TRANSMITTAL

SUBMITTAL NO. 012 REV 1

2 Carolyn Decker, P.E. Terra Associates, Inc. 12220 – 113th Avenue NE, Suite 130 Kirkland, WA 98034 Zayin Wall, P.E. Barghausen Consulting Engineers, Inc. 18215 72nd Avenue South Kent, WA 98032	DATE: 3/12/21 POE JOB NO.: 20-11 PROJECT: **PUYALLUP LOGISTICS** Submittal #012 REV 1 **RETAINING WALL**
ATTN: Above	

The items listed below are transmitted as checked below:

- ☒ For your approval
- ☐ For your use
- ☒ For review/comment
- ☐ Other - _____
- ☐ Sent as requested
- ☒ Returned after review
- ☐ Approved as submitted
- ☐ Approved as noted
- ☐ Returned for corrections

PGS	DATED	DESCRIPTION
6 pages	2/24/21	Retaining Wall Design
2 pages	11/15/20	Wall Material & Qty Criteria
20 pages	2/24/21	Design Calculations

REMARKS

Enclosed, please find our block retaining wall submittal including Design, Material Criteria and Design Calculation for review and approval.

Thanks.

COMMENTS

☒ NO EXCEPTIONS TAKEN ☐ REVISE AND RESUBMIT
☐ REJECTED SEE REMARKS ☐ FURNISH AS CORRECTED
☐ SUBMIT SPECIFIED ITEM

Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for conforming and correlating all quantities and dimensions selecting fabrication process and techniques or construction coordinating his work with that of all other trades, verifying compliance with the jurisdicting agencies; and performing his work in a safe and satisfactory manner.

BARGHAUSEN CONSULTING ENGINEERS, Inc.

Date 05/17/2021 By Zayin Wall

PRRWF20220381

Copy to: SMARTSHEET
Doug Deach

By: Clay Johnson
Title: Sr. Project Manager

PUYALLUP CORPORATE PARK
PUYALLUP, WA

GENERAL NOTES:

DESIGN PROVISIONS:

1. THE FOLLOWING EFFECTIVE STRENGTH PARAMETERS WERE ASSUMED IN THE PREPARATION OF THE STRUCTURAL CALCULATIONS FOR THE RETAINING WALL SYSTEM:

SOIL PROPERTIERS				
ZONE	$\phi°$	COH (PSF)	γ (PCF)	DESCRIPTION
REINFORCED FILL	33	0	125	SAND
RETAINED FILL	32	0	120	SILTY SAND
FOUNDATION	32	50	120	SILTY SAND

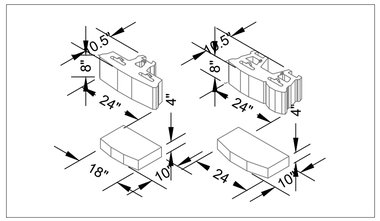
SOIL TYPES AND DESIGN PROPERTIES SHALL BE CONFIRMED BY THE SITE GEOTECHNICAL ENGINEER PRIOR TO WALL CONSTRUCTION.

2. THE WALL(S) ARE DESIGNED TO SUPPORT THE FOLLOWING MAXIMUM SURCHARGE LOADINGS:

LIVE LOAD: 250 PSF (PARKING)
DEAD LOAD: NONE
BACK SLOPE: NONE
SEISMIC: 0.326g (WsDOT BridgeLink)

3. THE FOUNDATION SOILS AT WALL LOCATIONS SHALL BE CAPABLE OF SAFELY SUPPORTING THE MAXIMUM APPLIED BEARING PRESSURE, AS SHOWN ON THE WALL PROFILES, WITHOUT FAILURE OR EXCESSIVE SETTLEMENT. LOCAL BEARING CAPACITY SHALL BE CONFIRMED BY THE SITE GEOTECHNICAL ENGINEER AFTER FOUNDATION EXCAVATION AND PRIOR TO WALL CONSTRUCTION.

4. REFERENCES:
4.1. GEOTECHNICAL REPORT
4.1.1. GEOTECHNICAL REPORT, East Main Industrial, East Main Street and Shaw Road, Puyallup, WA, Terra Associates, Inc., Project no T-8222, September 27, 2019.
4.1.2. 11/13/20 Properties confirmed by Terra Associates.



GravityStone Edge Retaining Wall

SHEET INDEX

GENERAL NOTES:

THESE TWO WALLS WILL BE REQUIRED TO BE INSPECTED TOTALLY BY THE GEO-ENGINEER, CERTIFIED TESTING LAB OR ENGINEER OF RECORD AND ALL DAILY REPORTS GIVEN TO THE CITY BUILDING INSPECTOR PRIOR TO A FINAL INSPECTION.

SUGGESTED QUALITY ASSURANCE PROVISIONS:

1. WALL CONSTRUCTION SHALL BE SUPERVISED BY A QUALIFIED ENGINEER OR TECHNICIAN TO VERIFY FIELD AND SITE SOIL CONDITIONS. IF THIS WORK IS NOT PERFORMED BY THE SITE GEOTECHNICAL ENGINEER, A QUALIFIED GEOTECHNICAL ENGINEER/TECHNICIAN SHALL BE CONSULTED IN THOSE MATTERS PERTAINING TO THE SOIL CONDITIONS AND WALL PERFORMANCE.

2. THE FOUNDATION SOILS AT THE BASE OF THE WALL(S) SHALL BE INSPECTED BY THE GEOTECHNICAL ENGINEER. ANY UNSUITABLE SOILS OR IMPROPERLY COMPACTED EMBANKMENT MATERIAL SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE ENGINEER PRIOR TO WALL CONSTRUCTION TO PROVIDE ADEQUATE BEARING CAPACITY AND MINIMIZE SETTLEMENT.

3. ALL WALL EXCAVATION AND RETAINED SOILS SHALL BE INSPECTED FOR GROUNDWATER CONDITIONS. ANY ADDITIONAL DRAINAGE PROVISIONS REQUIRED IN THE FIELD SHALL BE INCORPORATED INTO THE WALL CONSTRUCTION AS DIRECTED BY THE GEOTECHNICAL ENGINEER.

4. WALL BACKFILL MATERIAL SHALL BE TESTED AND APPROVED BY THE ENGINEER, MEETING THE MINIMUM REQUIREMENTS OF THE APPROVED DESIGN PLANS OR SPECIFICATIONS.

5. ALL SOIL BACKFILL SHALL BE TESTED BY THE GEOTECHNICAL ENGINEER FOR MOISTURE, DENSITY, AND COMPACTION PERIODICALLY (EVERY 2' VERTICALLY, 100'-200' C/C) MEETING THE MINIMUM REQUIREMENTS OF THE APPROVED DESIGN PLANS OR SPECIFICATIONS.

6. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN QUALITY CONTROL FOR THE CONSTRUCTION OF THE WALL TO ASSURE COMPLIANCE WITH CONTRACT REQUIREMENTS AND MAINTAIN RECORDS OF ITS QUALITY CONTROL.

7. ALL WALL ELEVATIONS, GRADES, AND BACK SLOPE CONDITIONS SHALL BE VERIFIED BY THE ENGINEER IN THE FIELD FOR CONFORMANCE WITH APPROVED DESIGN PLANS. ANY REVISIONS TO THE STRUCTURE GEOMETRY OR DESIGN CRITERIA SHALL REQUIRE DESIGN MODIFICATIONS PRIOR TO PROCEEDING WITH CONSTRUCTION.

8. SURFACE WATER SHALL BE DIVERTED AWAY FROM THE RETAINING WALL AND WALL REINFORCED ZONE. WHERE WATER CANNOT BE DIVERTED, NOTIFY THE ENGINEER FOR DESIGN OF A SWALE TO DIVERT THE FLOW OR A DROP BOX TO DRAIN THE WATER THROUGH THE WALL.

THE APPROVED CONSTRUCTION PLANS AND ALL ENGINEERING DOCUMENTS MUST BE POSTED ON THE JOB AT ALL INSPECTIONS IN A VISIBLE AND READILY ACCESSIBLE LOCATION.

FULL SIZED LEDGIBLE COLOR PLANS ARE REQUIRED TO BE PROVIDE BY THE PERMITTEE ON SITE FOR ALL INSPECTIONS MIN. PLAN SIZE 24 X 36

PART 1: GENERAL

1.01 Description
- A. The work to be performed includes sourcing, providing and installing concrete retaining wall blocks to the lines and grades as specified on the project construction drawings and as may be further specified herein.
- B. Work includes preparing foundation soil, furnishing and installing leveling pad, unit fill and backfill to the lines and grades shown on the construction drawings.
- C. Work includes furnishing and installing all related materials required for construction of the retaining wall as shown on the construction shop drawings.

1.02 Reference Standards
- A. ASTM D448 Sizes of Aggregate for Road and Bridge Construction.
  ASTM D698 Laboratory Compaction Characteristics using Standard Effort.

1.03 Quality Assurance
- A. Owner shall be responsible for soil testing and inspection quality control during earthwork operations.

PART 2: MATERIALS

2.01 Definitions
- A. Retaining Wall Unit - A segmental concrete facing block that is able to be arranged, stacked, placed, combined, or interchanged easily into an assembled wall system.
- B. Leveling Pad - A compacted crushed stone pad which serves as a flat surface for placing the initial course of precast units.
- C. Granular Aggregate - Clean 1" minus crushed angular rock located within and immediately behind the retaining wall units to facilitate drainage and avoid compaction in close proximity to the retaining wall units.
- D. Joint Geotextile - A filter fabric installed to prevent infill and/or backfill material from migrating through the joints.
- E. Foundation Soil - Soil zone immediately beneath the retaining wall facing units, the wall leveling pad and the reinforced soil zone.
- F. Retained Soil - Soil immediately behind the retaining wall facing drainage aggregate or reinforced backfill if present.
- G. Subsurface Drainage System - A system for removing water from behind the wall and channeling it to a point of positive drainage.

2.02 GravityStone Edge
- A. GravityStone Edge wall units shall have a minimum 28-day compressive strength of 3,000 psi.
- B. Texture on the face of the block shall be specified. Other surfaces to be smooth form type.

2.03 Base Leveling Pad Material
- A. Material shall consist of compacted crushed stone as shown on the construction drawing.

2.04 Gravel Layer
- A. Gravel layer shall consist of clean 1" minus crushed stone or crushed gravel meeting the following gradation:

Sieve Size	% Passing
1"	100
3/4"	100-75
No. 4	0-10
No. 50	0-5

APPROVED TO PROCEEDSUBJECT TO SPECIAL INSPECTION REPORTSAND FINAL FROM CITY BUILDING INSPECTOR 3/23/2022 DL

2.05 Retained Backfill
- A. Backfill shall be free of debris or organic material.
  Plasticity Index (PI)<20 and Liquid Limits (LL)<40
- B. Material can be site excavated material when the above requirements are met. Unsuitable soils for backfill (high plastic clays or organic materials) shall not be used in the retained soil mass.

PART 3: EXECUTION

3.01 Excavation
- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall be careful not to disturb embankment and foundation materials beyond lines shown.

3.02 Foundation Soil Preparation
- A. Foundation soil shall be excavated as required for leveling pad dimensions shown on the construction drawings, or as directed by the Geotechnical Engineer.
- B. Unsuitable soils shall be removed and replaced with acceptable material.
- C. Over-excavated areas shall be backfilled with approved compacted backfill material.

3.03 Base Leveling Pad
- A. Leveling pad materials shall be placed upon approved foundation as shown on the construction drawings to a minimum thickness of 6".
- B. Aggregate material shall be compacted to provide a dense, level surface on which to place the first course of modular units. Compaction shall be to 95% of Standard Proctor Density as determined in accordance with ASTM D698. For crushed rock, material shall be densely compacted as determined by visual observation.

3.04 Unit Installation
- A. The first course of concrete modular wall units shall be carefully placed on the base leveling pad. Each unit shall be checked for level and alignment.
- B. Units are placed side by side for full length of wall alignment. Alignment may be done by means of a string line or offset from a base line.
- C. Sweep excess material from top of units and install next course. Ensure that each course is completely unit filled between and 12" behind block. Backfill and compact prior to proceeding to next course.

3.05 Fill Placement
- A. Backfill material shall be placed with a maximum of 8" lifts and compacted to 95% of Standard Proctor Density. As determined in accordance with ASTM D698. The in place moisture content shall not exceed the optimum moisture content as determined in accordance with ASTM D698 and be no lower than 2% below optimum moisture content.
- B. Only hand-operated compaction equipment shall be allowed within 3' of the back surface of the concrete units.

PRRWF20220381

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PUYALLUP CORPORATE PARK
PUYALLUP, WA

Firm Name and Address
RACE ENGINEERING ASSOC.
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e: rrace@rea-llc.com
t: 612-670-7009

DESIGN INFORMATION PROVIDED FOR INTERNAL STABILITY ONLY. EXTERNAL STABILITY, INCLUDING BUT NOT LIMITED TO FOUNDATION SETTLEMENT, GLOBAL STABILITY AND SLOPE STABILITY ARE THE RESPONSIBILITY OF THE OWNER AND OWNER'S ENGINEER.

General Notes

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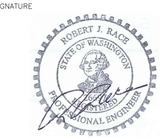

SHEET TITLE
TITLE PAGE/SPECIFICATIONS

Project	Sheet
20-006-04	T-1
Date: 2/24/2021	
Scale:	

Puyallup Corporate Center
2/24/21
RACE

SCALE: 1"=40'

WITH THE ANNULAR SPACE BETWEEN THE SLEEVE AND THE STORMWATER PIPE FILLED WITH GROUT.

GENERAL DESIGN NOTES:

THE SITE PLAN IS FOR ILLUSTRATION ONLY. IT WAS REPRODUCED FROM"
GRADING AND DRAINAGE PLAN, PUYALLUP CORPORATE PARK, PUYALLUP, WA., BARGHANUSEN CONSULTING ENGINEERS, INC., JOB NO 20705, SHEET C4, 1/25/2021.

0 40 80 120
GRAPHIC SCALE IN FEET

EX. 8D CB
RIM = 53.42
IE = 44.72 (12" S) NEW
IE = 44.72 (24" W) EXISTING
IE = 44.72 (24" N) EXISTING

EX. TREES WITHIN PLANTER/DRIVEWAY TO BE REMOVED PER ARBORIST REPORT (TYP. OF 8)

SSMH RIM EL=53.24' (UNABLE TO OPEN)

SSMH TYPE II 48" RIM EL=53.60' 8"CNC I.E. W=48.42' 8"CNC I.E. E=48.52'

SSMH RIM EL=54.73' 12"PVC I.E. NE=48.53' 8"CNC I.E. W=48.31' 8"CNC I.E. E=48.41'

ROAD SECTION A-A SEE SHEET C13

2 SSMH TYPE II 48" RIM EL=55.61' 8"CNC I.E. W=49.71' 8"CNC I.E. E=49.81'

LINDEN LANE

2 CB STD GRATE RIM EL=56.25' 24"CNC N IE=52.00' 18"CNC S IE=52.05' 12"DI SW IE=52.05' CONTRACTOR TO REMOVE AND PLUG 12"DI SW PIPE

SSMH TYPE II 48" RIM EL=56.68' 8"CNC I.E. W=51.38' 8"CNC I.E. E=51.48'

2 SSMH TYPE II 48" RIM EL=56.27' 8"CNC I.E. W=50.67' 8"CNC I.E. E=50.77'

EAST MAIN AVE.

65 LF 12" PVC SD @ 0.50%
12" CMP CULV I.E. W=50.44'
12" CMP CULV I.E. E=49.78'

BEGIN WALL 1
E. MAIN ST. WEST
NO 2
12" SS I.E. = 47.00
12" SD @ TOP=46.02
Δ=0.98'
STORM PIPE TO BE SLEEVED SEE NOTE 2, THIS SHEET

RETAINING WALL FOOTING DRAIN, CONNECT TO CB#15

47 LF 12" PVC SD @ 1.48%

BEGIN WALL 2
E. MAIN ST. EAST
NO 1

25 LF OF 24" STEEL CASING

142 LF 12" DI SD @ 1.35%

78 LF 12" DI SD @ 1.34%

RETAINING WALL FOOTING DRAIN, CONNECT TO CB#9

122 LF 12" CPEP SD @ 0.71%

116 LF 12" CPEP SD @ 0.61%

104 LF 12" CPEP SD @ 1.30%

95 LF 12" CPEP SD @ 0.73%

29 LF 12" CPEP SD @ 1.03%

FLOW CONTROL RISER

MOD. WETLAND

UTILITY CROSSING 12" CPEP SD IE=51.59 T/P 12" CPEP SD=47.59 Δ=4.00'

23 LF 12" CPEP SD @ 1.32%

30 LF 12" CPEP SD @ 0.50%

67 LF 12" DI SD @ 2.01%

CONSTRUCT CURB & GUTTER PER DETAIL SHEET C12

CONSTRUCT CURB & GUTTER PER DETAIL SHEET C12

125 LF

CONSTRUC PER DETAI

98 LF 15" CPEP SD @ 0.56%

UTILITY CROSSING 15" CPEP SD IE=51.46 T/P 12" CPEP SD=47.67 Δ=3.79'

21 LF 15" CPEP SD @ 0.53%

87 LF 12" CPEP SD @ 0.50%

DETENTION VAULT FOOTING DRAIN, CONNECT TO CB#23 IE=50.75

76 LF 12" CPEP SD @ 0.53%

25 LF 15" CPEP SD @ 0.50%

82 LF 15" CPEP SD @ 0.50%

57 LF 15" CPEP SD @ 0.50%

N0°30'22"E 535.40'

127 LF 15" CPEP SD @ 0.52%

7 LF 15" CPEP SD @ 0.50%

24 LF 15" CPEP SD @ 0.88%

193 LF 15" CPEP SD @ 0.50%

520 LF TRENCH DRAIN @ 0.75% MIN

109 LF 15" CPEP SD @ 0.50%

26 LF 15" CPEP SD @ 0.50%

SEE BLOWUP FOR EAST ACCESSIBLE ROUTE ON SHEET C5.

138 LF 12" CPEP SD @ 0.50%

243 LF 12" DI SD @ 0.23%

PROPOSED 488' X 72' STORMWATER VAULT
MIN GRADE OVER VAULT EL = 56.70
BOTTOM OF LID EL = 54.70
MAX WS EL = 54.20
STATIC WS EL = 48.20
BOTTOM OF VAULT EL = 47.70
VOLUME PROVIDED=204,960 CF

PROPOSED BUILDING
194,942 SF
FF EL=59.50

APN.0420263700

APN.0420264038

348 LF 12" CPEP SD @ 0.50%

198 LF 12" CPEP SD @ 0.21%

154 LF 12"

294 LF 12" CPEP SD @ 0.78%

305 LF 12" CPEP SD @ 0.50%

CB SOLID LID RIM=56.44

12" D.I. CULV. I.E. W=53.16'

162 LF 15" CPEP SD @ 0.52%

S0°30'13"W 200.04'

UTILITY CROSSING 12" DI SD IE=52.73 T/P 12" CPEP SD=50.10 Δ=2.63'

95 LF 12" DI SD @ 0.51%

100 LF 12" CPEP SD @ 0.77%

CONSTRUCT CURB & GUTTER PER DETAIL SHEET C12

245 LF 12" CPEP SD @ 0.50%

300 LF 12" CPEP SD @ 0.50%

INSTALL CONCRETE STEPS

142 LF 12" CPEP SD @

CB#1 CB#2 CB#3 CB#4 CB#5 CB#6 CB#7 CB#8 CB#9 CB#10 CB#11 CB#12 CB#13 CB#14 CB#15 CB#16 CB#17 CB#18 CB#19 CB#20 CB#21 CB#22 CB#23 CB#24 CB#25 CB#26 CB#27 CB#28 CB#29 CB#30 CB#31 CB#32 CB#33 CB#34

SDCO#1 SDCO#2 SDCO#3 SDCO#4 SDCO#5 SDCO#6 SDCO#7 SDCO#8 SDCO#9 SDCO#10 SDCO#11 SDCO#12 SDCO#13 SDCO#14 SDCO#15 SDCO#16 SDCO#17 SDCO#18

A & J LLC APN.0420263033

A & J LLC APN.0420263034

CJD EXCHANGE LLC APN.0420263015

OFFSITE BLDG

ROOF DRAIN

SDCO

RIDGELINE

PUYALLUP CORPORATE PARK

11/15/20

RRACE

T:\Projects\2020\Grade Solutions\20-006-04 Panattoni Puyallup Logistics\REV 210215\Drawings\20-006-04 Puyallup Corporate Park R0.dwg, 2/24/2021 10:43:54 AM, AutoCAD PDF (High Quality Print).pc3

Project Name and Address

PUYALLUP CORPORATE PARK
PUYALLUP, WA

Firm Name and Address

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General Notes

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ROBERT J. RACE STATE OF WASHINGTON PROFESSIONAL ENGINEER

SHEET TITLE

PLAN VIEW

Project	Sheet
20-006-04	P-1
Date: 2/24/2021	
Scale	

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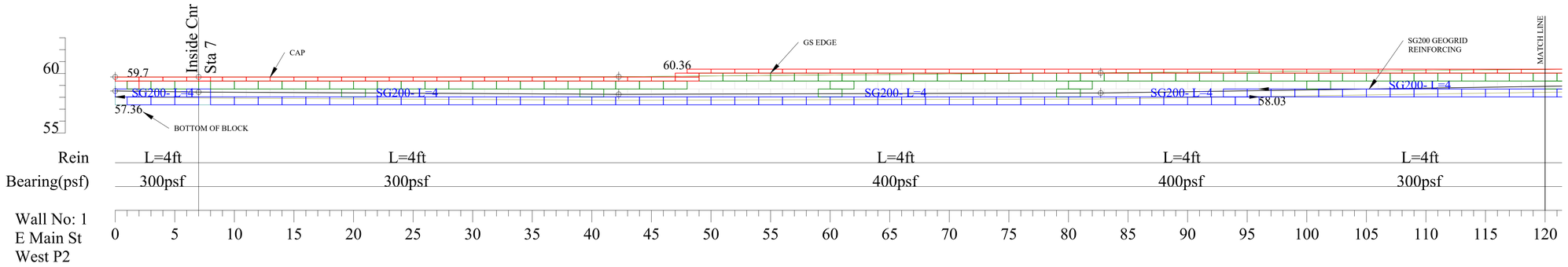

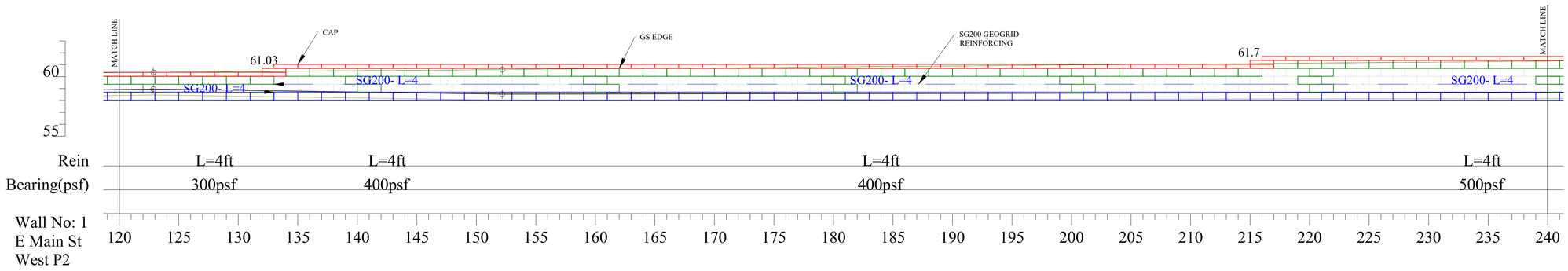

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SHEET TITLE

WALL 1

Project	Sheet
20-006-04	1-1
Date: 2/24/2021	
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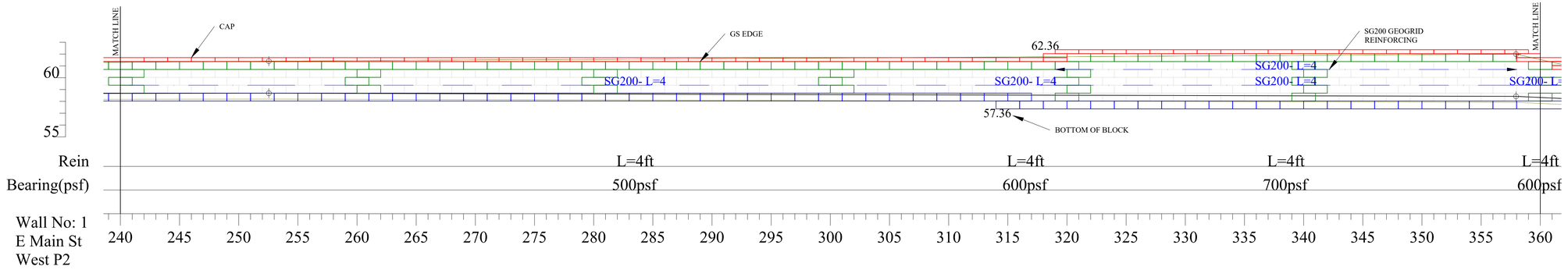
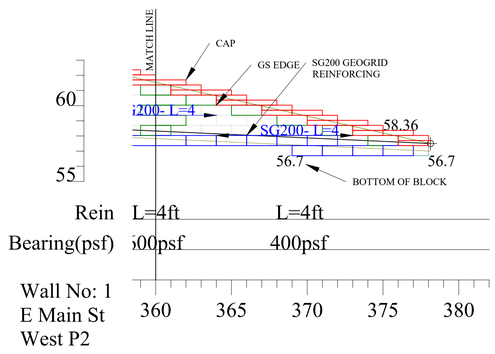
PUYALLUP CORPORATE PARK
11/15/20
RRACE





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WALL 1

Project	Sheet
20-006-04	1-2
Date: 2/24/2021	
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PUYALLUP CORPORATE PARK
11/15/20
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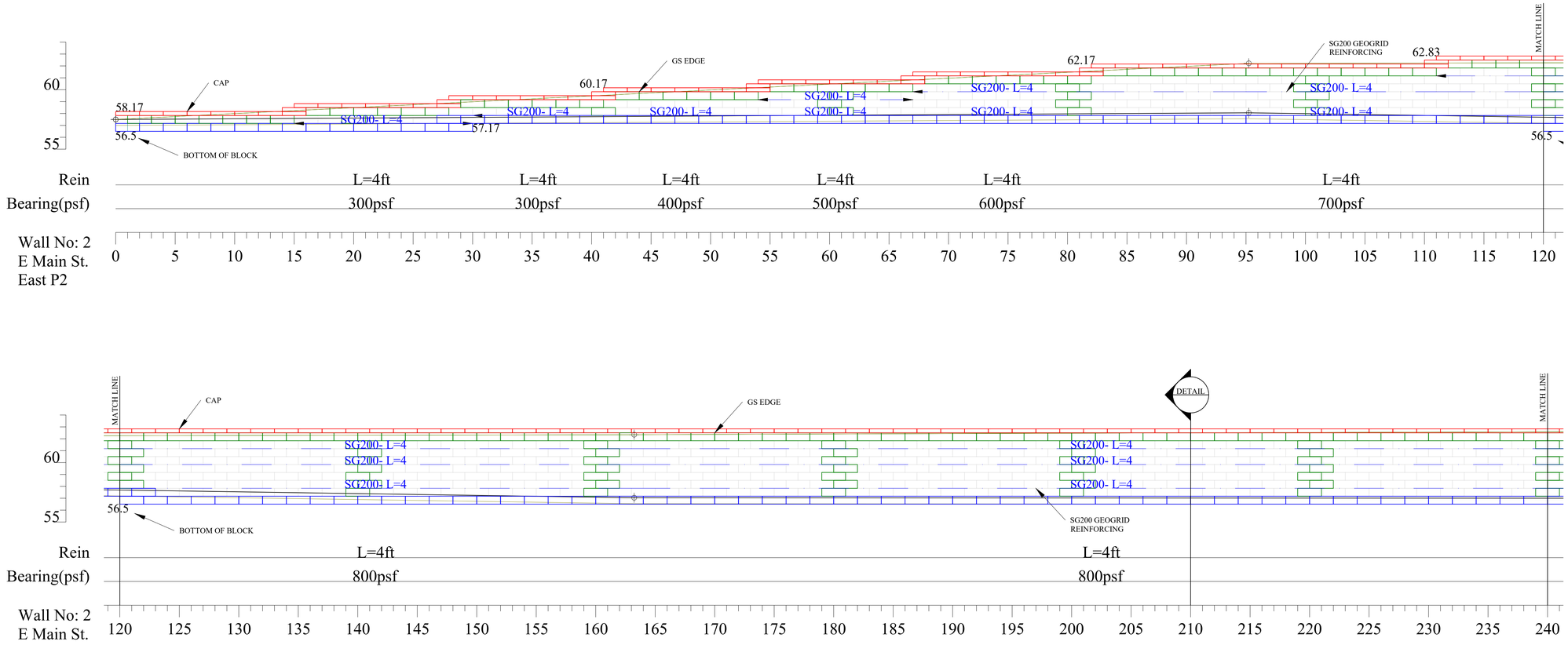

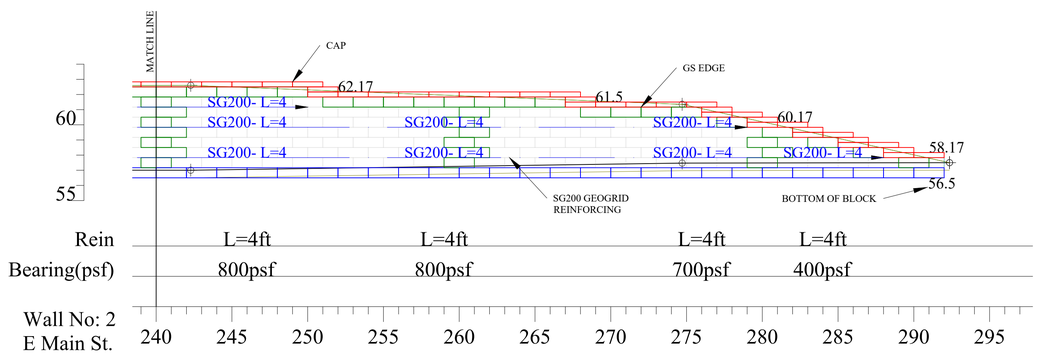

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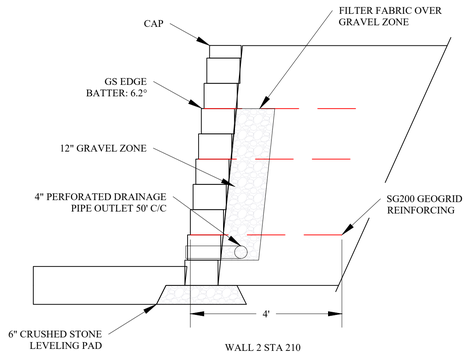
ROBERT J. RACE
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

SHEET TITLE

WALL 2

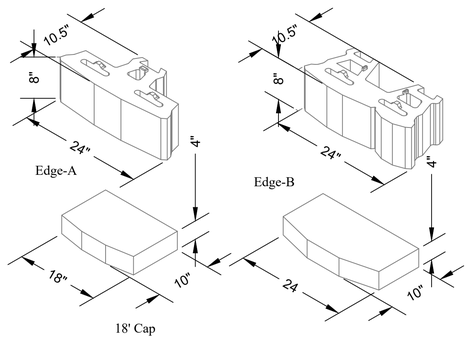
Project: 20-006-04	Sheet: 2-1
Date: 2/24/2021	
Scale:	

PRRWF20220381



WALL 2 STA 210

1. THE SECTION SHOWN IS A REPRESENTATIVE WALL SECTION. THE WALL HEIGHTS, ELEVATIONS, TOE SLOPES, AND BACK SLOPES VARY ACCORDING TO THE ELEVATION PLAN AND SITE PLAN RESPECTIVELY.
2. UPON EXCAVATION, WHERE UNSUITABLE SOILS ARE FOUND, SUBCUT TO DEPTH "D" AS REQUIRED BY THE ONSITE GEOTECHNICAL ENGINEER AND REPLACE WITH SUITABLE COMPACTED STRUCTURAL FILL TO ACHIEVE THE REQUIRED BEARING CAPACITY. THE STRUCTURAL FILL SHALL BE COMPACTED TO A MINIMUM 95% STANDARD PROCTOR DENSITY.
3. APPROXIMATE LIMITS OF EXCAVATION VARIES. ACTUAL LIMITS AND SIDE SLOPES TO BE DETERMINED BY CONTRACTOR, FIELD CONDITIONS AND OSHA REGULATIONS.
4. THE WALLS SHALL BE CONSTRUCTED WITH GS EDGE UNITS USING THE 6.2° SETBACK.
5. THE DESIGN REQUIRES STRATA SG200 SOIL REINFORCEMENT AT THE ELEVATIONS SHOWN.
6. DO NOT BRING HEAVY COMPACTION OR PAVING EQUIPMENT WITHIN 3' OF THE BACK OF THE RETAINING WALL.
7. SEE MANUFACTURER INFORMATION FOR ADDITIONAL DETAILS ON THE GS EDGE RETAINING WALL SYSTEM.



18' Cap

Project Name and Address

PUYALLUP CORPORATE PARK
PUYALLUP, WA

Firm Name and Address

RACE ENGINEERING ASSOC.
4851 Four Seasons Ct
Eagan, MN 55122
e: rrace@rea-llc.com
t: 612-670-7009

DESIGN INFORMATION PROVIDED FOR INTERNAL STABILITY ONLY. EXTERNAL STABILITY, INCLUDING BUT NOT LIMITED TO FOUNDATION SETTLEMENT, GLOBAL STABILITY AND SLOPE STABILITY ARE THE RESPONSIBILITY OF THE OWNER AND OWNER'S ENGINEER.

General Notes

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

No.	Revision/Issue	Date

PROFESSIONAL SIGNATURE

ROBERT J. RACE
STATE OF WASHINGTON
REGISTERED PROFESSIONAL ENGINEER

SHEET TITLE

GRAVITYSTONE EDGE DETAILS

Project	Sheet
20-006-04	D-1
Date: 2/24/2021	
Scale:	

PRRWF20220381

PUYALLUP CORPORATE PARK
11/15/20
RRACE