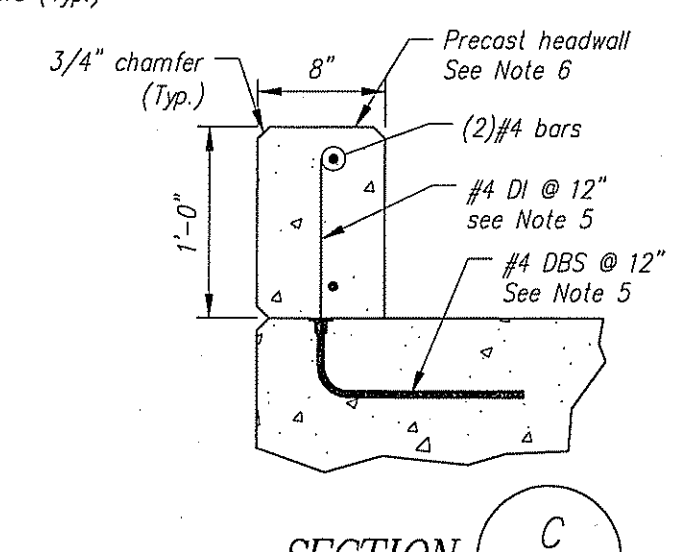
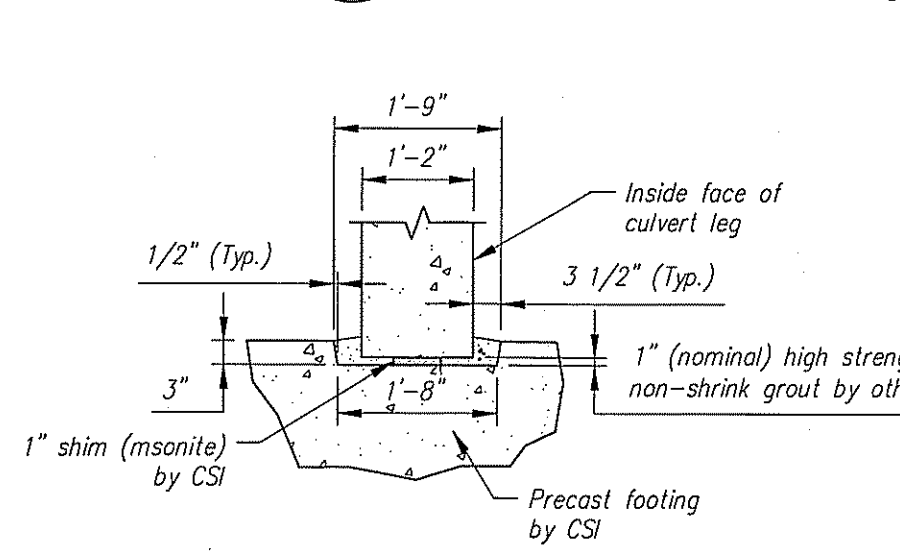
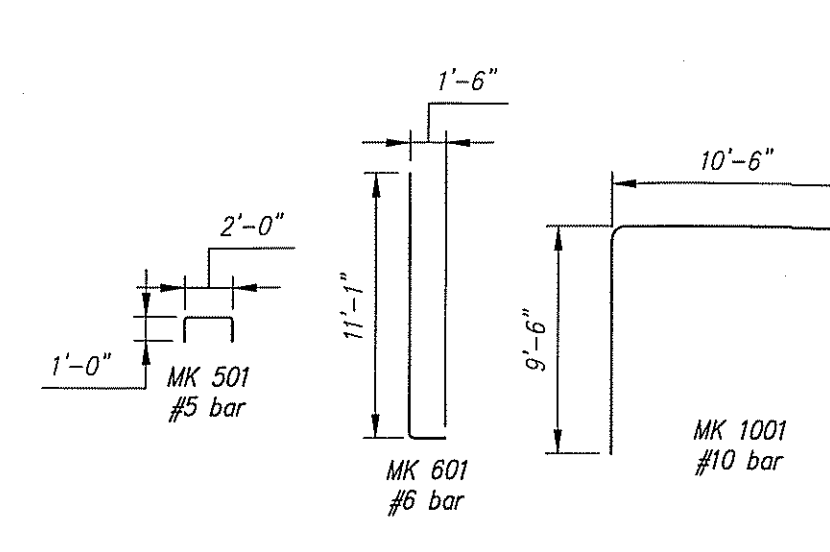
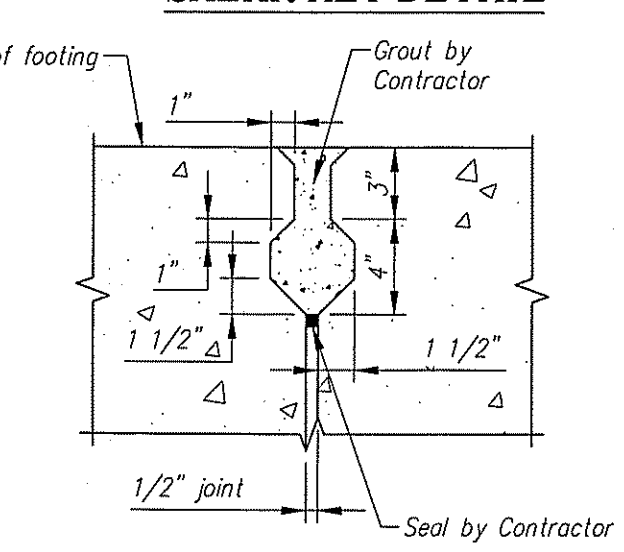
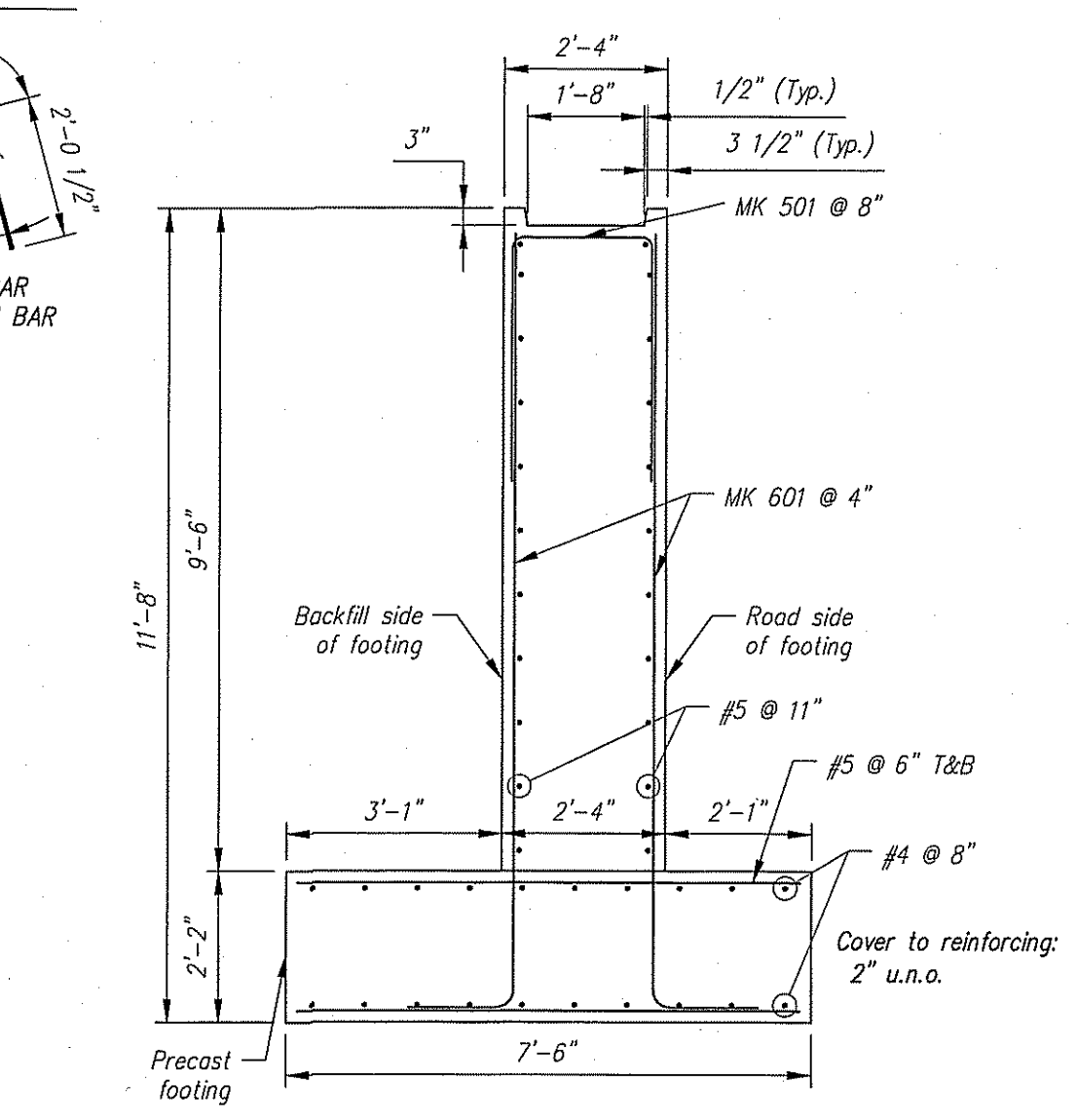
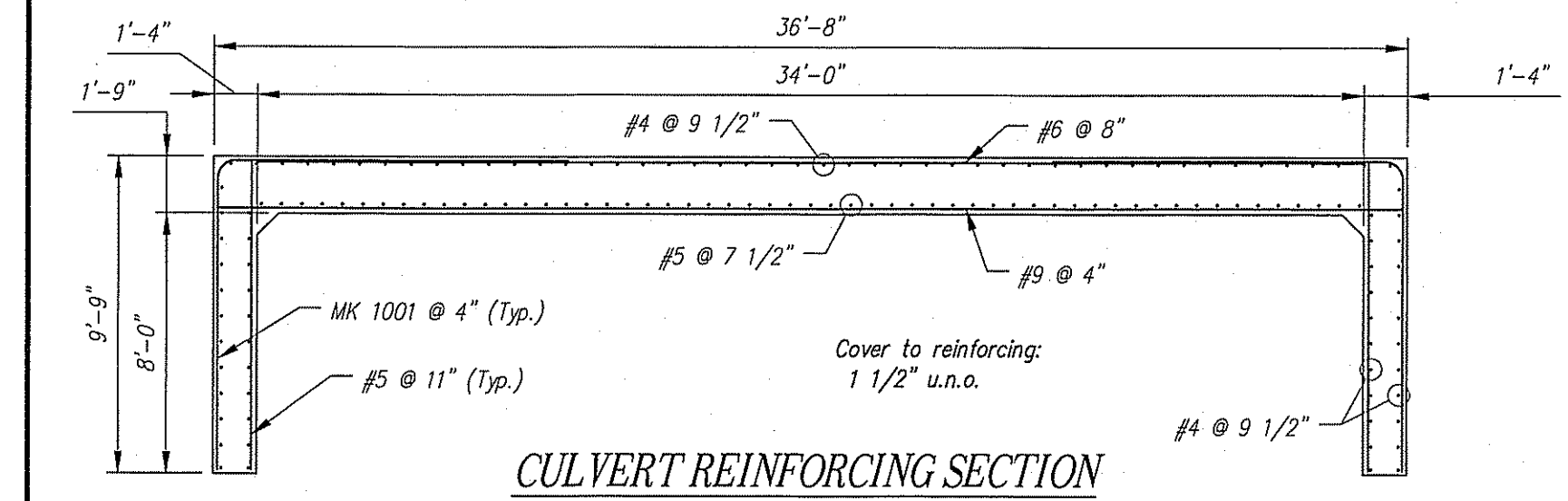
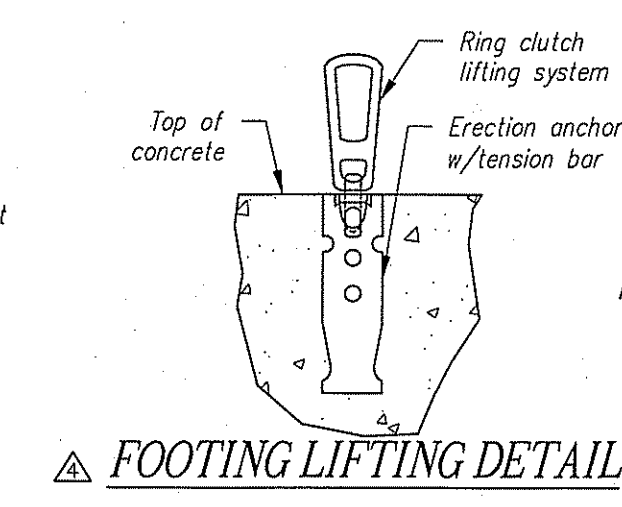
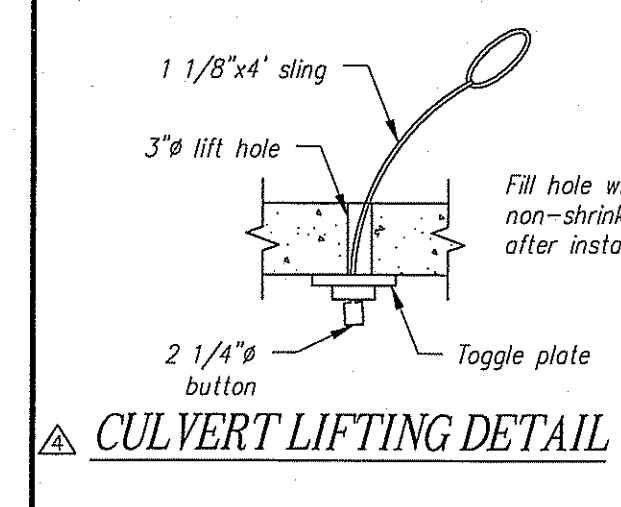
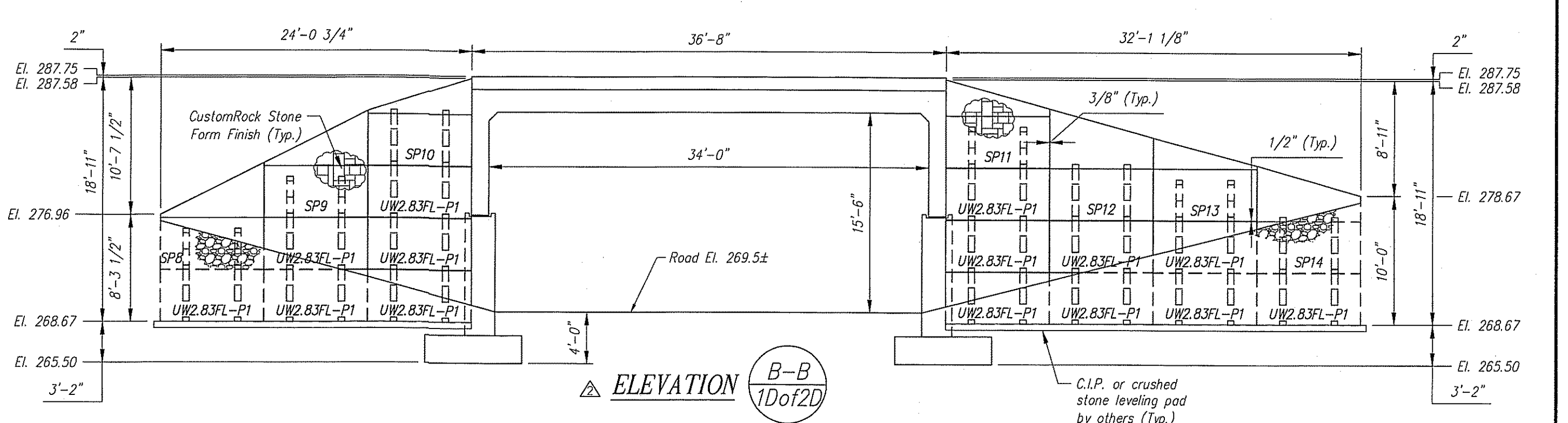
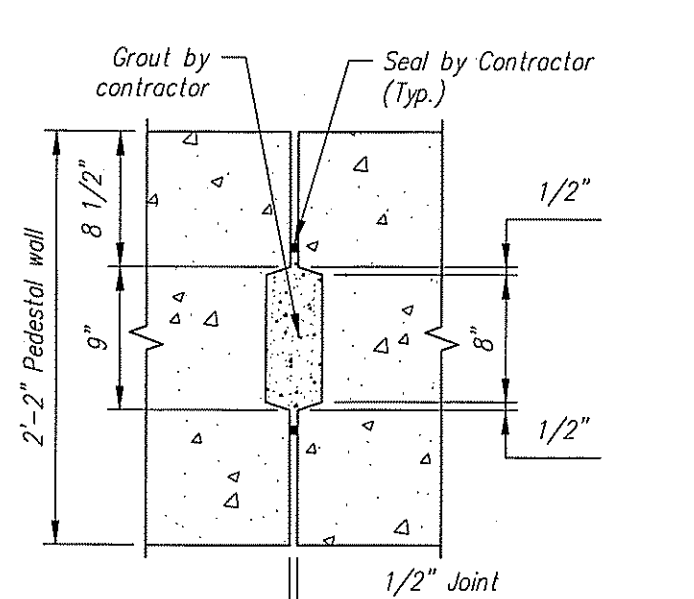
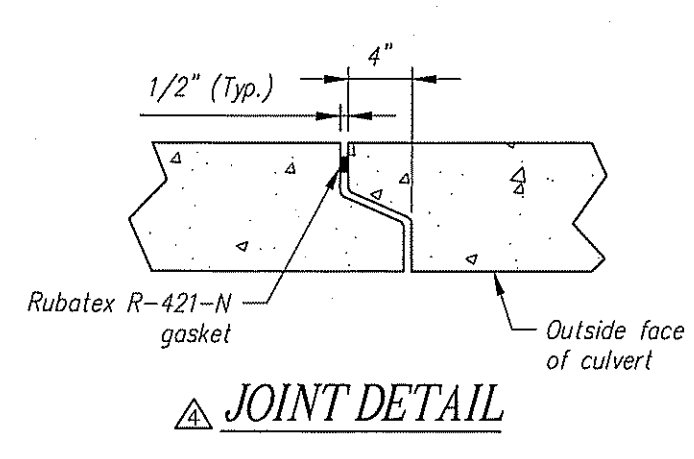
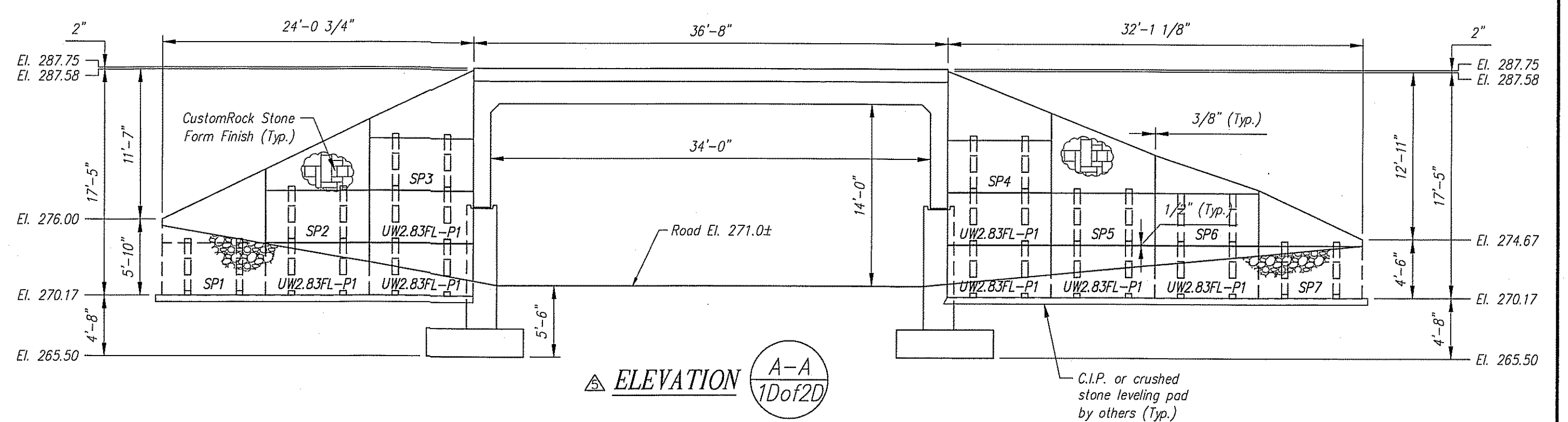
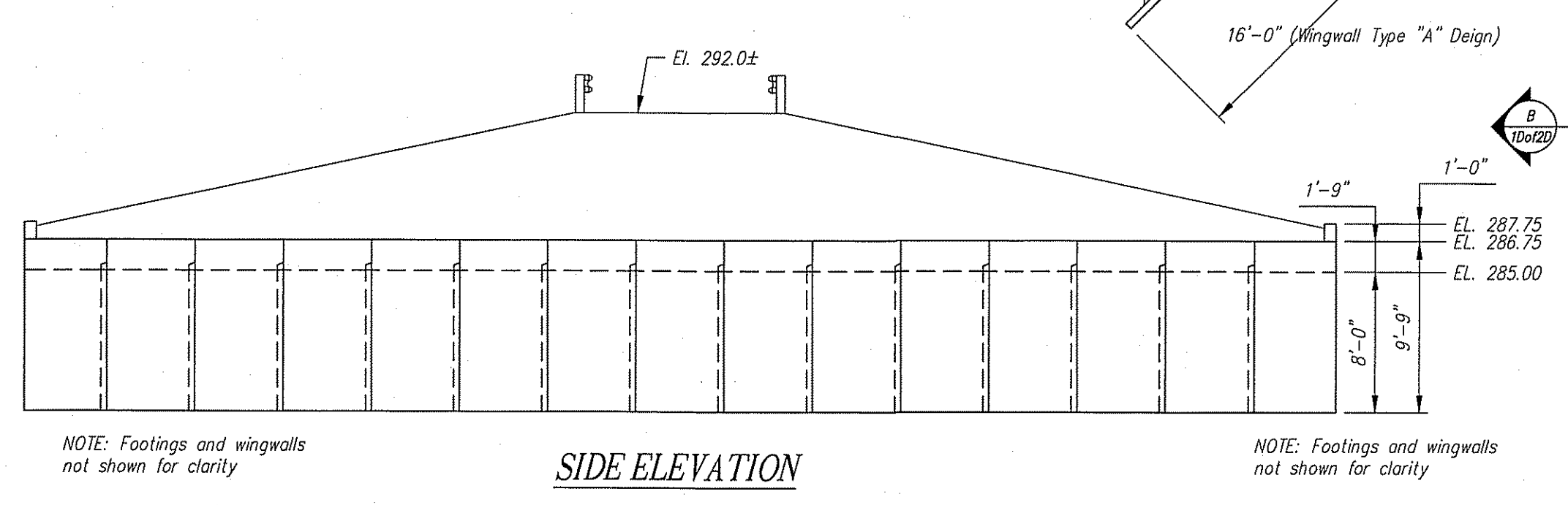
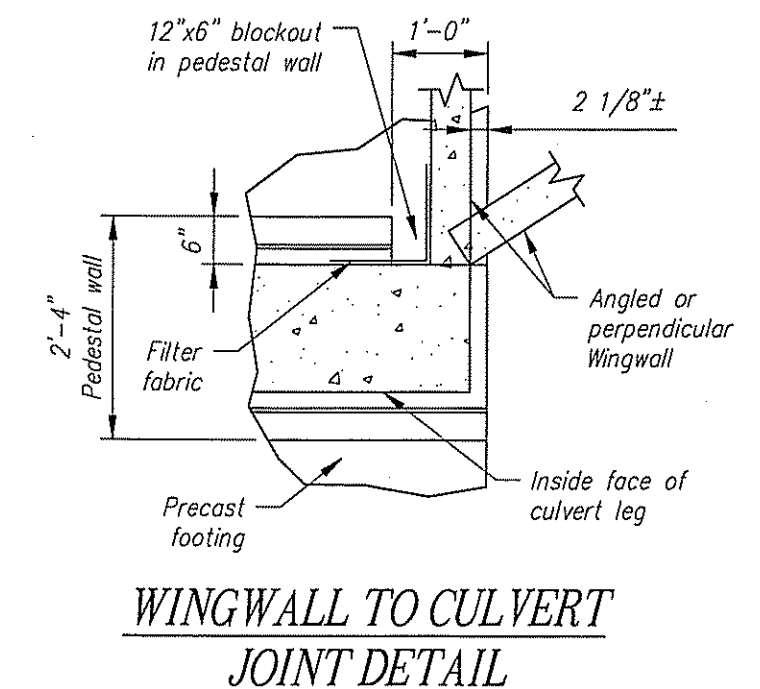
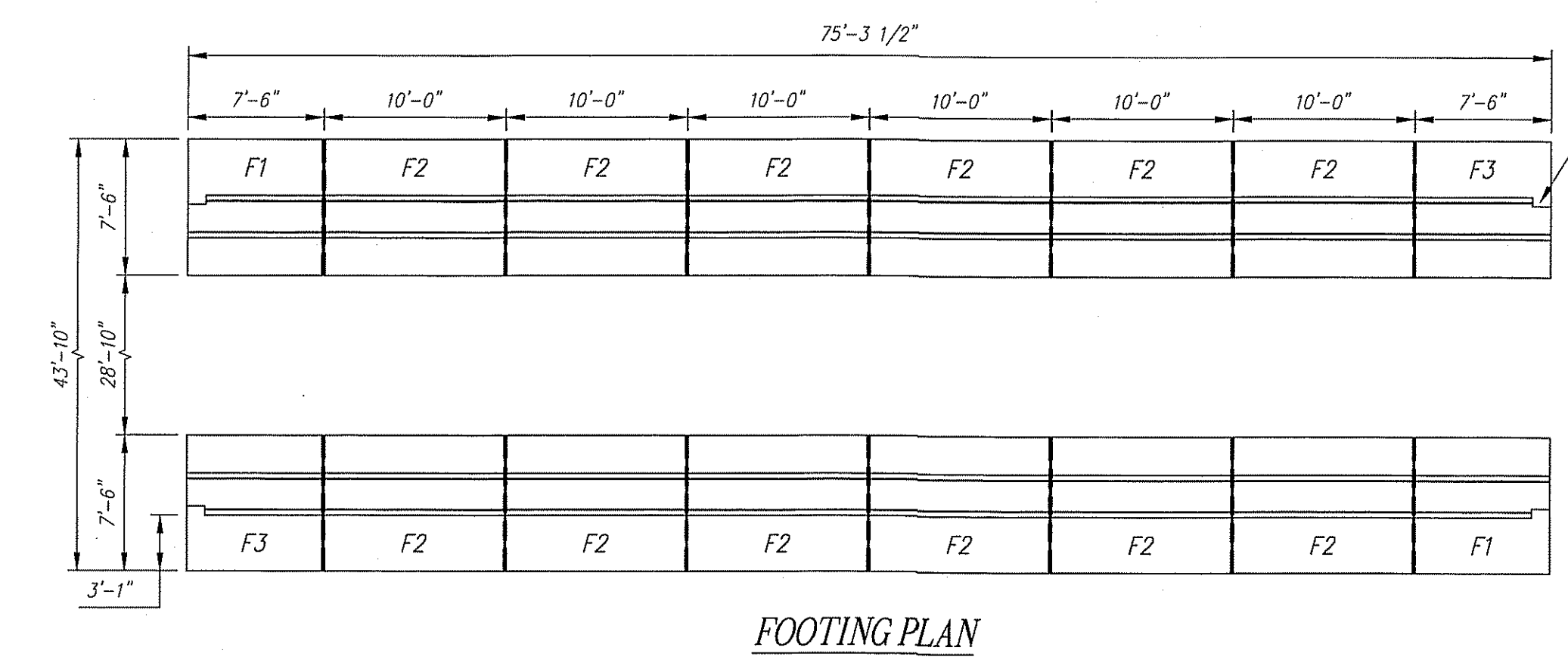


GENERAL NOTES:

- Reference Standards:
AASHTO "Standard Specifications for Highway Bridges"
ASIM C1504
- Design Parameters:
Live load: AASHTO HS20 (40,000 lbs)
Earth Cover: 7' to 8'
Concrete: Design strength $f'_c = 5000$ psi
Unit weight = 150 pcf
Reinforcing: ASTM A615 (rebar), grade 60
ASTM A1064 (WWF) $f_y = 60$ ksi
Soil: Unit weight = 120 pcf
Minimum lateral pressure coefficient .25
Maximum lateral pressure coefficient .50
Cover to reinforcing: 2" top of top slab
1 1/2" elsewhere u.n.a.
- Dimensions include a joint creep. Actual culvert piece length is 1/2" shorter (i.e. 6'-0 1/2" = 6'-0").
- No damproofing or waterproofing supplied by CSI.
- DBS are Dowel Bar Splicers and DI are Dowel Ins.
- Headwalls not designed for impact load.

PIECE SCHEDULE (MX-FA5000SC)				
MARK	QTY	LENGTH	YDS	WEIGHT
D1	1	4.67	15.55	31.48 TONS
D2	13	5.00	15.31	31.01 TONS
D3	1	4.67	14.85	30.08 TONS
F1	2	7.50	10.55	21.37 TONS
F2	12	10.00	14.07	28.49 TONS
F3	2	7.50	10.55	21.37 TONS

Wingwall PIECE SCHEDULE (MX-P1-FA4000WC)				
MARK	QTY	LENGTH	YDS	WEIGHT
UW2.83FL-P1	21	8.00	1.04	2.11 TONS
SP1	1	8.00	1.64	3.33 TONS
SP2	1	8.00	1.62	3.27 TONS
SP3	1	8.00	1.59	3.21 TONS
SP4	1	8.00	1.64	3.32 TONS
SP5	1	8.00	1.77	3.58 TONS
SP6	1	8.00	1.94	3.92 TONS
SP7	1	8.00	1.42	2.88 TONS
SP8	1	8.00	1.40	2.84 TONS
SP9	1	8.00	1.40	2.84 TONS
SP10	1	8.00	1.28	2.60 TONS
SP11	1	8.00	1.31	2.65 TONS
SP12	1	8.00	1.60	3.24 TONS
SP13	1	8.00	1.25	2.53 TONS
SP14	1	8.00	1.54	3.12 TONS



Contractor is to verify that all information shown on drawings has been thoroughly checked, complies with the contract documents and is adequate to meet the field conditions. Some dimensions and details may differ slightly from contract drawings to accommodate the manufacturing or design process. Approval of this drawing indicates that any deviation from the contract documents has been reviewed and found to be acceptable. Production will not commence until receipt of signed, approved shop drawings.

STAMP FOR STRUCTURAL DESIGN ONLY

CHRISTOPHER M. SCOTT
Professional Engineer
No. 10550
State of New Hampshire

Rev.	Date	DESCRIPTION	By
6	11/18/11	Re-aligned NE wingwall	CMV
5	10/19/11	Revised SP6 to have a shorter extension	MS
4	10/13/11	Added lifting and joint details	MS
3	10/12/11	Revised SW wingwall angle from perpendicular to 50°	MS
2	10/07/11	Revised size of footings; Misc. revisions	MS/CV
1	10/03/11	Added reinforcing details;	MS/CV

This drawing is based upon information provided from the following documents and/or sources:

Engineer: Benchmark Engineering
Project No: 911.2
Drawings: Spruce Pond Estates - Phase II
Sheets 1 through 89 of 89

Specifications:
Other Sources: Geotechnical Engineering Evaluation - Mallard Road Bridge and Culvert
Geo Report by Miller Engineering & Testing, Inc.

CSI
Concrete Systems Inc.
9 Commercial St., Hudson, NH, 03051
Phone 603-889-4163
Fax 603-889-2417

STATE AGENCY: CONTINENTAL PAVING
SPRUCE POND ESTATES PHASE II
WINDHAM, NH

Box CULVERT LAYOUT AND DETAILS
C20857-LO4-A

Quantity: 1 Project No: SHEET 1D OF 2D

UWALL SYSTEM NOTES:

A. GENERAL:

- The owner or owners representative is responsible for reviewing and verifying that the actual site conditions are as described prior to and during construction.
- All plan dimensions must be verified by the contractor. The project engineer shall be notified of any discrepancies before the contractor begins work.
- Structures such as building footings, swimming pools, retaining walls, storage or solid panel fencing must be kept clear such that the load is not placed between a line projected behind the wall from the founding level at 1V:1H and the wall.
- Precautions must be taken where other building work, service trenches, garden beds, etc. may be excavated in front of the wall.
- If the top of the reinforced fills is to be planted, plants with root systems that may adversely affect the facing units shall not be used.
- Where a safety fence is required by council it shall be set back a minimum of 40" from the top of the wall.

B. Reinforced Fill:

- Fill material in the reinforced soil structure shall be granular and non-expansive and comply with the design parameters specified on the contract drawings and or specifications. The material shall be capable of being compacted in accordance with the specified requirements to form a stable mass of fill.
- Fill material in the facing blocks and in the reinforced soil structure shall be free from organic matter, plastic, metal, rubber or other synthetic material inorganic contaminants, dangerous or toxic material, or material susceptible to combustion. The pH value of the fill shall be between 5 and 10.
- Fill material shall be placed in layers that are no more than one foot, and each layer shall be thoroughly compacted to not less than 95% of the maximum dry density for standard compaction in accordance with AS 1289, E1.2. The fill moisture content shall be within $\pm 2\%$ of the optimum moisture content for compaction.
- The placement and compaction of fill material shall be carried out in a direction parallel to the face of the wall, and shall be completed in stages to follow closely the erection of the Uwall units and placement of Macgrid reinforcing elements.
- Construction vehicles and equipment weighing more than 1,100 lbs. shall be kept more than five feet away from the facing Uwall. Fill material closer than five feet behind the facing wall may be compacted using hand operated mechanical equipment, such as a vibrating plate, trench compactor or similar.
- Where Macgrid layers overlap such as on convex wall curves, provide a minimum of 2' of fill between the Macgrid layers.

C. REINFORCING ELEMENTS (MINIMUM REQUIRED):

- Macgrid WG reinforcing elements to be stored, transported, handled and placed to the manufacturers specification. They shall not be damaged or displaced during placement and compaction of the fill. Vehicles shall not be operated directly above reinforcing elements that are not covered by at least 4" of fill.
- The Macgrid soil reinforcement shall be laid behind the Uwall units and horizontally on compacted fill. The strong axis of the grid shall be laid perpendicular to the wall face. The next course of units shall be placed. Pull Macgrid taut, and anchor Macgrid to compacted backfill prior to placing backfill. Slack in the Macgrid shall be removed.
- Do not allow fresh concrete, cement powder or lime to come into contact with the reinforcing elements.

GENERAL U-WALL NOTES:

- Concrete Strength $f_c = 4000$ psi.
- Reinforcing Steel: ASTM A615 (rebar) grade 60
ASTM A1064 (WWF) $f_y = 60$ ksi
- Designed per NCEMA.
- U-Wall units to have form liner finish.

D. DRAINAGE:

- Provide a drainage layer directly behind the face of the unit and between the stems. (1/2" thick layer of 3/8" crushed aggregate)
- If the backfill is not free-draining, a drainage layer at the back of the reinforcing block shall be provided from the base of the wall to half the wall height with a positive drainage path and a suitable outlet.
- All subsurface drains to have outlets at low point and a positive drainage path. Provide subsurface drainage pipes with flushing points at high points and intermediate points.

E. DESIGN ASSUMPTIONS:

- The design presented herein is based on soil parameters, foundation conditions, groundwater conditions, and loadings stated in the relevant specifications. Should actual conditions vary from those assumed, the project engineer should be notified prior to construction to determine if redesign of the proposed structure is required.
- CSI Group, Uwall and Maccaferri PTY LTD Group assumes no liability for interpretation of subsurface conditions suitability of soil design parameters, and subsurface groundwater conditions.

F. FOUNDATIONS:

- Bearing capacity is controlled by general shear, maximum permissible eccentricity ratio (soil), $e/A = 0.25$. Applied bearing pressure at maximum height: 3,070 psf.
- The foundation soil shall be proof-rolled prior to placement of fill and Macgrid geosynthetic reinforcement.
- The foundation soil shall be examined by the engineer to ensure that the actual foundation soil strength meets or exceeds the assumed design strength. Soil not meeting the required strength shall be excavated or replaced with approved material.

G. DESIGN PARAMETERS:

- Design of the reinforced soil structures are based upon the following parameters:
 - Reinforced fill (Select):
The infill soil material shall be free of debris and consist of a granular select fill with gradation conforming to Table 1 of the Geotechnical Engineering Evaluation (shown on this sheet).
Effective internal friction angle = 35°
Effective Cohesion = N/A
Moist unit weight = 135 pcf
 - Retained fill:
Effective internal friction angle = 32°
Effective Cohesion = N/A
Moist unit weight = 115 pcf
 - Foundation material:
Effective internal friction angle = 30°
Effective cohesion = N/A
Moist unit weight = 120 pcf
- Surcharge loads applied to structure:
 - Live Load surcharge: N/A
 - Live Load construction surcharge = N/A
- The design assumes no water pressure acts on the wall.
- The design has not considered seismic forces.
- Global (slip circle) stability, settlement, bearing capacity of foundation soils, scour, and site drainage to be checked by others.

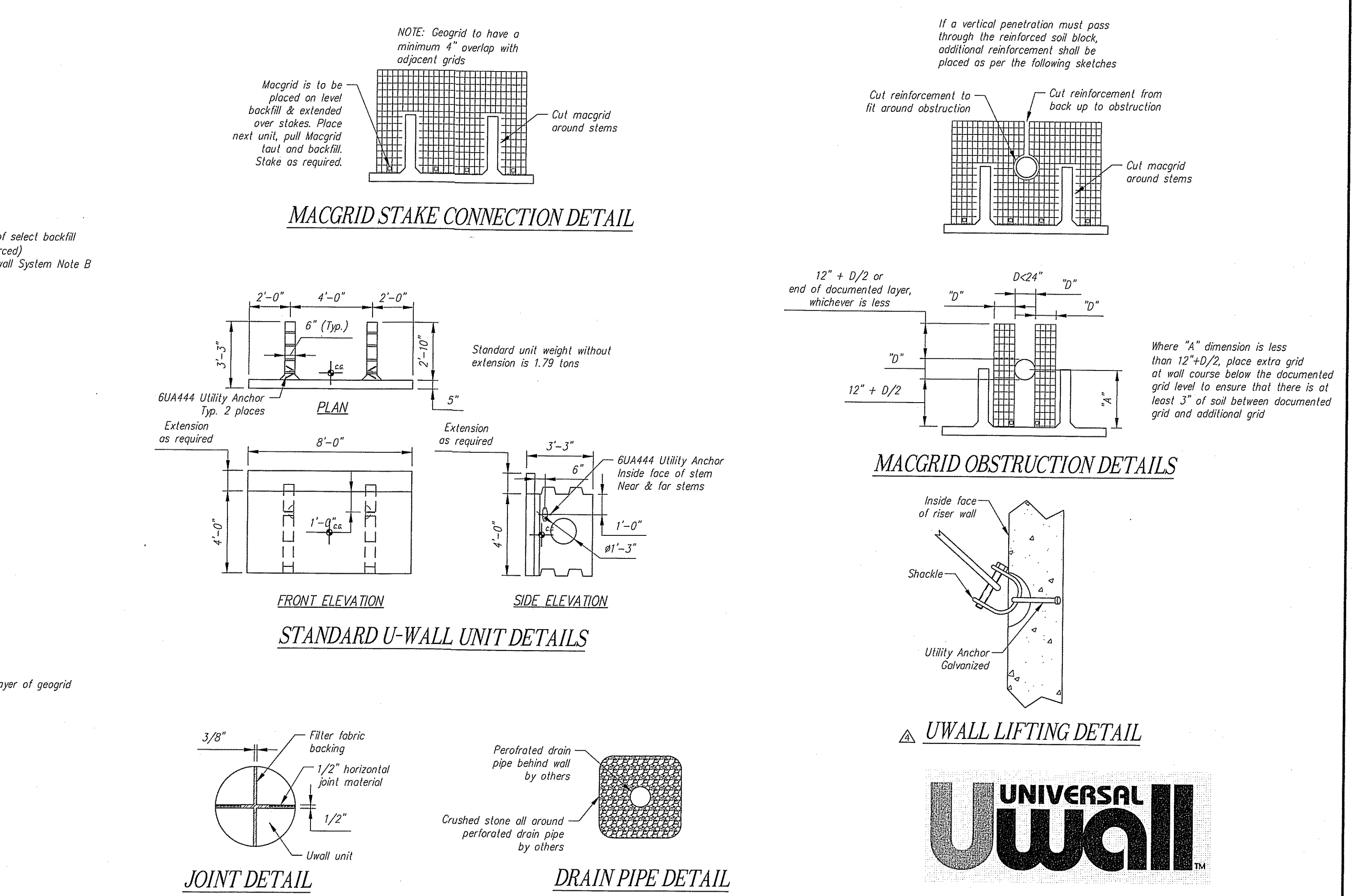
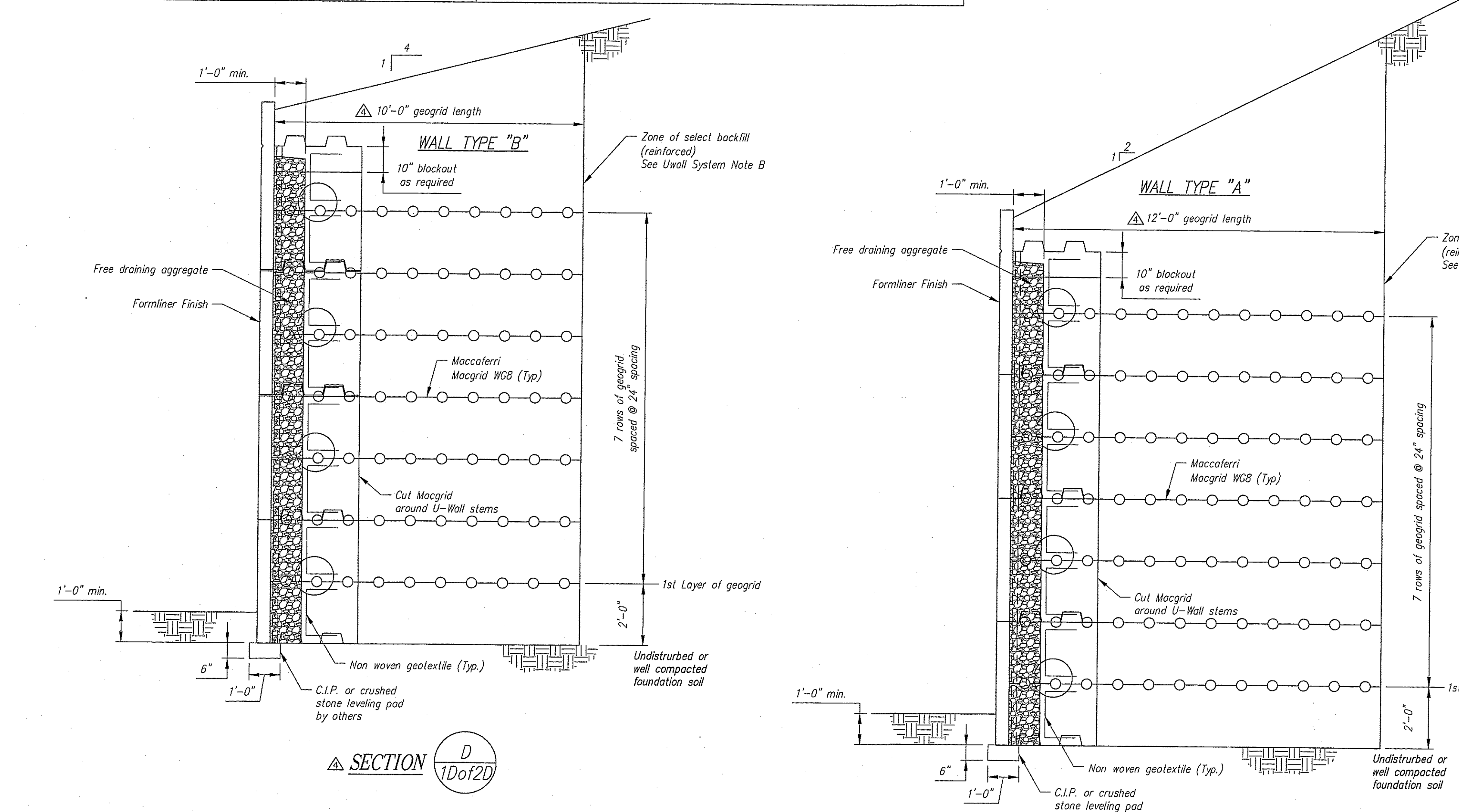
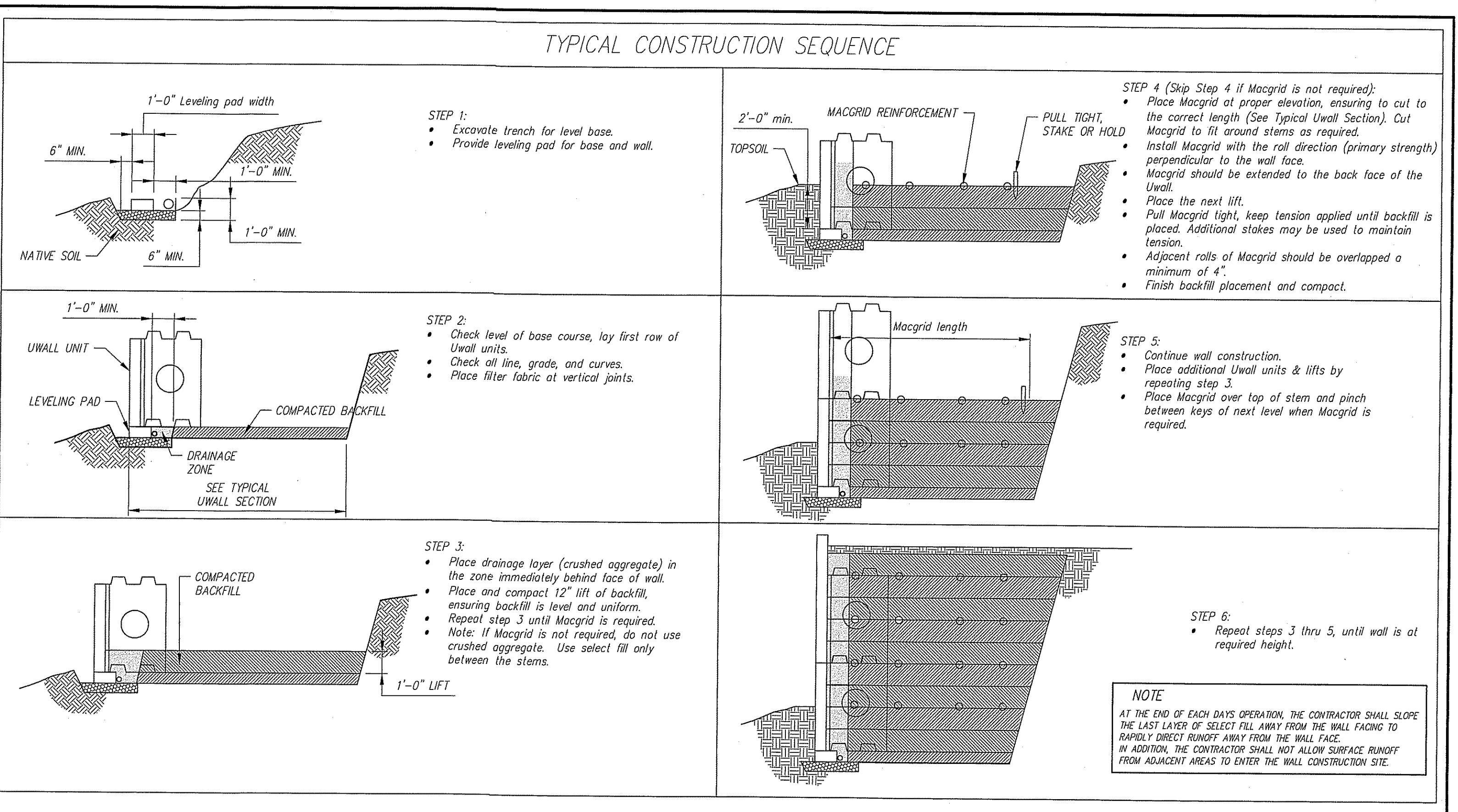
SOUTH EAST WINGWALL TYPE "A" - MACCAFERRI MACGRID TAKEOFF					
Macgrid Row	Wall Length at Row	Macgrid Grade	Macgrid Length Required (ft)	Macgrid Roll Dimensions (ft) (W x L)	Rolls of Macgrid required
1	32.09	WG8	12	12.8 x 328	0.11
2	32.09	WG8	12	12.8 x 328	0.11
3	28.36	WG8	12	12.8 x 328	0.07
4	23.36	WG8	12	12.8 x 328	0.07
5	18.43	WG8	12	12.8 x 328	0.04
Total Rolls:					0.40

SOUTH WEST WINGWALL TYPE "B" - MACCAFERRI MACGRID TAKEOFF					
Macgrid Row	Wall Length at Row	Macgrid Grade	Macgrid Length Required (ft)	Macgrid Roll Dimensions (ft) (W x L)	Rolls of Macgrid required
1	24.06	WG8	10	12.8 x 328	0.06
2	24.06	WG8	10	12.8 x 328	0.06
3	24.06	WG8	10	12.8 x 328	0.06
4	24.06	WG8	10	12.8 x 328	0.06
5	20.87	WG8	10	12.8 x 328	0.06
6	16.7	WG8	10	12.8 x 328	0.03
7	12.72	WG8	10	12.8 x 328	0.03
Total Rolls:					0.27

NORTH EAST WINGWALL TYPE "B" - MACCAFERRI MACGRID TAKEOFF					
Macgrid Row	Wall Length at Row (ft +/-)	Macgrid Grade	Macgrid Length Required (ft)	Macgrid Roll Dimensions (ft) (W x L)	Rolls of Macgrid required
1	24.06	WG8	10	12.8 x 328	0.06
2	24.06	WG8	10	12.8 x 328	0.06
3	24.06	WG8	10	12.8 x 328	0.06
4	24.06	WG8	10	12.8 x 328	0.06
5	20.87	WG8	10	12.8 x 328	0.06
6	16.7	WG8	10	12.8 x 328	0.03
7	12.72	WG8	10	12.8 x 328	0.03
Total Rolls:					0.37

NORTH WEST WINGWALL TYPE "A" - MACCAFERRI MACGRID TAKEOFF					
Macgrid Row	Wall Length at Row	Macgrid Grade	Macgrid Length Required (ft)	Macgrid Roll Dimensions (ft) (W x L)	Rolls of Macgrid required
1	32.09	WG8	12	12.8 x 328	0.11
2	32.09	WG8	12	12.8 x 328	0.11
3	32.09	WG8	12	12.8 x 328	0.11
4	32.09	WG8	12	12.8 x 328	0.11
5	32.09	WG8	12	12.8 x 328	0.11
6	25.25	WG8	12	12.8 x 328	0.07
7	17.77	WG8	12	12.8 x 328	0.04
Total Rolls:					0.68

SELECT FILL GRADATION SPECIFICATIONS (PERCENT PASSING BY WEIGHT)				
SIEVE SIZE	CLEAN GRANULAR FILL	BASE COURSE	SELECT GRANULAR FILL	
8"	100	100	100	
3"	70 - 100	100	70 - 100	
1 1/2"	40 - 100	40 - 80	40 - 90	
No. 4	25 - 100	30 - 70	25 - 80	
No. 10	15 - 95	20 - 60	15 - 70	
No. 40	10 - 70	10 - 30	5 - 40	
No. 200	0 - 15	3 - 10	0 - 12	



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Stamp for structural design and internal stability of Uwall structures only

Rev.	Date	DESCRIPTION	By
6	11/18/11	No changes to this sheet	CM
5	10/19/11	No changes to this sheet	MS
4	10/14/11	Revised weights of Uwall units on sheet 1D of 2D; Revised Section D & Section E	MS
3	10/12/11	Revised SW wingwall angle on sheet 1D of 2D	MS
2	10/07/11	Revised footings on sheet 1D of 2D	MS
1	10/03/11	Added sheet 2D	MS/CV

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Engineer: Benchmark Engineering
Project No: 911.2
Drawings: Spruce Pond Estates - Phase II
Sheets 1 through 89 of 89

Specifications:

Other Sources: Geotechnical Engineering Evaluation - Mallard Road Bridge and Culvert
Geo Report by Miller Engineering & Testing, Inc.

CSI
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Fax 603-889-2417

UNIVERSAL Uwall
PRECAST CONCRETE RETAINING WALL SYSTEM

STATE AGENCY		CONTINENTAL PAVING	
Checked By: M. SCOTT	Date: 07/18/2011	SPRUCE POND ESTATES PHASE II WINDHAM, NH	
Approved By: M. SCOTT	Date: 10/19/2011	RAIL TRAIL BOX CULVERT WINGWALL DETAILS	
Quantity: 1	Project No:	C20857-LO4-B	

REV 6 SHEET 2D OF 2D