation Research Record 1655, pp 145-151, Transporation Research Board, Washington, D.C., 1999.

ATTACHMENT C

TABLE C-1
ESAL Calculation: Division Street
Traffic volumes according to information provided by Quality Counts, LLC (2014)

Year of Traffic Count	2014	**Pavement Type**	Flexible
Average Daily Traffic	5,089	**Year Pavement Put Into Service**	2017
One-way or Two-way	Two-way	**Lane Distribution Factor**	100
Linear Growth Rate (%)	2.00	**Percent Heavy Trucks**	5.8

FHWA Classification	Average Daily Traffic by Classification in 2014	Conversion Factor	ESALs in 2014
4	12.7225	123	1,565
5	239.183	52	12,438
6	27.9895	142	3,975
7	1	378.5	379
8	7	126.5	886
9	3	233	699
10	3	280.5	842
11	0	301.5	0
12	0	273	0
13	0	518.5	0
	Total ESALs in 2014		20,781

Year	ESALs	Cumulative ESALs	Year	ESALs	Cumulative ESALs
2017 (1)	22,028	22,028	2042 (26)	32,419	707,814
2018 (2)	22,444	44,472	2043 (27)	32,835	740,649
2019 (3)	22,860	67,332	2044 (28)	33,250	773,899
2020 (4)	23,275	90,607	2045 (29)	33,666	807,565
2021 (5)	23,691	114,298	2046 (30)	34,081	841,646
2022 (6)	24,106	138,404	2047 (31)	34,497	876,144
2023 (7)	24,522	162,926	2048 (32)	34,913	911,056
2024 (8)	24,938	187,864	2049 (33)	35,328	946,385
2025 (9)	25,353	213,217	2050 (34)	35,744	982,129
2026 (10)	25,769	238,986	2051 (35)	36,160	1,018,288
2027 (11)	26,185	265,171	2052 (36)	36,575	1,054,863
2028 (12)	26,600	291,771	2053 (37)	36,991	1,091,854
2029 (13)	27,016	318,787	2054 (38)	37,407	1,129,261
2030 (14)	27,431	346,218	2055 (39)	37,822	1,167,083
2031 (15)	27,847	374,065	2056 (40)	38,238	1,205,321
2032 (16)	28,263	402,328	2057 (41)	38,653	1,243,974
2033 (17)	28,678	431,006	2058 (42)	39,069	1,283,043
2034 (18)	29,094	460,100	2059 (43)	39,485	1,322,528
2035 (19)	29,510	489,610	2060 (44)	39,900	1,362,428
2036 (20)	29,925	519,535	2061 (45)	40,316	1,402,744
2037 (21)	30,341	549,876	2062 (46)	40,732	1,443,476
2038 (22)	30,756	580,632	2063 (47)	41,147	1,484,623
2039 (23)	31,172	611,804	2064 (48)	41,563	1,526,185
2040 (24)	31,588	643,392	2065 (49)	41,978	1,568,164
2041 (25)	32,003	675,395	2066 (50)	42,394	1,610,558

2-Year ESALs	15-Year ESALs	20-Year ESALs	30-Year ESALs	40-Year ESALs	50-Year ESALs
45,000	375,000	520,000	842,000	1,206,000	1,611,000

TABLE C-2
ESAL Calculation: 15th Street
Traffic volumes according to information provided by Quality Counts, LLC (2014)

Year of Traffic Count	2014	**Pavement Type**	Flexible
Average Daily Traffic	2,966	**Year Pavement Put Into Service**	2017
One-way or Two-way	Two-way	**Lane Distribution Factor**	100
Linear Growth Rate (%)	2.00	**Percent Heavy Trucks**	4.1

FHWA Classification	Average Daily Traffic by Classification in 2014	Conversion Factor	ESALs in 2014
4	6	123	738
5	94	52	4,888
6	16	142	2,272
7	0	378.5	0
8	4	126.5	506
9	2	233	466
10	1	280.5	281
11	0	301.5	0
12	0	273	0
13	0	518.5	0
	Total ESALs in 2014		9,151

Year	ESALs	Cumulative ESALs	Year	ESALs	Cumulative ESALs
2017 (1)	9,700	9,700	2042 (26)	14,275	311,666
2018 (2)	9,883	19,582	2043 (27)	14,458	326,124
2019 (3)	10,066	29,648	2044 (28)	14,641	340,765
2020 (4)	10,249	39,896	2045 (29)	14,824	355,588
2021 (5)	10,432	50,328	2046 (30)	15,007	370,595
2022 (6)	10,615	60,942	2047 (31)	15,190	385,785
2023 (7)	10,798	71,740	2048 (32)	15,373	401,158
2024 (8)	10,981	82,721	2049 (33)	15,556	416,714
2025 (9)	11,164	93,884	2050 (34)	15,739	432,453
2026 (10)	11,347	105,231	2051 (35)	15,922	448,375
2027 (11)	11,530	116,760	2052 (36)	16,105	464,479
2028 (12)	11,713	128,473	2053 (37)	16,288	480,767
2029 (13)	11,896	140,369	2054 (38)	16,471	497,238
2030 (14)	12,079	152,447	2055 (39)	16,654	513,892
2031 (15)	12,262	164,709	2056 (40)	16,837	530,729
2032 (16)	12,445	177,154	2057 (41)	17,020	547,749
2033 (17)	12,628	189,781	2058 (42)	17,203	564,952
2034 (18)	12,811	202,592	2059 (43)	17,386	582,338
2035 (19)	12,994	215,586	2060 (44)	17,569	599,907
2036 (20)	13,177	228,763	2061 (45)	17,752	617,659
2037 (21)	13,360	242,122	2062 (46)	17,935	635,594
2038 (22)	13,543	255,665	2063 (47)	18,118	653,712
2039 (23)	13,726	269,391	2064 (48)	18,301	672,013
2040 (24)	13,909	283,299	2065 (49)	18,484	690,497
2041 (25)	14,092	297,391	2066 (50)	18,667	709,164

2-Year ESALs	15-Year ESALs	20-Year ESALs	30-Year ESALs	40-Year ESALs	50-Year ESALs
20,000	165,000	229,000	371,000	531,000	710,000

TABLE C-3
ESAL Calculation: 16th Street
Traffic volumes according to information provided by Quality Counts, LLC (2014)

Year of Traffic Count	2014	**Pavement Type**	Flexible
Average Daily Traffic	358	**Year Pavement Put Into Service**	2017
One-way or Two-way	Two-way	**Lane Distribution Factor**	100
Linear Growth Rate (%)	2.00	**Percent Heavy Trucks**	19.3

FHWA Classification	Average Daily Traffic by Classification in 2014	Conversion Factor	ESALs in 2014
4	52	123	6,396
5	10	52	520
6	7	142	994
7	0	378.5	0
8	0	126.5	0
9	0	233	0
10	0	280.5	0
11	0	301.5	0
12	0	273	0
13	0	518.5	0
	Total ESALs in 2014		7,910

Year	ESALs	Cumulative ESALs	Year	ESALs	Cumulative ESALs
2017 (1)	8,385	8,385	2042 (26)	12,340	269,415
2018 (2)	8,543	16,927	2043 (27)	12,498	281,912
2019 (3)	8,701	25,628	2044 (28)	12,656	294,568
2020 (4)	8,859	34,488	2045 (29)	12,814	307,383
2021 (5)	9,017	43,505	2046 (30)	12,972	320,355
2022 (6)	9,176	52,681	2047 (31)	13,131	333,486
2023 (7)	9,334	62,014	2048 (32)	13,289	346,774
2024 (8)	9,492	71,506	2049 (33)	13,447	360,221
2025 (9)	9,650	81,157	2050 (34)	13,605	373,827
2026 (10)	9,808	90,965	2051 (35)	13,763	387,590
2027 (11)	9,967	100,932	2052 (36)	13,922	401,512
2028 (12)	10,125	111,056	2053 (37)	14,080	415,591
2029 (13)	10,283	121,339	2054 (38)	14,238	429,829
2030 (14)	10,441	131,781	2055 (39)	14,396	444,226
2031 (15)	10,599	142,380	2056 (40)	14,554	458,780
2032 (16)	10,758	153,138	2057 (41)	14,713	473,493
2033 (17)	10,916	164,053	2058 (42)	14,871	488,363
2034 (18)	11,074	175,127	2059 (43)	15,029	503,392
2035 (19)	11,232	186,360	2060 (44)	15,187	518,580
2036 (20)	11,390	197,750	2061 (45)	15,345	533,925
2037 (21)	11,549	209,299	2062 (46)	15,504	549,429
2038 (22)	11,707	221,005	2063 (47)	15,662	565,090
2039 (23)	11,865	232,870	2064 (48)	15,820	580,910
2040 (24)	12,023	244,894	2065 (49)	15,978	596,889
2041 (25)	12,181	257,075	2066 (50)	16,136	613,025

2-Year ESALs	15-Year ESALs	20-Year ESALs	30-Year ESALs	40-Year ESALs	50-Year ESALs
17,000	143,000	198,000	321,000	459,000	614,000

ATTACHMENT D

1993 AASHTO FLEXIBLE PAVEMENT DESIGN

Job ID:	Providence-63-04		Division Street
Date:	22-Dec-16		Oregon City, Oregon
Design life (years) =	20		

INPUTS FOR STRUCTURAL NUMBER (SN) CALCULATIONS

Variable	Value	Reference	Coefficient	Value	Reference
S_0 =	0.49	I-62, III-51	m_2 (Base) =	1.00	II-26
Subgrade M_R =	5,800	I-14	m_3 (Subbase) =	1.00	II-26
p_0 =	4.2	II-12	a_1 (AC) =	0.42	II-19
p_t =	2.5	II-12	a_2 (Base) =	0.10	II-20
ΔPSI =	1.7	II-12	a_3 (Subbase) =	0.08	II-20
Design ESALs =	520,000				

MINIMUM ASPHALT CONCRETE THICKNESS

Base Rock M_R= 20,000 psi

	Reconstructed	not used	not used	not used
Reliability (Ref II-9)	90	90	90	90
Z_R	-1.282	-1.282	-1.282	-1.282
ESALs	520,000	520,000	520,000	520,000
SN estimate	2.178	2.178	2.178	2.178
ESALs from SN est.	520,000	520,000	520,000	520,000
FINAL SN =	2.18	2.18	2.18	2.18
Min AC Thickness	5.19	5.19	5.19	5.19

	Reconstructed	not used	not used	not used
Resilient Modulus	5,800	5,800	5,800	5,800
ESALs	520,000	520,000	520,000	520,000
SN estimate	3.509	3.509	3.509	3.509
ESALs from SN est.	520,000	520,000	520,000	520,000
FINAL SN =	3.51	3.51	3.51	3.51

If LOCK AC is set to "1", the Calc AC button will not change AC thickness value

NEW PAVEMENT ANALYSIS

LOCK AC: 0

New Pavement, Reconstructed — 520,000 ESALs

$SN=a_1 \times D_1 + a_2 \times D_2 \times m_2 + a_3 \times D_3 \times m_3$

Coefficient	Value	Ref	Thickness	SN	Total SN
m_2 (Base)	1.00	II-26			
m_3 (Subbase)	1.00	II-26			
a_1 (AC)	0.42	II-19	6.0	2.52	2.52
a_2 (Base)	0.10	II-20	10.0	1.00	3.52
a_3 (Subbase)	0.08	II-20	0.0	0.00	3.52
Total Thickness			16.00		

1993 AASHTO FLEXIBLE PAVEMENT DESIGN

Job ID:	Providence-63-04	15th Street	
Date:	23-Dec-16	Oregon City, Oregon	
Design life (years) =	20		

INPUTS FOR STRUCTURAL NUMBER (SN) CALCULATIONS

Variable	Value	Reference	Coefficient	Value	Reference
S_0 =	0.49	I-62, III-51	m_2 (Base) =	1.00	II-26
Subgrade M_R =	5,800	I-14	m_3 (Subbase) =	1.00	II-26
p_0 =	4.2	II-12	a_1 (AC) =	0.42	II-19
p_t =	2.5	II-12	a_2 (Base) =	0.10	II-20
ΔPSI =	1.7	II-12	a_3 (Subbase) =	0.08	II-20
Design ESALs =	229,000				

MINIMUM ASPHALT CONCRETE THICKNESS

Base Rock M_R= 20,000 psi

	Reconstructed	not used	not used	not used
Reliability (Ref II-9)	90	90	90	90
Z_R	-1.282	-1.282	-1.282	-1.282
ESALs	229,000	229,000	229,000	229,000
SN estimate	1.895	1.895	1.895	1.895
ESALs from SN est.	229,000	229,000	229,000	229,000
FINAL SN =	1.90	1.90	1.90	1.90
Min AC Thickness	4.52	4.52	4.52	4.52

	Reconstructed	not used	not used	not used
Resilient Modulus	5,800	5,800	5,800	5,800
ESALs	229,000	229,000	229,000	229,000
SN estimate	3.065	3.065	3.065	3.065
ESALs from SN est.	229,000	229,000	229,000	229,000
FINAL SN =	3.07	3.07	3.07	3.07

If LOCK AC is set to "1", the Calc AC button will not change AC thickness value

NEW PAVEMENT ANALYSIS

LOCK AC
0

New Pavement, Reconstructed — 229,000 ESALs

$SN=a_1 \times D_1 + a_2 \times D_2 \times m_2 + a_3 \times D_3 \times m_3$

Coefficient	Value	Ref	Thickness	SN	Total SN
m_2 (Base)	1.00	II-26			
m_3 (Subbase)	1.00	II-26			
a_1 (AC)	0.42	II-19	5.0	2.10	2.10
a_2 (Base)	0.10	II-20	10.0	1.00	3.10
a_3 (Subbase)	0.08	II-20	0.0	0.00	3.10
Total Thickness			15.00		

1993 AASHTO FLEXIBLE PAVEMENT DESIGN

Job ID:	Providence-63-04		16th Street
Date:	22-Dec-16		Oregon City, Oregon
Design life (years) =	20		

INPUTS FOR STRUCTURAL NUMBER (SN) CALCULATIONS

Variable	Value	Reference	Coefficient	Value	Reference
S_0 =	0.49	I-62, III-51	m_2 (Base) =	1.00	II-26
Subgrade M_R =	5,800	I-14	m_3 (Subbase) =	1.00	II-26
p_0 =	4.2	II-12	a_1 (AC) =	0.42	II-19
p_t =	2.5	II-12	a_2 (Base) =	0.10	II-20
ΔPSI =	1.7	II-12	a_3 (Subbase) =	0.08	II-20
Design ESALs =	198,000				

MINIMUM ASPHALT CONCRETE THICKNESS

Base Rock M_R= 20,000 psi

	Reconstructed	not used	not used	not used
Reliability (Ref II-9)	90	90	90	90
Z_R	-1.282	-1.282	-1.282	-1.282
ESALs	198,000	198,000	198,000	198,000
SN estimate	1.849	1.849	1.849	1.849
ESALs from SN est.	198,000	198,000	198,000	198,000
FINAL SN =	1.85	1.85	1.85	1.85
Min AC Thickness	4.40	4.40	4.40	4.40

	Reconstructed	not used	not used	not used
Resilient Modulus	5,800	5,800	5,800	5,800
ESALs	198,000	198,000	198,000	198,000
SN estimate	2.992	2.992	2.992	2.992
ESALs from SN est.	198,000	198,000	198,000	198,000
FINAL SN =	3.00	3.00	3.00	3.00

If LOCK AC is set to "1", the Calc AC button will not change AC thickness value

NEW PAVEMENT ANALYSIS

New Pavement, Reconstructed			198,000 ESALs		LOCK AC
Coefficient	Value	Ref	$SN=a_1 \times D_1+a_2 \times D_2 \times m_2+a_3 \times D_3 \times m_3$		0
m_2 (Base)	1.00	II-26			
m_3 (Subbase)	1.00	II-26	Thickness	SN	Total SN
a_1 (AC)	0.42	II-19	5.0	2.10	2.10
a_2 (Base)	0.10	II-20	9.0	0.90	3.00
a_3 (Subbase)	0.08	II-20	0.0	0.00	3.00
Total Thickness			14.00		

LEGEND

- EXISTING SIDEWALK POTENTIALLY SAVED
- PROPOSED NEW CURB LINE
- PHASE 1 - PROPOSED SAWCUT AND PAVEMENT RESTORATION, MINIMUM DEPTH
- PHASE 2 - PROPOSED SAWCUT AND PAVEMENT RESTORATION, FULL-DEPTH
- PHASE 2 - MILL DOWN (GRIND) AND RE-PAVE 2" OF PHASE 1 PAVEMENT AT TIME OF PHASE 2 PAVING TO CREATE A SEAMLESS FINAL PAVED STREET SURFACE

EXISTING 4' SIDEWALK DOES NOT MEET CITY STREET SECTION (6')

PROPOSED SAWCUT LINE

EXISTING 4' SIDEWALK DOES NOT MEET CITY STREET SECTION (6')

PAVEMENT RESTORATION AREA

PROPOSED SIDEWALK

PROPOSED DRIVEWAY

PROPOSED CURB AND GUTTER

15TH ST

EXISTING 4' SIDEWALK DOES NOT MEET CITY STREET SECTION (6')

PROPOSED SIDEWALK

PROPOSED SIDEWALK

PROPOSED BUILDING
FFE=272.00

PROPOSED CURB AND GUTTER

PROPOSED SIDEWALK

PROPOSED 6' BIKE LANE

PAVEMENT RESTORATION AREA

PROPOSED CURB AND GUTTER

PROPOSED 6' BIKE LANE

PROPOSED SIDEWALK

PAVEMENT RESTORATION AREA

DIVISION ST

PROPOSED DRIVEWAY

PROPOSED SIDEWALK

PAVEMENT RESTORATION AREA

PROPOSED CURB REPAIR

16TH ST

PROPOSED SAWCUT LINE

PROPOSED 6' BIKE LANE

A

B

C

D

SEE DIVISION ST, 15TH ST AND 16TH ST TYPICAL SECTION ON FOLLOWING SHEETS

20 0 20 40
SCALE IN FEET

REV	DATE	REVISIONS DESCRIPTION	BY

DOWL
WWW.DOWL.COM
720 SW Washington Street, #750
Portland, Oregon 97205
971-280-8641

PROVIDENCE MOB OREGON CITY
OREGON CITY, OREGON

STREET RESTORATION EXHIBIT

PROJECT 14211-01
DATE 02/24/2017

SHEET
EX 1.0