PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

Bull Run TREATMENT PROJECTS

Filtration

Technical Memorandum

Subject:	Truck Turning Paths at Multnomah County Intersections
PWB Project #s:	W02229
Date:	September 5, 2023
To:	Michelle Cheek, P.E., Deputy Program Manager Portland Water Bureau
From:	Mark Graham, P.E., PMP Project Manager Stantec
Prepared by:	Mark Graham, P.E., PMP Stantec
	Rafael Gaeta, P.E. Emerio Design
Reviewed by:	Matt Perkins, P.E. Stantec

Stantec in association with carollo and other firms

EMERIO

Exhibit J.88

Construction of the Bull Run Filtration Facility (Facility) will require that large construction vehicles connect from the Facility site to the regional transportation network, specifically to Dodge Park Boulevard via Carpenter Lane and Cottrell Road, as shown in Figure 1. An evaluation of this route determined that the intersections at Carpenter Lane and Cottrell Road and at Cottrell Road and Dodge Park Boulevard would benefit from improvements to facilitate safer turning movements through these intersections by Facility construction traffic. All of these proposed improvements exceed Multnomah County standards.

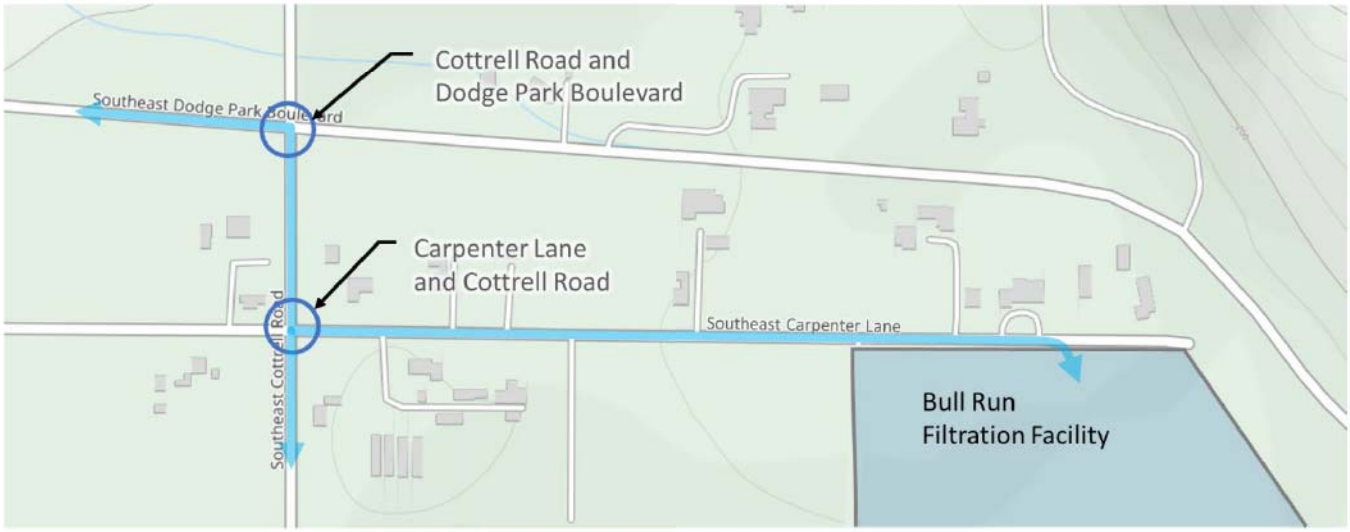


Figure 1. Truck Route from Facility to Dodge Park Boulevard and Cottrell Road

As shown in the figures included in Attachment A, improvements to these intersections are proposed which achieve the following design criteria.

- Intersections are designed for or will accommodate a WB-50 tractor-trailer combination. This is the largest truck that will be used for the project during or after construction without special oversized load procedures, such as flaggers. Such oversized loads will be rarely needed for the project, for specialized items like crane segments. Other truck combinations, such as a dump truck with a trailer (also known as a "pup"), have tighter turning paths, as shown on the enclosed drawings. The vast majority of trucks for the project will be a dump truck with trailer ("pup"). Because the design can accommodate the WB-50 tractor-trailer combination, it will be able to accommodate safe movements by all other truck combinations that will be used for the project, other than those with special oversized load safety procedures.
- Turn paths stay entirely within the existing right-of-way and on paving or gravel shoulders, with a minimum of 1 ft. clearance between the turn path and the outside edge of the shoulder.
- Turn paths avoid vertical obstructions (e.g., walls or poles) with a minimum 2 ft. clearance.
- Trucks turning from Dodge Park Boulevard onto Cottrell Road will not queue on Dodge Park Boulevard while waiting for vehicles stopped on Cottrell Road to clear the intersection. Intersection improvements will allow trucks to turn from eastbound Dodge Park Boulevard onto southbound Cottrell Road without entering into the westbound lane on Dodge Park Boulevard or the northbound lane on Cottrell Road.
- Intersection improvements meet all County sight distance requirements. For example, at the intersection of Dodge Park Boulevard and Cottrell Road, the construction of a retaining wall, regrading at the intersection, and removal of vegetation on the south side of Dodge Park Boulevard will increase sight distances for vehicles stopped northbound on Cottrell Road. This will allow trucks turning from northbound Cottrell Road

onto Dodge Park Boulevard an unobstructed view of traffic on Dodge Park Boulevard – both east and west – well before entering the intersection.

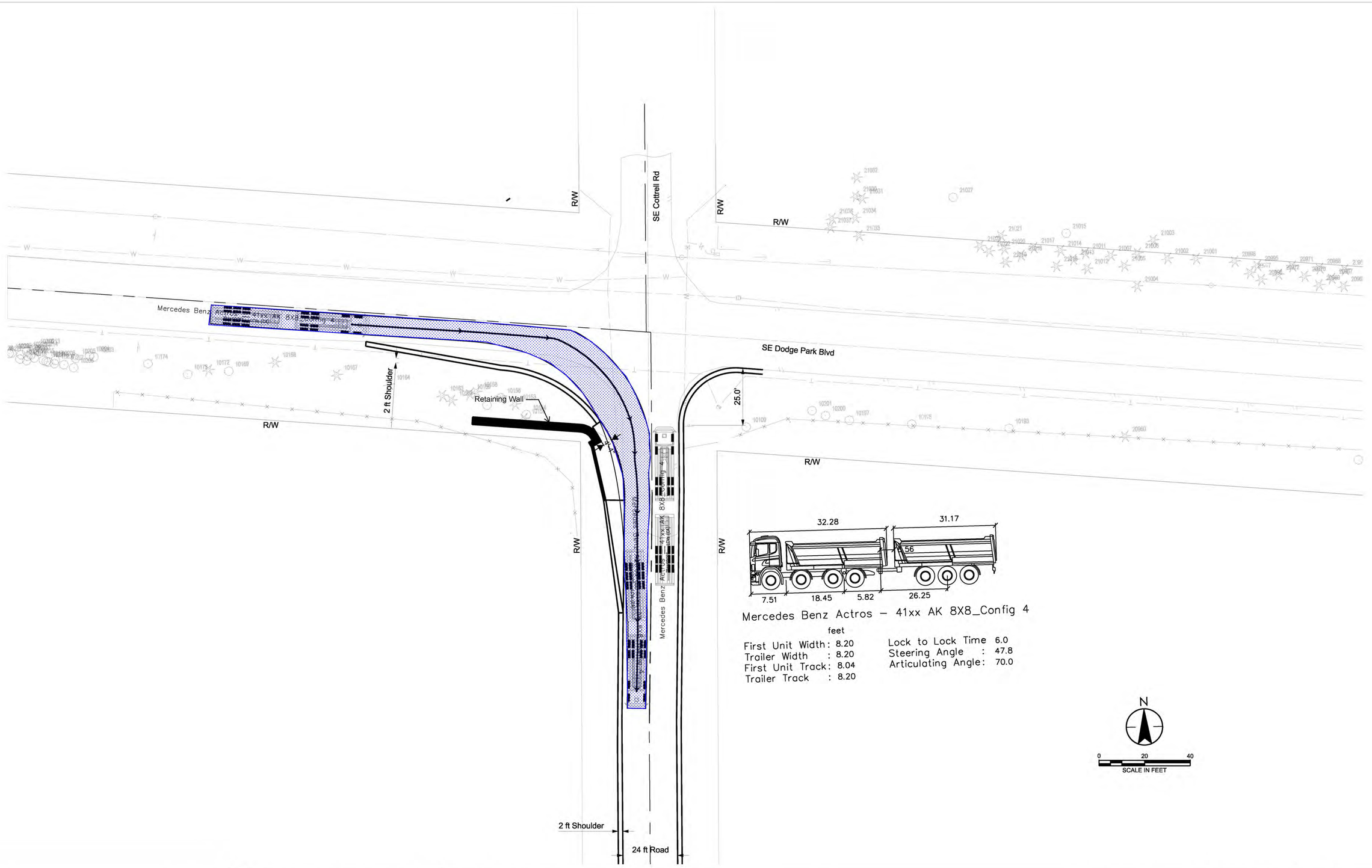
- Dump trucks with trailers ("pups") can turn along haul routes without entering into a conflicting travel lane.

Table 1. Turning Diagrams (Attachment A)	
Drawing Number	**Drawing Name**
LU-T-01	Turn Path – EB Dodge Park Boulevard to SB Cottrell Road
LU-T-02	Turn Path – NB Cottrell Road to WB Dodge Park Boulevard
LU-T-03	Turn Path – SB Cottrell Road to EB Carpenter Lane
LU-T-04	Turn Path – WB Carpenter Lane to NB Cottrell Road
LU-T-05	Turn Path – WB Carpenter Lane to SB Cottrell Road
LU-T-06	Turn Path – NB Cottrell Road to EB Carpenter Lane

Grading and paving improvements to accommodate the turning paths described above are shown in the drawings attached as Attachment B and listed in Table 2. At the intersection of Dodge Park Boulevard and Cottrell Road, a retaining wall on the southwest corner of the intersection is required to accommodate the increased turning radius. Details of this retaining wall are also included in Attachment B.

Table 2. Intersection Paving and Grading Drawings (Attachment B)	
Drawing Number	**Drawing Name**
02-C-301	Intersection Improvements – Dodge Park and Cottrell
02-C-302	Intersection Improvements – Cottrell and Carpenter
02-C-441	Retaining Wall Plan and Profile

Attachment A: Turning Diagrams



Mercedes Benz Actros – 41xx AK 8X8_Config 4

	feet		
First Unit Width	8.20	Lock to Lock Time	6.0
Trailer Width	8.20	Steering Angle	47.8
First Unit Track	8.04	Articulating Angle	70.0
Trailer Track	8.20		

$$$$FILENAME$$$$

$$$$USER$$$$

$$$$DATE$$$$

No	Date	Description	Appd
Revision			
Survey			

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Designed By	Design Mgr	LSH
Drawn By	Const Mgr	TG
Checked By	Const Supvr	RM
Project Mgr	Date	MRG

Warning

0 ½ 1

If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683

Date

CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

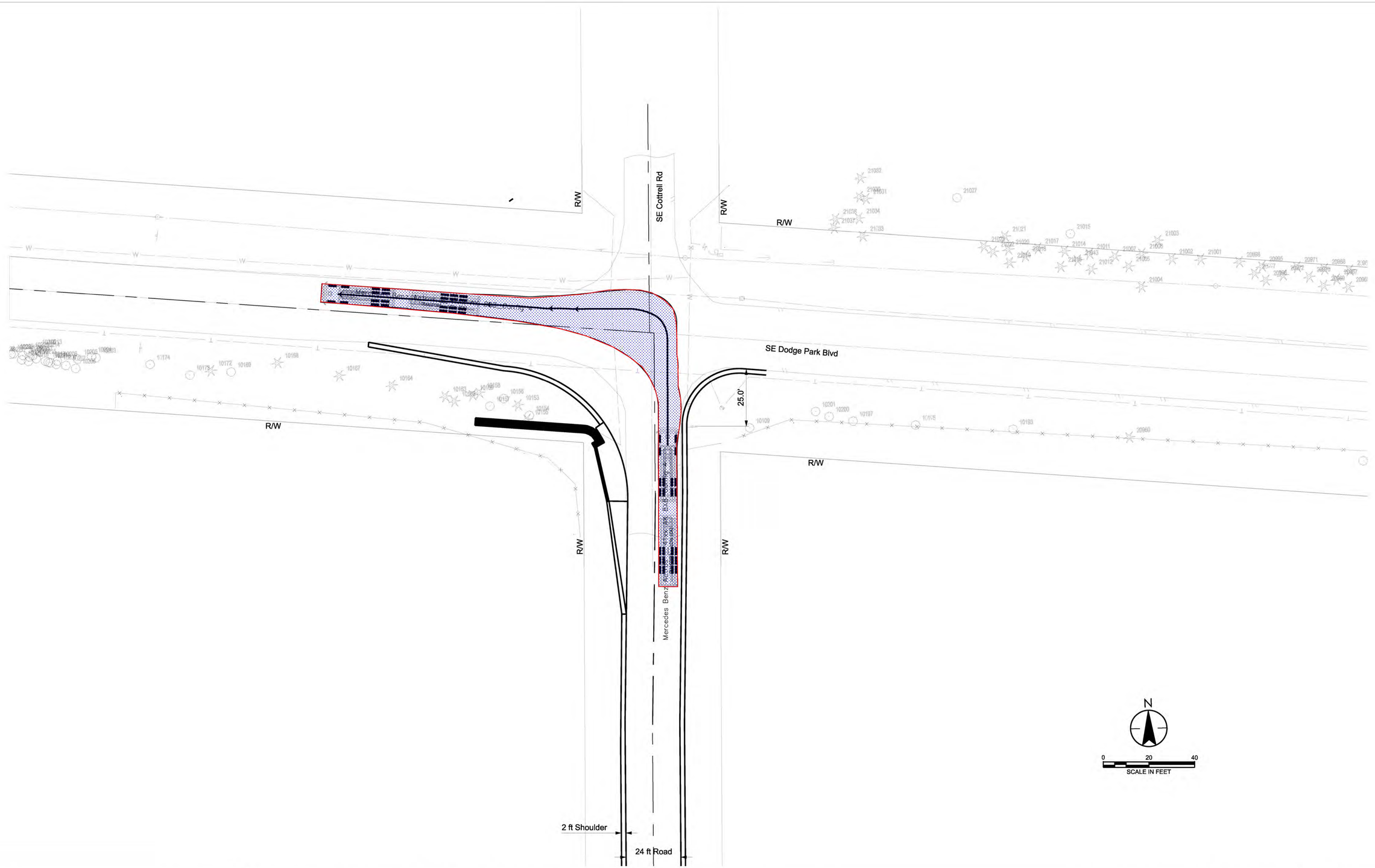
Civil

AutoTurn Exhibit
Turning Path
EB Dodge Park Boulevard to SB Cottrell Road

SAP Project No
W02229

1/4 Section
3765 / 3766

Sheet No
LU-T-01



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David W. Peters, Engineering Manager, PE No 16683

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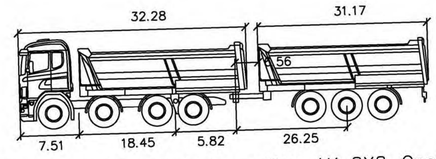
Civil

AutoTurn Exhibit
Turn Path
NB Cottrell Road to WB Dodge Park Boulevard

SAP Project No	W02229
1/4 Section	3765 / 3766
Sheet No	LU-T-02



Mercedes Benz Actros – 41xx AK 8X8_Config 4

	feet		
First Unit Width	8.20	Lock to Lock Time	6.0
Trailer Width	8.20	Steering Angle	47.8
First Unit Track	8.04	Articulating Angle	70.0
Trailer Track	8.20		

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$$$$DATE$$$$

No	Date	Description	Appd
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Date

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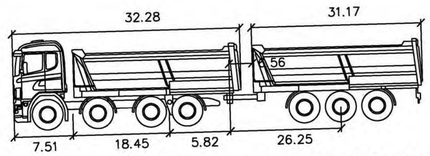
Bull Run Filtration Facility

Civil

AutoTurn Exhibit
Turning Path
SB Cottrell Road to EB Carpenter Lane

SAP Project No	W02229
1/4 Section	3765 / 3766
Sheet No	LU-T-03



Mercedes Benz Actros – 41xx AK 8X8_Config 4

	feet		
First Unit Width	8.20	Lock to Lock Time	6.0
Trailer Width	8.20	Steering Angle	47.8
First Unit Track	8.04	Articulating Angle	70.0
Trailer Track	8.20		

60 ft R/W

28 ft Road

SE Cottrell Rd

16 ft Shoulder

R/W

R/W

R/W

R/W

Relocate Utility Pole(s)

Edge of Pavement

Stop Bar

Painted Median

SE Carpenter Ln

6 ft Shoulder

24 ft Road

6 ft Shoulder

60 ft R/W

N

0 20 40

SCALE IN FEET

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Checked By		Const Supvr	RM
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David W. Peters, Engineering Manager, PE No 16683

Date

CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

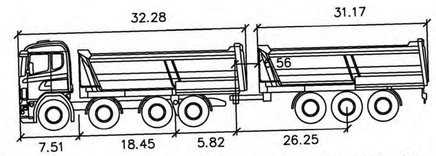
Civil

AutoTurn Exhibit
Turning Path
WB Cottrell Road to NB Carpenter Lane

SAP Project No
W02229

1/4 Section
3765 / 3766

Sheet No
LU-T-04



Mercedes Benz Actros – 41xx AK 8X8_Config 4

	feet		
First Unit Width	8.20	Lock to Lock Time	6.0
Trailer Width	8.20	Steering Angle	47.8
First Unit Track	8.04	Articulating Angle	70.0
Trailer Track	8.20		

60 ft R/W

28 ft Road

16 ft Shoulder

SE Cottrell Rd

R/W

R/W

R/W

Edge of Pavement

Relocate Utility Pole(s)

8X8_Config_4

6 ft Shoulder

24 ft Road

60 ft R/W

SE Carpenter Ln

6 ft Shoulder

Stop Bar

R/W

Painted Median

R/W

Mercedes Benz Actros – 41xx AK 8X8_Config 4

N

0 20 40

SCALE IN FEET

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$$$$USER$$$$

$$$$DATE$$$$

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Revision			
Survey			

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Drawn By	Const Mgr	TG
Checked By	Const Supvr	RM
Project Mgr	Date	MRG

Warning

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David W. Peters, Engineering Manager, PE No 16683

Date

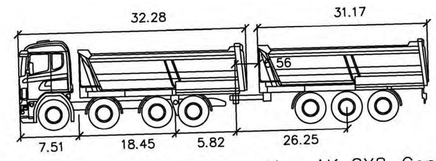
CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

Civil

AutoTurn Exhibit
Turn Path
WB Carpenter Lane to SB Cottrell Road

SAP Project No	
W02229	
1/4 Section	
3765 / 3766	
Sheet No	
LU-T-05	



Mercedes Benz Actros – 41xx AK 8X8_Config 4

	feet		
First Unit Width	8.20	Lock to Lock Time	6.0
Trailer Width	8.20	Steering Angle	47.8
First Unit Track	8.04	Articulating Angle	70.0
Trailer Track	8.20		

60 ft R/W

28 ft Road

16 ft Shoulder

SE Cottrell Rd

R/W

R/W

R/W

R/W

Relocate Utility Pole(s)

Painted Median

Stop Bar

8X8_Config 4

6 ft Shoulder

24 ft Road

60 ft R/W

6 ft Shoulder

SE Carpenter Ln

Edge of Pavement

Edge of Pavement

Mercedes Benz Actros – 41xx AK 8X8_Config 4

N

0 20 40

SCALE IN FEET

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No	Date	Description	Appd
		Revision	
Survey			

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Checked By	Const Supvr	RM
Project Mgr	Date	MRG

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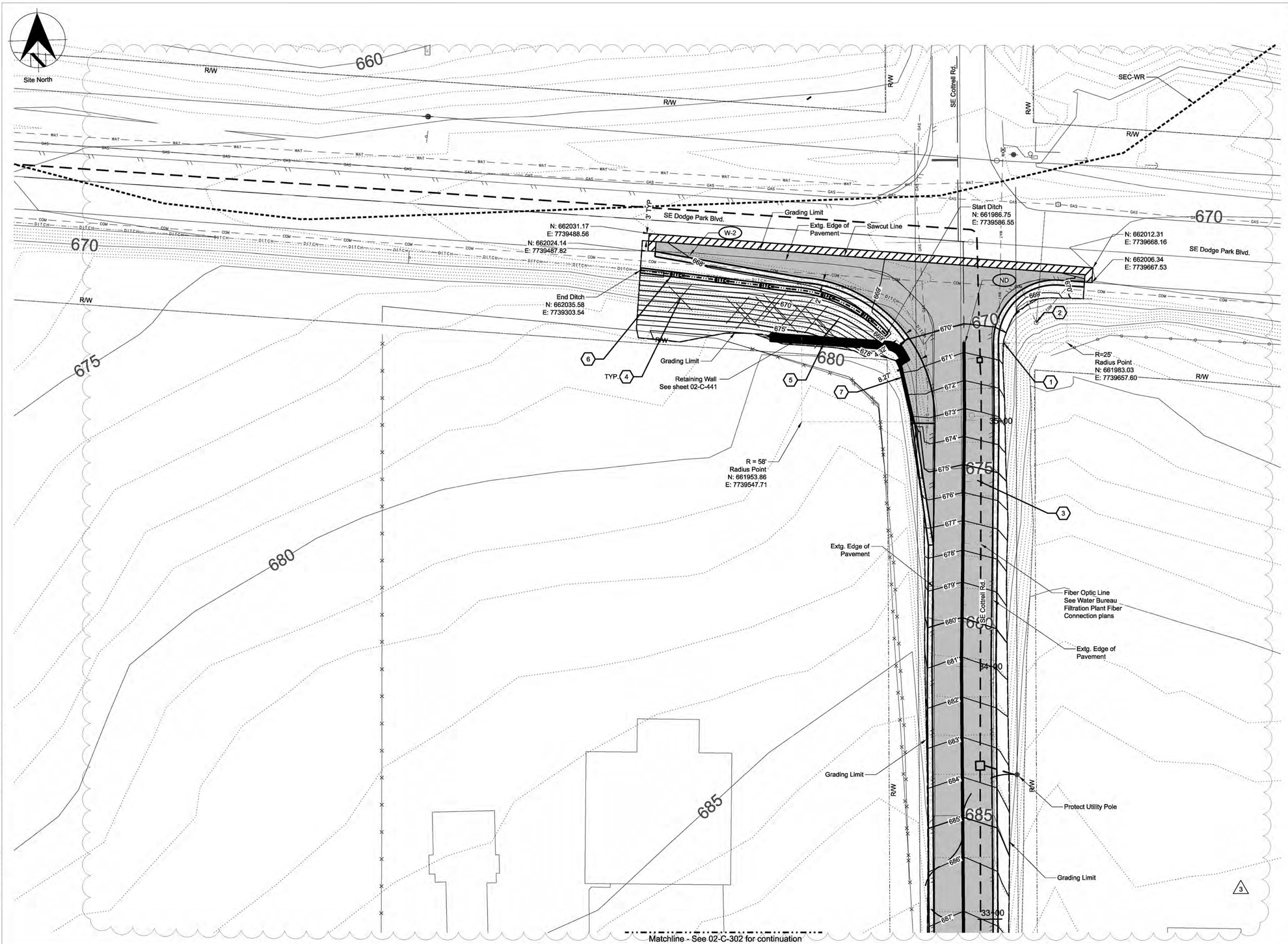
Bull Run Filtration Facility

Civil

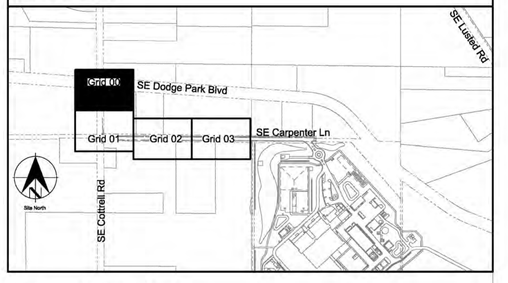
AutoTurn Exhibit
Turn Path
NB Cottrell Road to EB Carpenter Lane

SAP Project No	1/4 Section	Sheet No
W02229	3765 / 3766	LU-T-06

Attachment B: Intersection Grading and Paving Plans



KEY PLAN



General Sheet Notes

1. See sheet GEN-C-301 for survey control information.
2. See sheets 02-C-901 & 02-C-902 for typical roadway section.
3. See sheet 02-C-400 through 02-C-437 for roadway plan and profile.

Sheet Keynotes

1. Remove and Reinstall sign after work. During construction provide temporary sign.
2. Protect existing transformer.
3. Asphalt roadway, see detail D/02-C-902.
4. Remove tree (10 total).
5. Modular block retaining wall per C-110 on sheet GEN-C-903.
6. Roadside ditch per C-170 on sheet GEN-C-922.
7. Soldier pile wall per C-220 to C-222 on sheet GEN-C-935.

Legend

- Asphalt Pavement
- Gravel
- Retaining Wall
- Sawcut Line
- Fiber Optic Line
- Wire Connection Line
- Fiber Optic Handhold
- Ditch
- Grind and Inlay
- Striping Callout See C-113 on sheet GEN-C-905
- Tree Removal

0 20 40
SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
55529PE
OREGON
JULY 15, 2005
RAFAEL GAETA
EXPIRES 6-30-25

$$$$$FILENAME$$$$$
$$$$USER$$$$
$$$$DATE$$$$

No	Date	Description	Appd
3	09/05/23	Permitting - Not for Construction	MRG
2	08/23/23	Design Change 001	MRG
1	3/31/23	Addendum 1	MRG
		Revision	
Survey			

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Drawn By	DJD	Const Mgr	TG
Checked By	LCS	Const Supvr	RM
Project Mgr	MRG	Date	08/23/23

Warning
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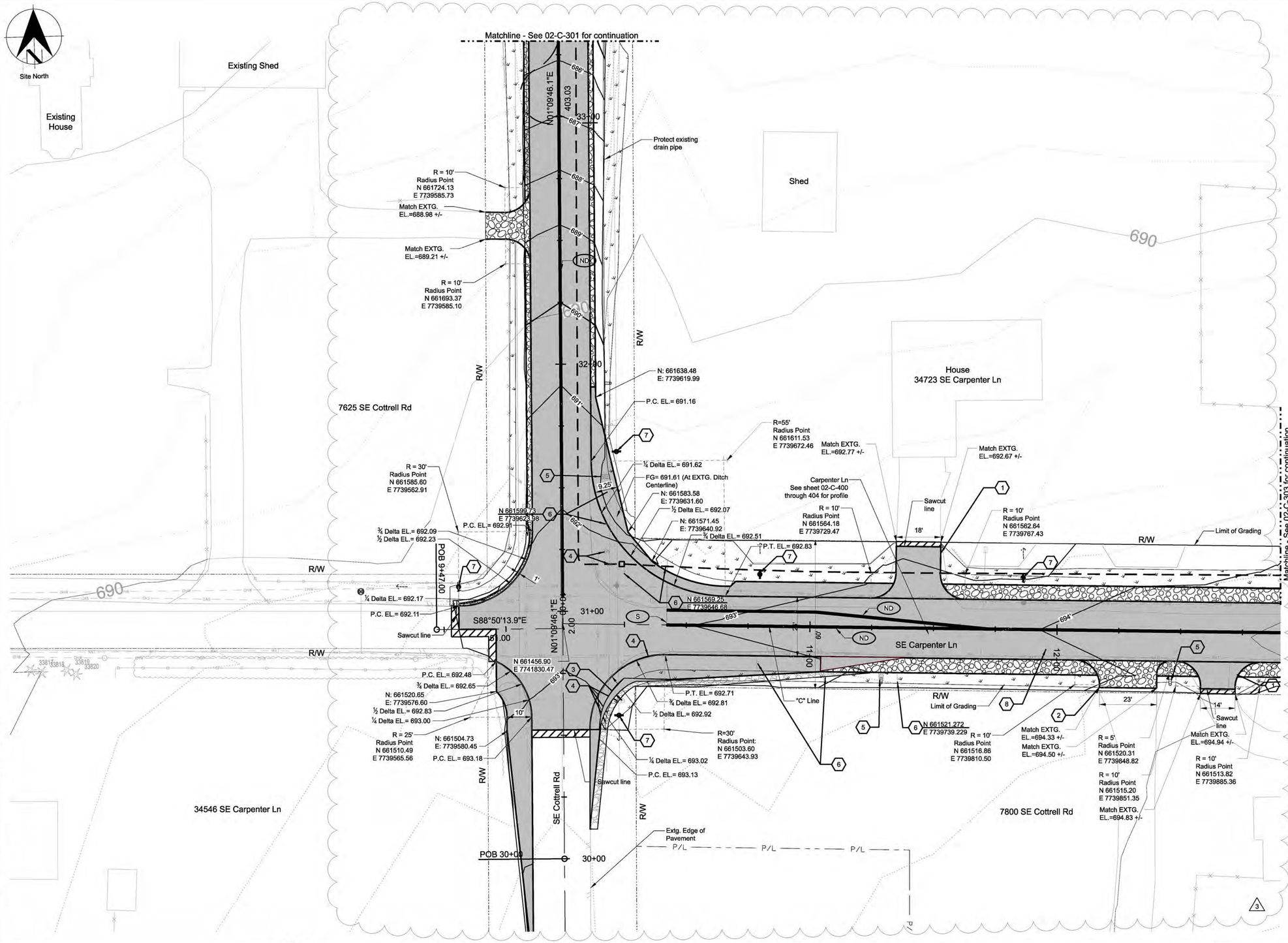
PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683 — Date

CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility
Civil
Grading & Paving
Grid 00

SAP Project No W02229
1/4 Section 3765 / 3766
Sheet No 02-C-301
79 of 2410



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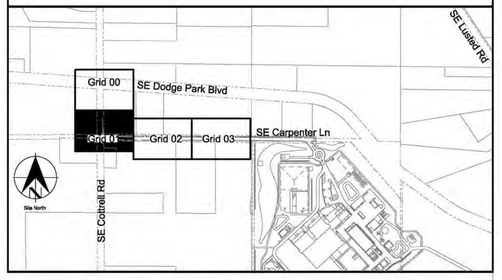

General Sheet Notes

1. See sheet GEN-C-301 for survey control information.
2. Approximate outlines of infiltration basins and swales are shown to meet the required square footage of the basin area as indicated in the storm managment report. The final footprint locations of the stormwater facilities shall be subject to engineer approval prior to installing plantings.
3. See sheet 02-C-901 for typical roadways section.
4. See sheets 02-C-400 through 02-C-432 for roadway plan and profile.
5. See landscape sheets for additional information.
6. See sheet 03-C-601 for utility design information.
7. See LS Networks drawing set for additional utility information not shown in this set.

Sheet Keynotes

1. Asphalt driveway approach per detail C-118 on sheet GEN-C-907.
2. Gravel driveway approach per detail C-118 on sheet GEN-C-907.
3. Protect existing fire hydrant.
4. Protect existing water valves, adjust to finished grade.
5. Mailbox support per detail C-111 on sheet GEN-C-904.
6. Salvage and reinstall sign and post in new location as shown.
7. Proposed utility poles (by others).
8. Asphalt roadway, see sheet 02-C-901 for detail.

Legend

- Asphalt Pavement
- Gravel
- Sawcut line
- Fiber Optic Line
- Wire Connection Line
- Fiber Optic Handhold
- Ditch
- Grind and Inlay
- Striping Callout See C-113 on sheet GEN-C-905 (XX)

0 20 40
SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
55529PE
OREGON
JULY 15, 2005
RAFAEL GAETA
EXPIRES 6-30-25

$$$$DATE$$$$ | $$$$USER$$$$ | $$$$FILENAME$$$$

No	Date	Description	Appd
3	09/05/23	Permitting	MRG
2	08/23/23	Design Change 001	MRG
1	3/31/23	Addendum 1	MRG

Revision

Survey

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Designed By	RG	Design Mgr	LSH
Drawn By	DJD	Const Mgr	TG
Checked By	LCS	Const Supvr	RM
Project Mgr	MRG	Date	08/23/23

Warning
0 ½ 1
If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683

Date

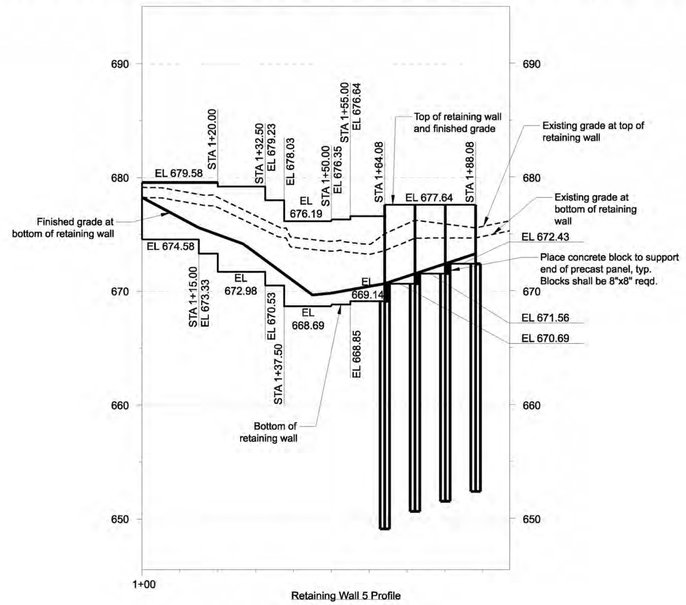
COUNTY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

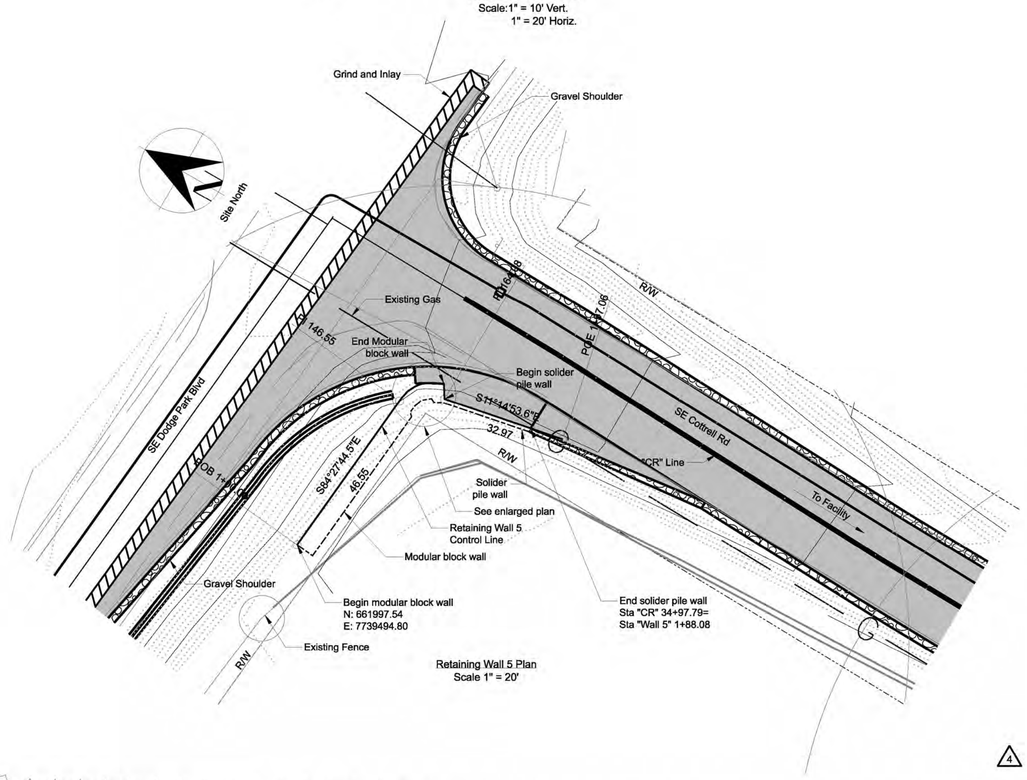
Civil

Grading & Paving
Grid 01

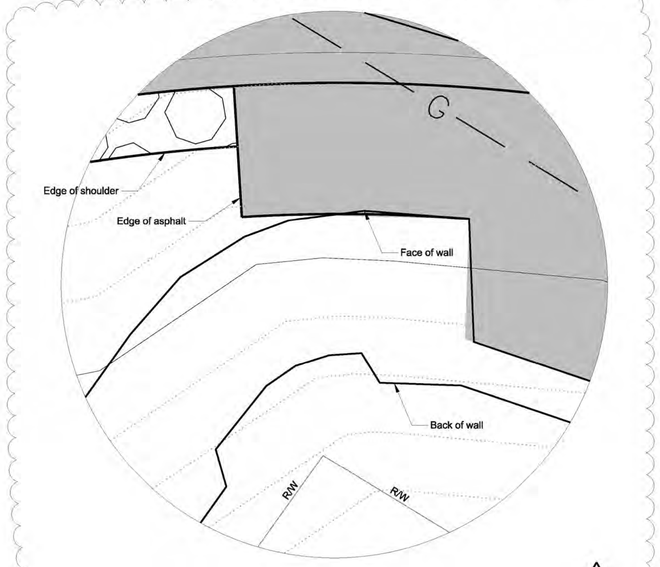
SAP Project No
W02229
1/4 Section
3765 / 3766
Sheet No
02-C-302
80 of 2410



Retaining Wall 5 Profile
Scale:1" = 10' Vert.
1" = 20' Horiz.

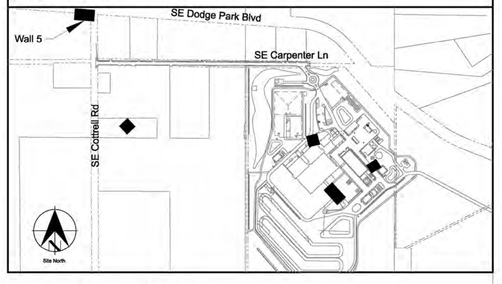


Retaining Wall 5 Plan
Scale 1" = 20'



Enlarged Plan
Scale 1" = 2'-6"

KEY PLAN



General Sheet Notes

1. Modular block per detail C-110 on sheet GEN-C-903.
2. Solider pile per details C-220 to C-222 on sheet GEN-C-935. 4
3. All materials and workmanship shall conform to the 2021 Oregon Standard Specifications for Construction and the Project Special Provisions, and the current edition of The General Conditions for Construction for the City of Portland Road Department. 3
4. Provide ASTM Specification A572 Grade 50 steel for the solider piles.
5. Drilled Shaft Concrete, Class 400 for prebored holes.
6. Fill prebored holes with drilled shaft concrete to bottom of lagging, typ. Where lagging is stepped, cast to lower panel and block up higher panel with concrete blocks.
7. Provide Class 4000 - 3/4" concrete for the precast concrete lagging panels and concrete blocks.

Design References:
1. ODOT Geotechnical Design Manual

Design Parameters: 3
Temporary Surcharge = 0 psf (G.C. to enforce)

Based on project geotechnical bore log P5:
Stiff Clay (Elevation 673' to 665')
Unit weight: 115 psf
Submerged unit weight: 58 psf
Phi: 28 deg
Ka: 0.36
Kp: 2.76
Wall friction: 4.75 deg

Stiff Clay to Sandy Clay (Elevation 665' to 656.5')
Unit weight: 115 psf
Submerged unit weight: 58 psf
Phi: 28 deg
Ka: 0.36
Kp: 2.76
Wall friction: 4.75 deg

Ground water assumed at elevation 634.00' 1

REGISTERED PROFESSIONAL ENGINEER 17298PE OREGON JULY 19, 1994 ROBERT J. TOVAR EXPIRES: 6/30/2024

No	Date	Description	Appd
4	09/05/23	Permitting - Not for Construction	MRG
3	08/23/23	Design Change 001	MRG
2	6/30/23	Addendum 5	MRG
1	4/28/23	Addendum 2	MRG
		Revision	
Survey			

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Drawn By	DJD	Const Mgr	TG
Checked By	LCS	Const Supvr	RM
Project Mgr	MRG	Date	08/23/23

Warning
0 ½ 1
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PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683 — Date

CITY OF PORTLAND OREGON 1851

Bull Run Filtration Facility
Civil
Retaining Walls
Plan and Profile - 4

SAP Project No W02229
1/4 Section 3765 / 3766
Sheet No 02-C-441
156 of 2410

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