



# City of Albuquerque

Planning Department

Development & Building Services Division

## DRAINAGE AND TRANSPORTATION INFORMATION SHEET

(REV 02/2013)

Project Title: \_\_\_\_\_ Building Permit #: \_\_\_\_\_ City Drainage #: \_\_\_\_\_

DRB#: \_\_\_\_\_ EPC#: \_\_\_\_\_ Work Order#: \_\_\_\_\_

Legal Description: \_\_\_\_\_

City Address: \_\_\_\_\_

**Engineering Firm:** \_\_\_\_\_ Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_ E-mail: \_\_\_\_\_

**Owner:** \_\_\_\_\_ Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_ E-mail: \_\_\_\_\_

**Architect:** \_\_\_\_\_ Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_ E-mail: \_\_\_\_\_

**Surveyor:** \_\_\_\_\_ Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_ E-mail: \_\_\_\_\_

**Contractor:** \_\_\_\_\_ Contact: \_\_\_\_\_

Address: \_\_\_\_\_

Phone#: \_\_\_\_\_ Fax#: \_\_\_\_\_ E-mail: \_\_\_\_\_

### TYPE OF SUBMITTAL:

- ☐ DRAINAGE REPORT
- ☐ DRAINAGE PLAN 1st SUBMITTAL
- ☐ DRAINAGE PLAN RESUBMITTAL
- ☐ CONCEPTUAL G & D PLAN
- ☐ GRADING PLAN
- ☐ EROSION & SEDIMENT CONTROL PLAN (ESC)
- ☐ ENGINEER'S CERT (HYDROLOGY)
- ☐ CLOMR/LOMR
- ☐ TRAFFIC CIRCULATION LAYOUT (TCL)
- ☐ ENGINEER'S CERT (TCL)
- ☐ ENGINEER'S CERT (DRB SITE PLAN)
- ☐ ENGINEER'S CERT (ESC)
- ☐ SO-19
- ☐ OTHER (SPECIFY) \_\_\_\_\_

### CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

- ☐ SIA/FINANCIAL GUARANTEE RELEASE
- ☐ PRELIMINARY PLAT APPROVAL
- ☐ S. DEV. PLAN FOR SUB'D APPROVAL
- ☐ S. DEV. FOR BLDG. PERMIT APPROVAL
- ☐ SECTOR PLAN APPROVAL
- ☐ FINAL PLAT APPROVAL
- ☐ CERTIFICATE OF OCCUPANCY (PERM)
- ☐ CERTIFICATE OF OCCUPANCY (TCL TEMP)
- ☐ FOUNDATION PERMIT APPROVAL
- ☐ BUILDING PERMIT APPROVAL
- ☐ GRADING PERMIT APPROVAL
- ☐ PAVING PERMIT APPROVAL
- ☐ WORK ORDER APPROVAL
- ☐ GRADING CERTIFICATION
- ☐ SO-19 APPROVAL
- ☐ ESC PERMIT APPROVAL
- ☐ ESC CERT. ACCEPTANCE
- ☐ OTHER (SPECIFY) \_\_\_\_\_

WAS A PRE-DESIGN CONFERENCE ATTENDED: \_\_\_\_\_ Yes \_\_\_\_\_ No \_\_\_\_\_ Copy Provided

DATE SUBMITTED: \_\_\_\_\_ By: \_\_\_\_\_

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location, and scope to the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres
3. **Drainage Report:** Required for subdivision containing more than ten (10) lots or constituting five (5) acres or more
4. **Erosion and Sediment Control Plan:** Required for any new development and redevelopment site with 1-acre or more of land disturbing area, including project less than 1-acre that are part of a larger common plan of development

RIO GRANDE ENGINEERING OF NEW MEXICO, LLC

October 14, 2014

Mr. Rudy Rael  
Engineer  
Hydrology  
City of Albuquerque

**RE: Revised Grading and Drainage Plan  
Retaining wall at Covered Wagon Subdivision  
L23-D14**

Dear Mr. Rael:

The purpose of this letter is to accompany the enclosed plans. The plans include a grading plan prepared by this office based upon the overall subdivision grading plan. This plan provides greater detail for top and bottom of walls at each property line. In addition a signed copy of the retaining wall supplier detail and stationing profile has been included. Finally a comparison between the two was prepared to assure the wall designed meets the height requirements of the grading plan. The contractor will be submitting plans for retaining wall permit separately.

Should you have any questions regarding this re-submittal, please do not hesitate to call me.

Sincerely,



David Soule, PE  
Rio Grande Engineering  
505.321.9099

EROSION CONTROL NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A TOPSOIL DISTURBANCE PERMIT PRIOR TO BEGINNING WORK.
2. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING RUN-OFF ON SITE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR CLEANING ALL SEDIMENT THAT GETS INTO EXISTING RIGHT-OF-WAY.
4. REPAIR OF DAMAGED FACILITIES AND CLEANUP OF SEDIMENT ACCUMULATIONS ON ADJACENT PROPERTIES AND IN PUBLIC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL EXPOSED EARTH SURFACES MUST BE PROTECTED FROM WIND AND WATER EROSION PRIOR TO FINAL (CITY) ACCEPTANCE OF ANY PROJECT.

LEGAL DESCRIPTION:

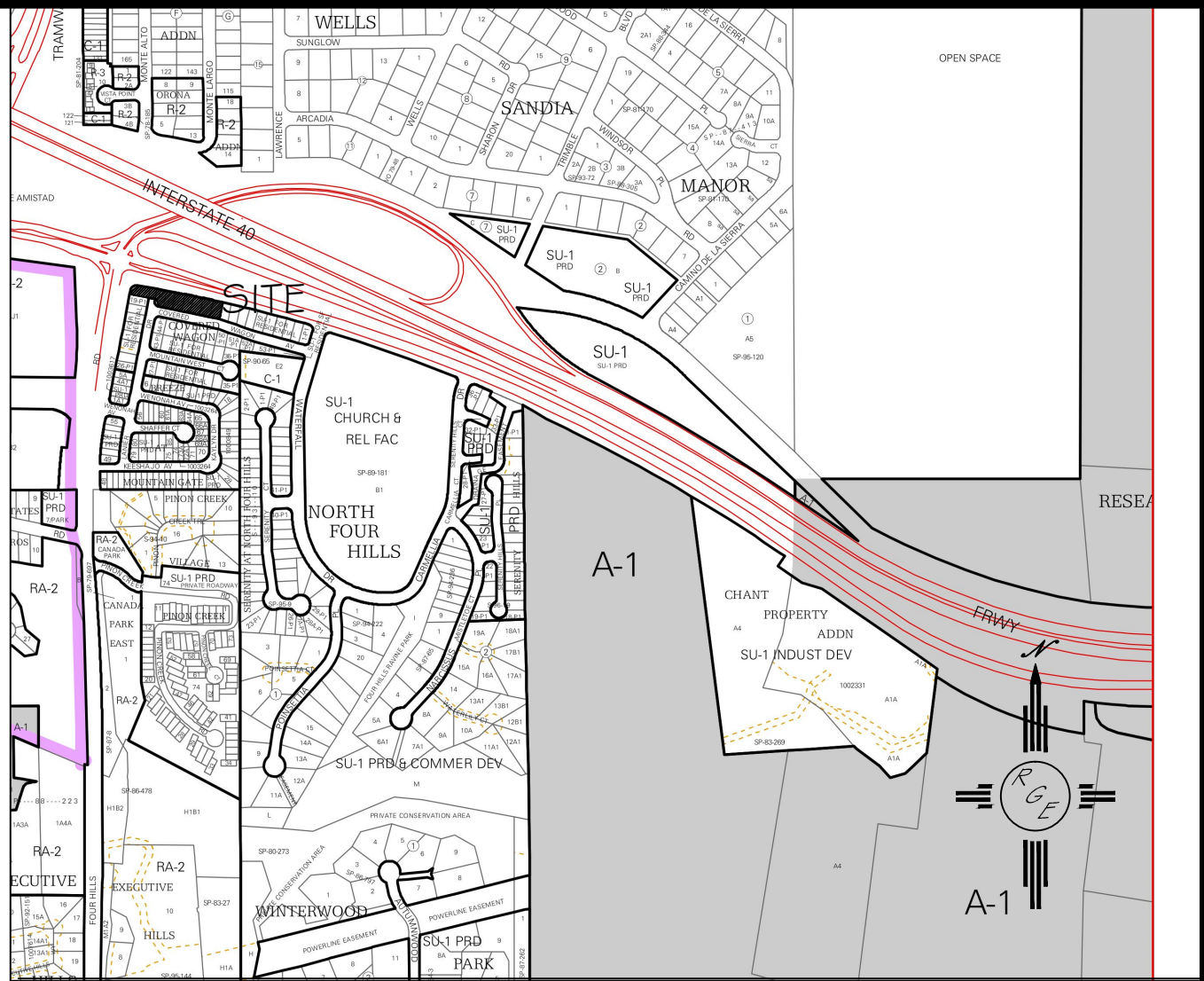
LOTS 11-19 COVERED WAGON SUBDIVISION

NOTES:

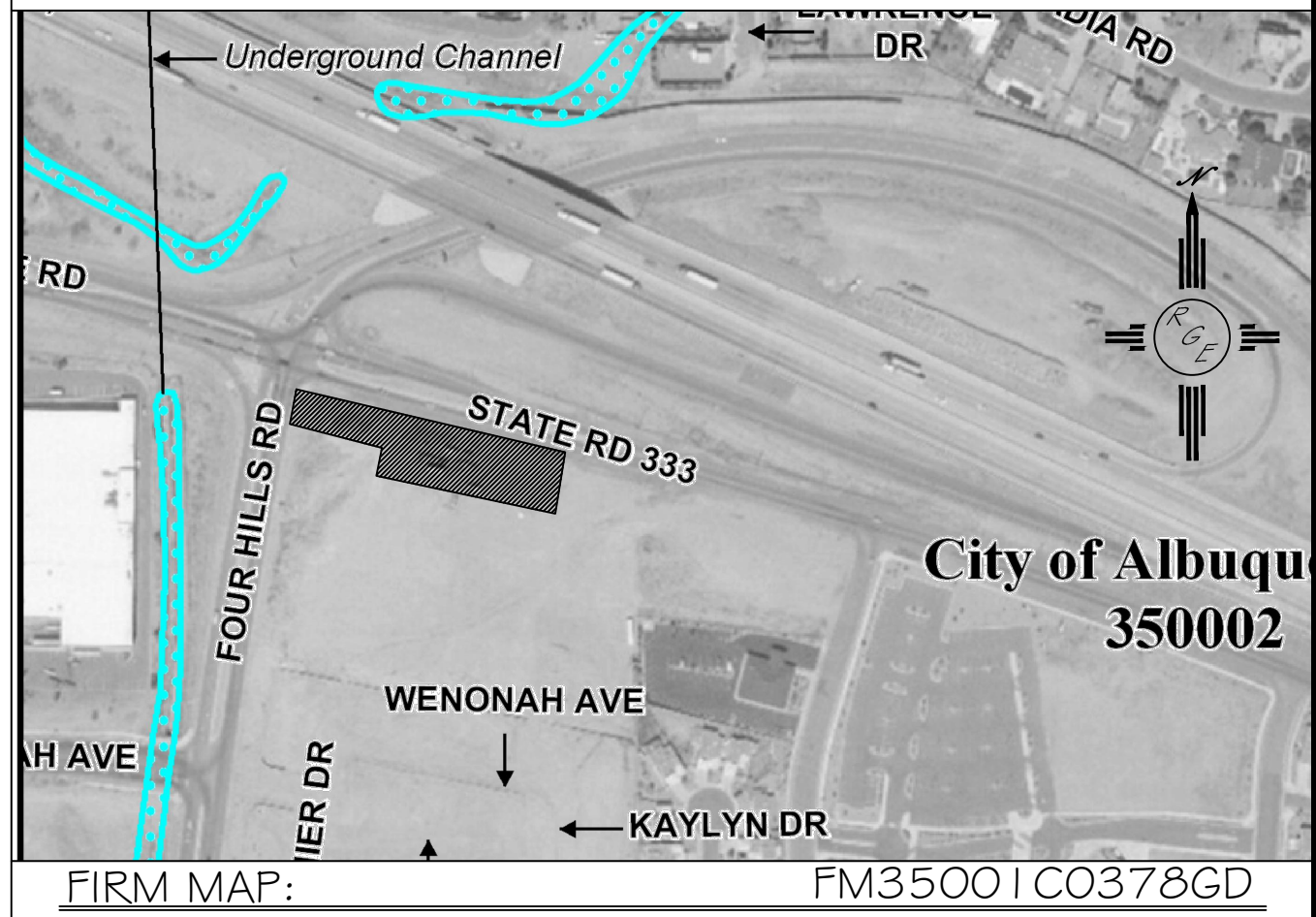
1. ALL SPOT ELEVATIONS REPRESENT FLOWLINE ELEVATION UNLESS OTHERWISE NOTED.
2. TOPOGRAPHIC INFORMATION PROVIDED BY CONSTRUCTION SURVEYS SEPTEMBER 2014
3. ELEVATION DATUM IS NAVD 1988 PROVIDED BY CONSTRUCTION SURVEY TECHNOLOGIES, INC PLS 21082

LEGEND

- 5411--- EXISTING CONTOUR
- 5410--- EXISTING INDEX CONTOUR
- 5411--- PROPOSED CONTOUR
- 5410--- PROPOSED INDEX CONTOUR
- PROJECT BENCHMARK

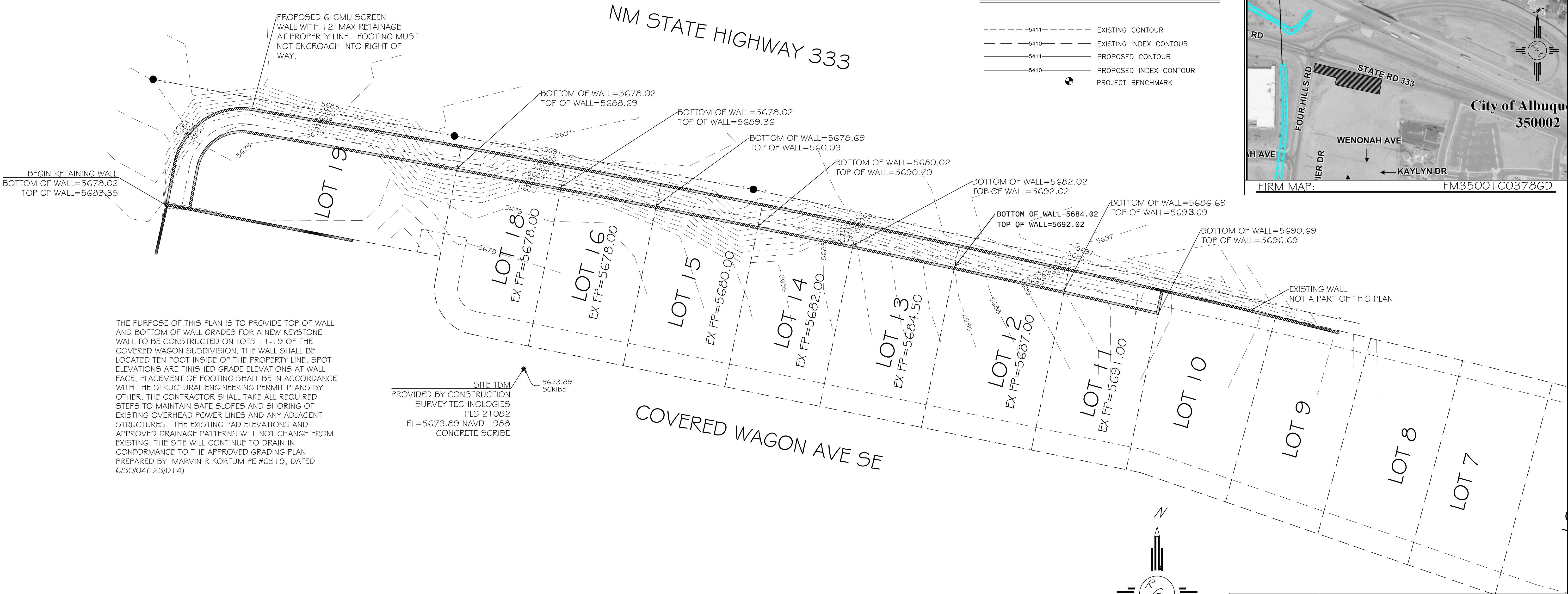


VICINITY MAP:



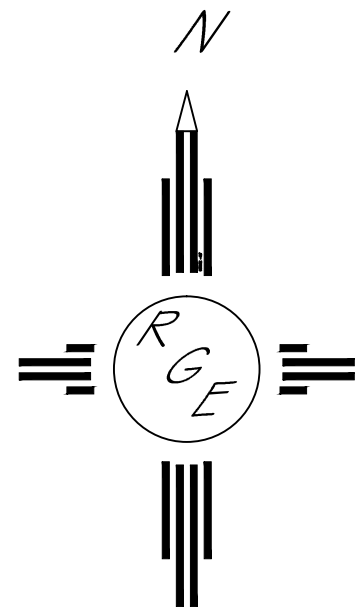
FIRM MAP:

FM35001C0378GD

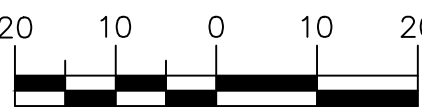


THE PURPOSE OF THIS PLAN IS TO PROVIDE TOP OF WALL AND BOTTOM OF WALL GRADES FOR A NEW KEYSTONE WALL TO BE CONSTRUCTED ON LOTS 11-19 OF THE COVERED WAGON SUBDIVISION. THE WALL SHALL BE LOCATED TEN FOOT INSIDE OF THE PROPERTY LINE. SPOT ELEVATIONS ARE FINISHED GRADE ELEVATIONS AT WALL FACE. PLACEMENT OF FOOTING SHALL BE IN ACCORDANCE WITH THE STRUCTURAL ENGINEERING PERMIT PLANS BY OTHER. THE CONTRACTOR SHALL TAKE ALL REQUIRED STEPS TO MAINTAIN SAFE SLOPES AND SHORING OF EXISTING OVERHEAD POWER LINES AND ANY ADJACENT STRUCTURES. THE EXISTING PAD ELEVATIONS AND APPROVED DRAINAGE PATTERNS WILL NOT CHANGE FROM EXISTING. THE SITE WILL CONTINUE TO DRAIN IN CONFORMANCE TO THE APPROVED GRADING PLAN PREPARED BY MARVIN R. KORTUM PE #6519, DATED 6/30/04(123/D14)

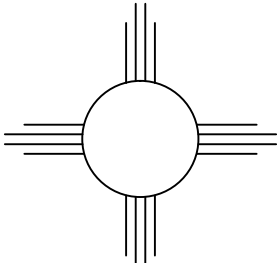
SITE TBM  
PROVIDED BY CONSTRUCTION  
SURVEY TECHNOLOGIES  
PLS 21082  
EL=5673.89 NAVD 1988  
CONCRETE SCRIBE



GRAPHIC SCALE

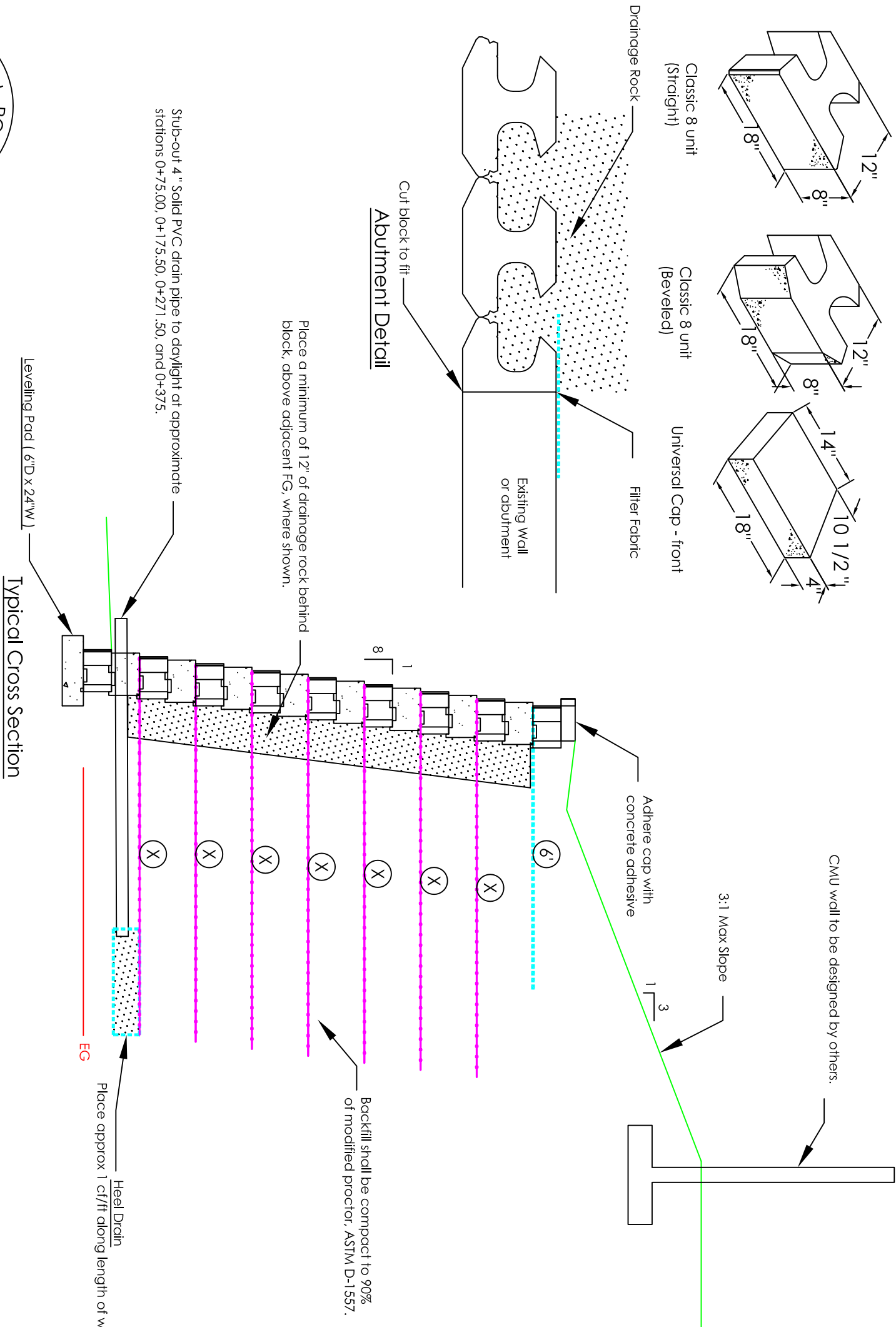


SCALE: 1"=20'

|                                                                                                                                                                                                              |                           |                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------|
| ENGINEER'S<br>SEAL<br><br><br><br>10/14/14<br><br>DAVID SOULE<br>P.E. #14522                                            | COVERED WAGON SUBDIVISION | DRAWN<br>BY JDG    |
|                                                                                                                                                                                                              | WALL PLAN                 | DATE<br>09-10-2014 |
| <br><b>Rio Grande<br/>Engineering</b><br>1606 CENTRAL AVENUE SE<br>SUITE 201<br>ALBUQUERQUE, NM 87106<br>(505) 872-0999 |                           | SHEET #<br>1 OF 1  |
|                                                                                                                                                                                                              |                           | JOB #              |

# Covered Wagon Subdivision Wall

## Typical Cross Section



- Foundation Soils
- A. Foundation soils must be found competent at design excavation grade. **EG**, by project soils engineer. Global stability shall be analyzed by the project soils engineer.

### Base Leveling Pad Material

- A. Base leveling pad material shall consist of compacted aggregate base or non-reinforced concrete. Aggregate base material shall meet the following gradation in accordance with ASTM D-422:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 1 inch     | 100             |
| no. 4      | 35 - 70         |
| no. 200    | 5 - 15          |

### Drainage Fill Material

- A. Drainage fill material shall consist of crushed rock meeting the following gradation in accordance with ASTM D-422:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 3 inch     | 100             |
| 1/2 inch   | 0-25            |
| no. 200    | 0-5             |

### Backfill

- A. Backfill shall consist of soil that is free of debris and deleterious material. Backfill shall meet the following gradation in accordance with ASTM D-422:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 3 inch     | 100             |
| no. 40     | 0-60            |
| no. 200    | 0-30            |

- B. Backfill shall have a Plasticity Index (PI) < 15 and Liquid Limit (LL) < 40 per ASTM D 4318.

- C. Backfill shall have an peak effective friction angle of 36°, as determined by direct shear testing.

- D. The contractor shall obtain independent lab test results to verify that the backfill meets the requirements of A through C.

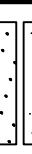
### Geogrid

- A. Geogrid shall be Stratagrid SG200 or equivalent. Geogrid length, X, shall be as shown on sheet 3 through 6 of 6, *Wall Plan and Profile*.

- B. Filter Fabric shall be Mirofil 140N or equivalent.

### Installation

- A. Unless specified herein, refer to Rockwood's *Installation Guide*. Contact MSE should additional details be needed.

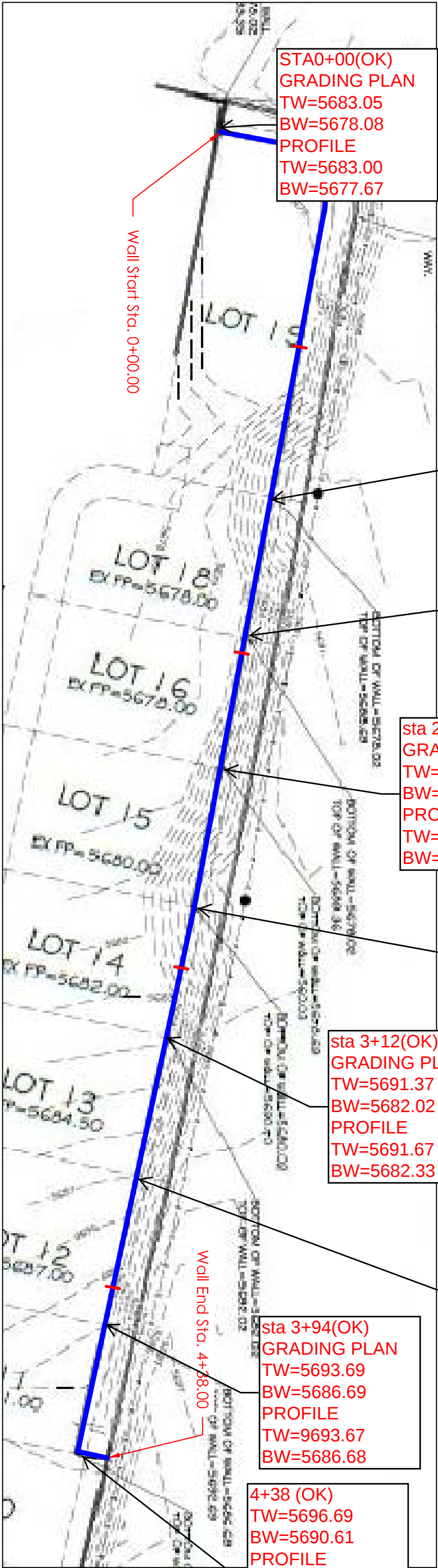
|                                                                                                                                                                                                                                                                                                                               |  |          |  |                                                                                                                                                                                                            |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| <div><div><div>16810</div><div>NEW MEXICO</div><div>CAMERON ROBERSON</div><div>LICENSED PROFESSIONAL ENGINEER</div></div></div>                                                                                                                                                                                               |  |          |  | I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of New Mexico. |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
| Print Name: <u>Cameron Roberson</u>                                                                                                                                                                                                                                                                                           |  |          |  | Signature: _____                                                                                                                                                                                           |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
| Date: <u>3/26/2014</u>                                                                                                                                                                                                                                                                                                        |  |          |  | License # <u>16810</u>                                                                                                                                                                                     |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
| No.                                                                                                                                                                                                                                                                                                                           |  | Date.    |  | Revision.                                                                                                                                                                                                  |  | By. |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
| 1                                                                                                                                                                                                                                                                                                                             |  | 10/01/14 |  | Profiles revised based on new plans                                                                                                                                                                        |  | JAS |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                               |  |          |  |                                                                                                                                                                                                            |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                               |  |          |  |                                                                                                                                                                                                            |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                               |  |          |  |                                                                                                                                                                                                            |  |     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |
| <div><div><div><div>Mortarless Systems Engineering</div><div>325 Alliance Place NE</div><div>Rochester, MN 55906</div><div>Phone: 507-535-3526</div><div>Fax: 507-529-2879</div></div></div><div><div>An SRW Design Firm</div></div></div> |  |          |  |                                                                                                                                                                                                            |  |     |  | <div><div>Legend</div><div><div> Stratagrid 200 or equal</div><div> Finish Grade</div><div> Mirofil 140N or equal</div><div> Grid/Fabric Length (Measured from face of wall)</div></div></div> |  |  |  |  |  |  |  | <div><div>Project Name and Location:</div><div><div>Covered Wagon Subdivision Wall</div><div>Albuquerque, NM</div></div></div> |  |  |  |  |  |  |  | <div><div>Prepared For:</div><div><div>Poll Design and Construction</div><div>Drawn By: JAS</div><div>Checked By: CER</div></div></div> |  |  |  |  |  |  |  |
| <div><div>Drawing Description:</div><div>Typical Cross Section</div></div>                                                                                                                                                                                                                                                    |  |          |  |                                                                                                                                                                                                            |  |     |  | <div><div>Sheet 1 of 6</div><div>Date: 3/26/2014</div><div>Project Number: 13-0354</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |                                                                                                                                |  |  |  |  |  |  |  |                                                                                                                                         |  |  |  |  |  |  |  |

Typical Cross Section

A. Unless specified herein, refer to Rockwood's Installation Guide. Contact MSE should additional details be needed.

# Covered Wagon Subdivision

## Wall Plan View



STA0+00(OK)  
GRADING PLAN  
TW=5683.05  
BW=5678.08  
PROFILE  
TW=5683.00  
BW=5677.67

sta1+39(OK)  
GRADING PLAN  
TW=5688.02  
BW=5678.69  
PROFILE  
TW=5688.85  
BW5677.67

sta1+85(OK)  
GRADING PLAN  
TW=5689.36  
BW=5678.02  
PROFILE  
TW=5690.00  
BW=5678.00

sta 2+27(OK)  
GRADING PLAN  
TW=5690.03  
BW=5978.69  
PROFILE  
TW=5690.68  
BW=5678.67

sta 2+70(OK)  
GRADING PLAN  
TW=5690.70  
BW=5680  
PROFILE  
TW=5691.00  
BW=5680.10

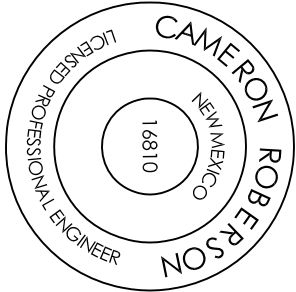
sta 3+12(OK)  
GRADING PLAN  
TW=5691.37  
BW=5682.02  
PROFILE  
TW=5691.67  
BW=5682.33

sta 3+57(OK)  
GRADING PLAN  
TW=5692.02  
BW=5684.02  
PROFILE  
TW=5692.33  
BW=5864.45

sta 3+94(OK)  
GRADING PLAN  
TW=5693.69  
BW=5686.69  
PROFILE  
TW=9693.67  
BW=5686.68

4+38 (OK)  
TW=5696.69  
BW=5690.61  
PROFILE  
TW=96.00  
BW=90.50

Excerpt from Sheet 1 of 1, Wall Palm, by Rio Grande Engineering for the Covered Wagon Subdivision project in Albuquerque, NM, dated 9/10/14.  
Wall alignment is at bottom of wall. Contractor and surveyor must consider batter of wall in determining top of wall alignment.  
Scale: None



I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of New Mexico.  
Print Name: Cameron Roberson  
Signature: \_\_\_\_\_  
Date: 3/26/2014 License # 16810

| No. | Date.    | Revision.                           | By. |
|-----|----------|-------------------------------------|-----|
| 1   | 10/01/14 | Profiles revised based on new plans | JAS |
|     |          |                                     |     |
|     |          |                                     |     |

**Mortanless Systems Engineering**  
325 Alliance Place NE  
Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

**AS SHW Design Firm**

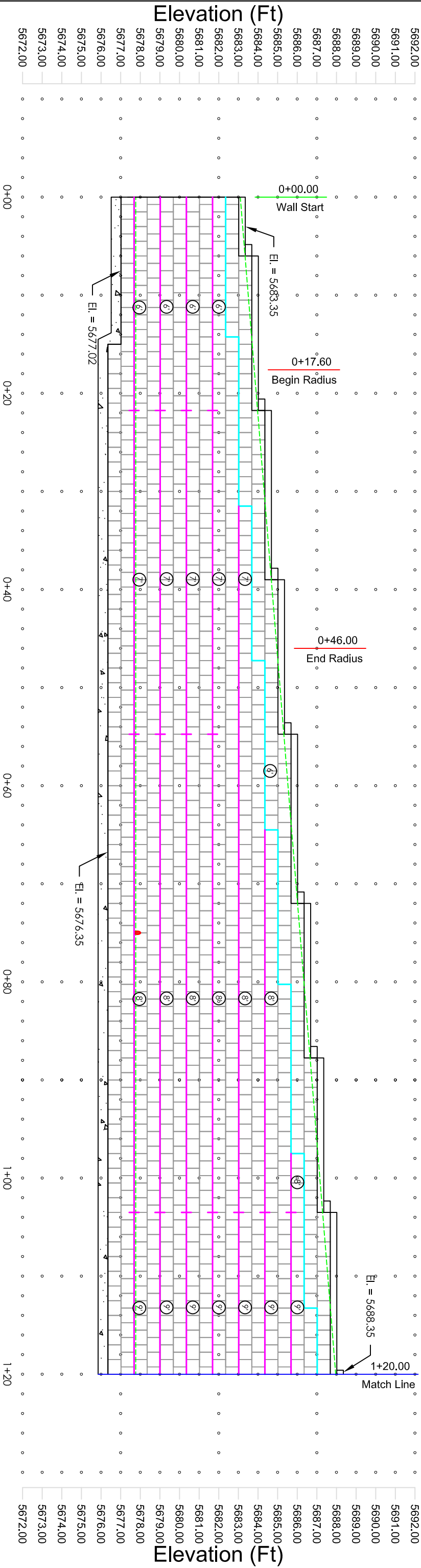
**Legend**

 Wall Alignment  
 Approximate Location of Heel Drain Outlet

| Project Name and Location:                        |  | Prepared For:                |                    |
|---------------------------------------------------|--|------------------------------|--------------------|
| Covered Wagon Subdivision Wall<br>Albuquerque, NM |  | Palm Design and Construction |                    |
| Drawing Description:<br>Wall Plan View            |  | Drawn By:<br>JAS             | Checked By:<br>CER |
|                                                   |  | Sheet 2 of 6                 |                    |
|                                                   |  | Date: 3/26/2014              |                    |
|                                                   |  | Project Number: 13-0354      |                    |

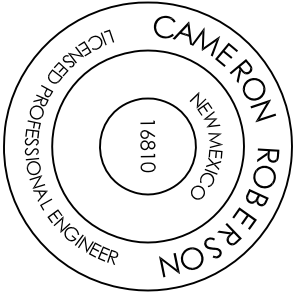
# Covered Wagon Subdivision Wall

## Wall Profile



Wall 1 — FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



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Print Name: Cameron Roberson  
Signature: \_\_\_\_\_  
Date: 3/26/2014 License # 16810

| No. | Date.    | Revision.                           | By. |
|-----|----------|-------------------------------------|-----|
| 1   | 10/01/14 | Profiles revised based on new plans | JAS |
|     |          |                                     |     |
|     |          |                                     |     |

**MSE**  
*AN SHW Design Firm*

**Mortanless Systems Engineering**  
325 Alliance Place NE  
Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

**Legend**

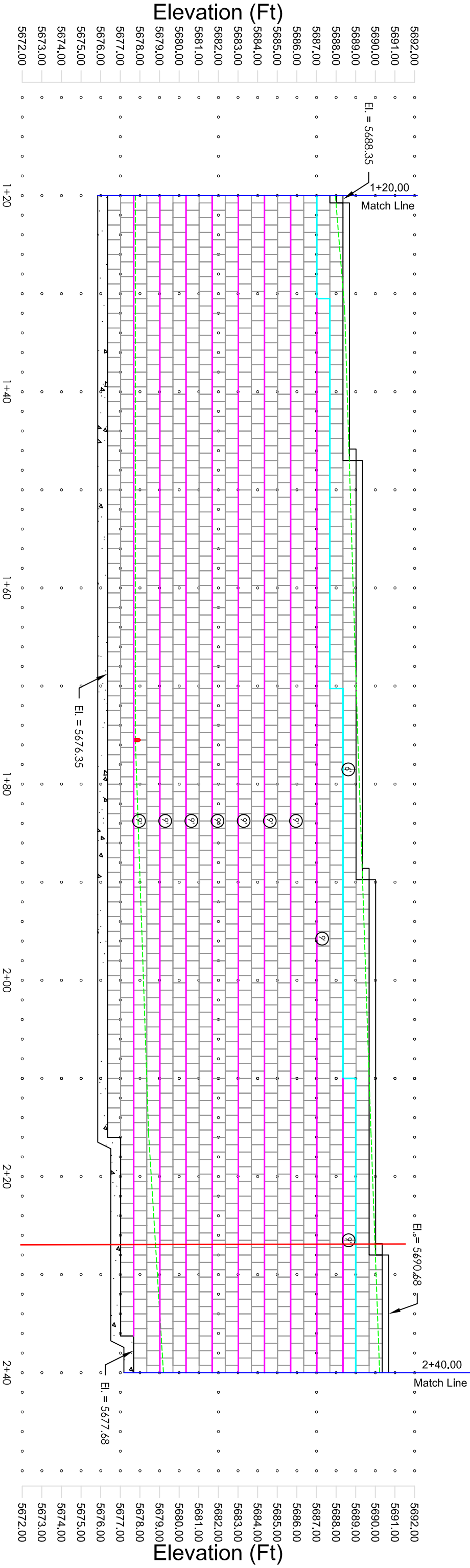
 Leveling Pod  
 Heel Drain Outlet

 Stratogrid 200 or equal  
 Finish Grade  
 Mirafi 140N or equal  
 Grid/Fabric Length (Measured from face of wall)

| Project Name and Location:        |  | Prepared For:                |                 |
|-----------------------------------|--|------------------------------|-----------------|
| Covered Wagon Subdivision Wall    |  | Fort Design and Construction |                 |
| Albuquerque, NM                   |  | Drawn By: JAS                | Checked By: CER |
| Drawing Description: Wall Profile |  | Sheet 3 of 6                 |                 |
|                                   |  | Date: 3/26/2014              |                 |
|                                   |  | Project Number: 13-0354      |                 |

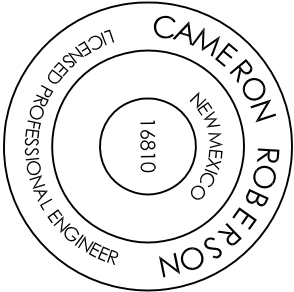
# Covered Wagon Subdivision Wall

## Wall Profile



Wall 1 – FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of New Mexico.

Print Name: Cameron Roberson

Signature: \_\_\_\_\_

Date: 3/26/2014 License # 16810

| No. | Date.    | Revision.                           | By. |
|-----|----------|-------------------------------------|-----|
| 1   | 10/01/14 | Profiles revised based on new plans | JAS |
|     |          |                                     |     |
|     |          |                                     |     |



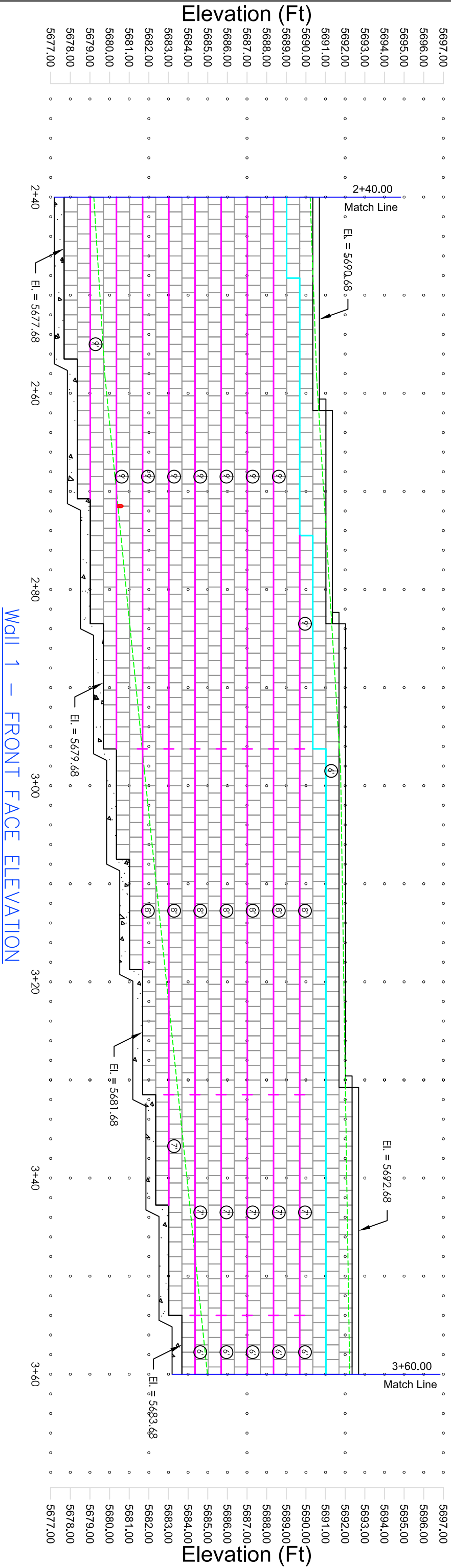
**Mortarless Systems Engineering**  
325 Alliance Place NE  
Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

| Legend |                                                 |
|--------|-------------------------------------------------|
|        | Stratagrid 200 or equal                         |
|        | Finish Grade                                    |
|        | Miffl 140N or equal                             |
|        | Heel Drain Outlet                               |
|        | Grid/Fabric Length (Measured from face of wall) |

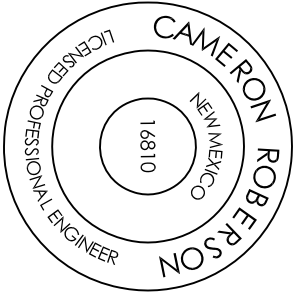
| Project Name and Location:                        |                         |
|---------------------------------------------------|-------------------------|
| Covered Wagon Subdivision Wall<br>Albuquerque, NM |                         |
| Drawing Description:<br>Wall Profile              |                         |
| Prepared For:<br>Port Design and Construction     | Drawn By:<br>JAS        |
| Checked By:<br>CER                                | Sheet 4 of 6            |
| Date: 3/26/2014                                   | Project Number: 13-0354 |

# Covered Wagon Subdivision Wall

## Wall Profile



Scale:  
H: 1" = 10'  
V: 1" = 5'



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Print Name: Cameron Roberson

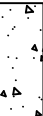
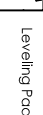
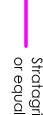
Signature: \_\_\_\_\_

Date: 3/26/2014 License # 16810

| No. | Date.    | Revision.                           | By. |
|-----|----------|-------------------------------------|-----|
| 1   | 10/01/14 | Profiles revised based on new plans | JAS |
|     |          |                                     |     |
|     |          |                                     |     |

**MSE**  
*Mortarless Systems Engineering*

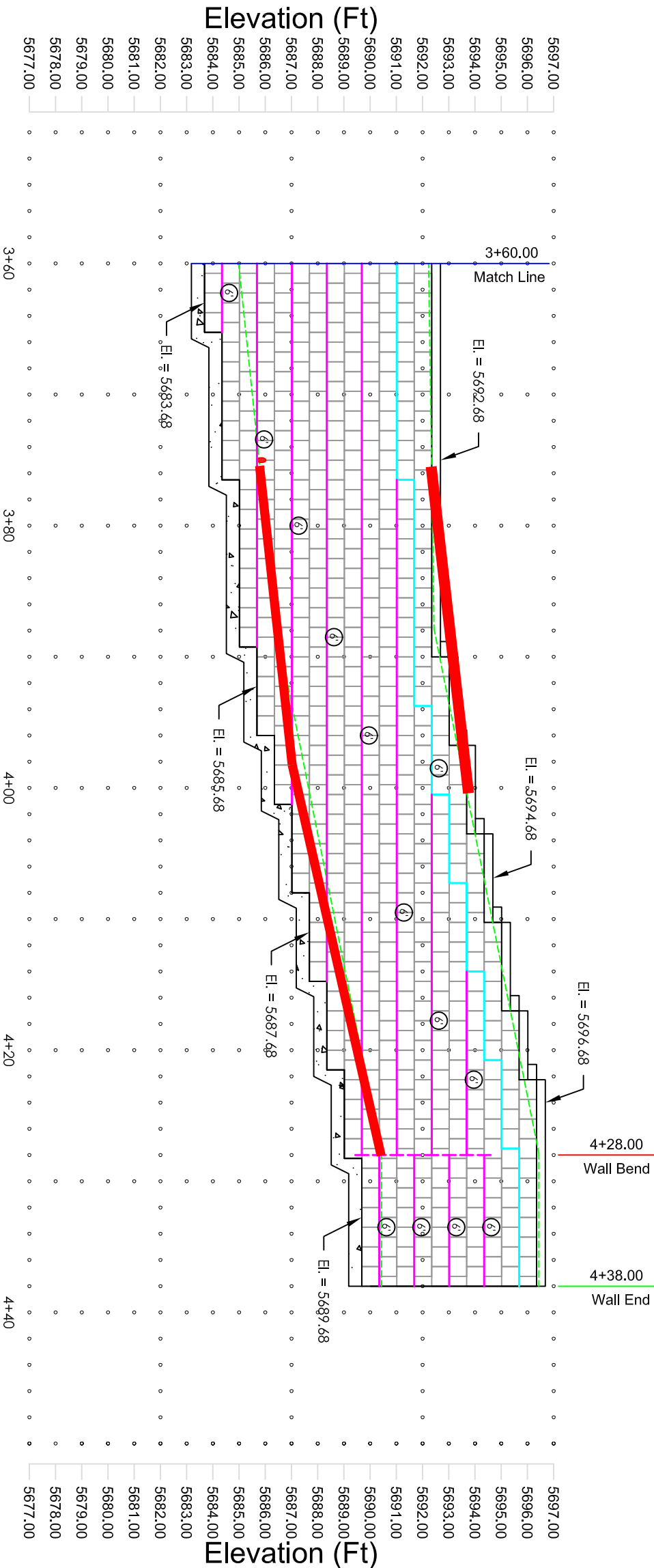
325 Alliance Place NE  
Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

| Legend                                                                              |                             |
|-------------------------------------------------------------------------------------|-----------------------------|
|  | Stratagrid 200 or equal     |
|  | Finish Grade or equal       |
|  | Grid/Fabric Length or equal |
|  | Heel Drain Outlet           |

| Project Name and Location:                        |                            |
|---------------------------------------------------|----------------------------|
| Covered Wagon Subdivision Wall<br>Albuquerque, NM |                            |
| Drawing Description:<br>Wall Profile              |                            |
| Prepared For:<br>Port Design and Construction     | Drawn By:<br>JAS           |
| Checked By:<br>CER                                | Sheet 5 of 6               |
| Date:<br>3/26/2014                                | Project Number:<br>13-0354 |

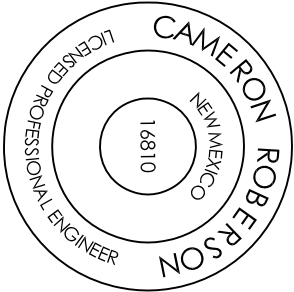
# Covered Wagon Subdivision Wall

## Wall Profile



Wall 1 - FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



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Signature: \_\_\_\_\_

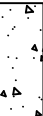
Date: 3/26/2014 License # 16810

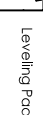
| No. | Date. | Revision. | By. |
|-----|-------|-----------|-----|
|     |       |           |     |
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|     |       |           |     |

**MSE**  
*AN SHW Design Firm*

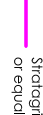
**Mortanless Systems Engineering**  
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Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

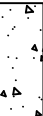
**Legend**

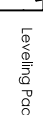
Stratagrid 200 or equal

Finish Grade

Mirafi 140N or equal

Grid/Fabric Length (Measured from face of wall)

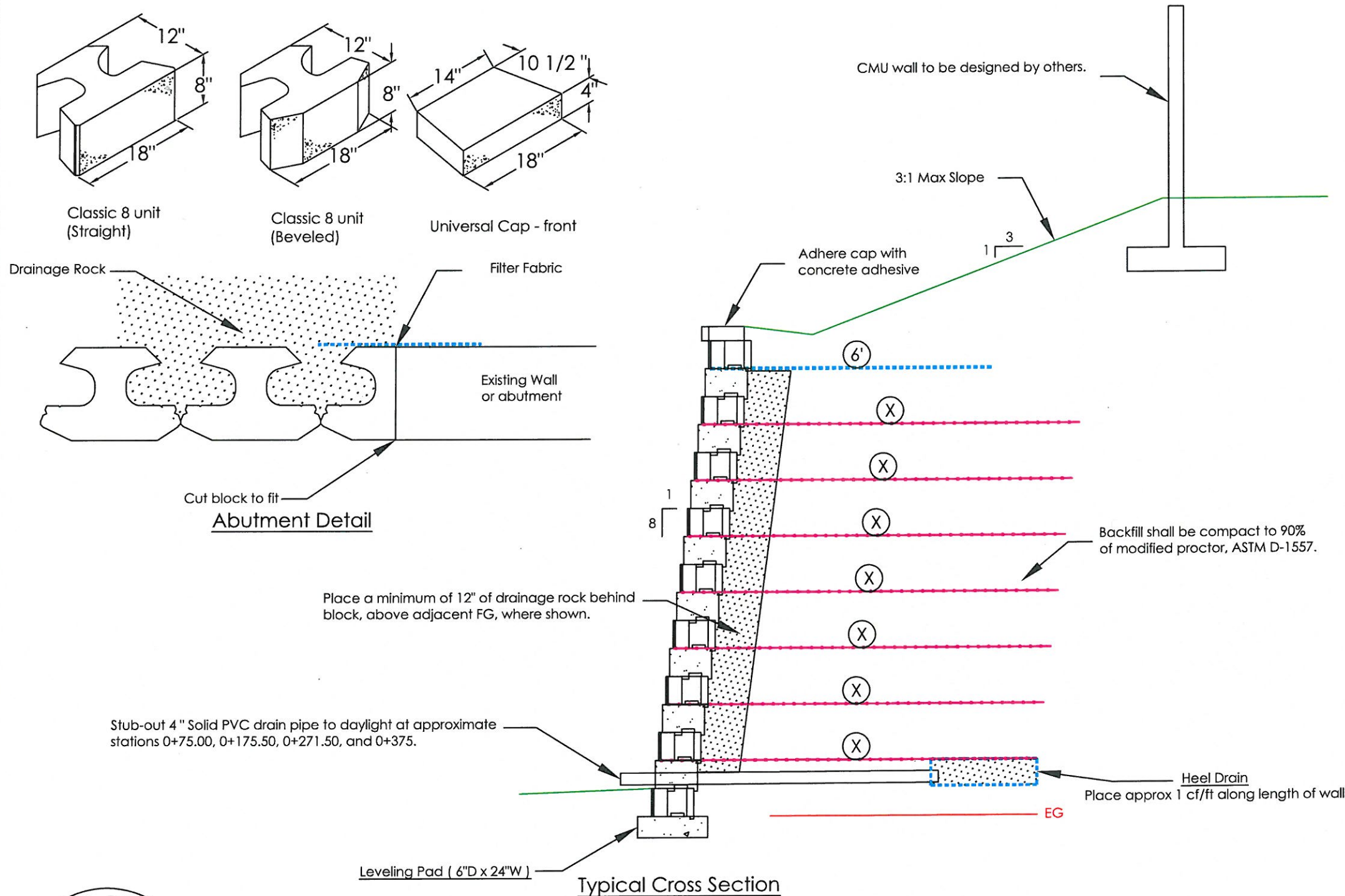
Leveling Pod

Heel Drain Outlet

| Project Name and Location:        |  | Prepared For:                |                 |
|-----------------------------------|--|------------------------------|-----------------|
| Covered Wagon Subdivision Wall    |  | Fort Design and Construction |                 |
| Albuquerque, NM                   |  | Drawn By: JAS                | Checked By: CER |
| Drawing Description: Wall Profile |  | Sheet 6 of 6                 | Date: 3/26/2014 |
|                                   |  | Project Number: 13-0354      |                 |

# Covered Wagon Subdivision Wall

## Typical Cross Section



**Foundation Soils**  
A. Foundation soils must be found competent at design excavation grade, **EG**, by project soils engineer. Global stability shall be analyzed by the project soils engineer.

**Base Leveling Pad Material**  
A. Base leveling pad material shall consist of compacted aggregate base or non-reinforced concrete. Aggregate base material shall meet the following gradation in accordance with ASTM D-422:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 1 inch     | 100             |
| no. 4      | 35 - 70         |
| no. 200    | 5 - 15          |

**Drainage Fill Material**  
A. Drainage fill material shall consist of crushed rock meeting the following gradation in accordance with ASTM D-422:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 3 inch     | 100             |
| 1/2 inch   | 0-25            |
| no. 200    | 0-5             |

**Backfill**  
A. Backfill shall consist of soil that is free of debris and deleterious material. Backfill shall meet the following gradation in accordance with ASTM D-422:

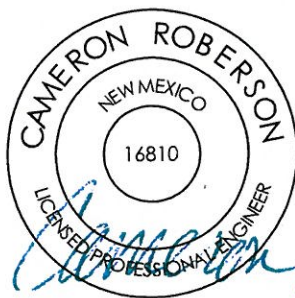
| Sieve Size | Percent Passing |
|------------|-----------------|
| 3 inch     | 100             |
| no. 40     | 0-60            |
| no. 200    | 0-30            |

- B. Backfill shall have a Plasticity Index (PI) < 15 and Liquid Limit (LL) < 40 per ASTM D 4318.
- C. Backfill shall have an peak effective friction angle of 36°, as determined by direct shear testing.
- D. The contractor shall obtain independent lab test results to verify that the backfill meets the requirements of A through C.

**Geogrid**  
A. Geogrid shall be Stratagrid SG200 or equivalent. Geogrid length, X, shall be as shown on sheet 3 through 6 of 6, Wall Plan and Profile.

B. Filter Fabric shall be Mirafi 140N or equivalent.

**Installation**  
A. Unless specified herein, refer to Rockwood's *Installation Guide*. Contact MSE should additional details be needed.



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Print Name: Cameron Roberson  
Signature: *Cameron Roberson*  
Date: 3/26/2014 License # 16810

| No. | Date     | Revision                            | By  |
|-----|----------|-------------------------------------|-----|
| 1   | 10/11/14 | Profiles revised based on new plans | JAS |
|     |          |                                     |     |
|     |          |                                     |     |
|     |          |                                     |     |



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Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

**An SHW Design Firm**

**Legend**

Leveling Pad

Drainage Rock

Stratagrid 200 or equal

Finish Grade

Mirafi 140N or equal

Grid/Fabric Length (Measured from face of wall)

X

Project Name and Location:

Covered Wagon Subdivision Wall  
Albuquerque, NM

Drawing Description:

Typical Cross Section

Prepared For:

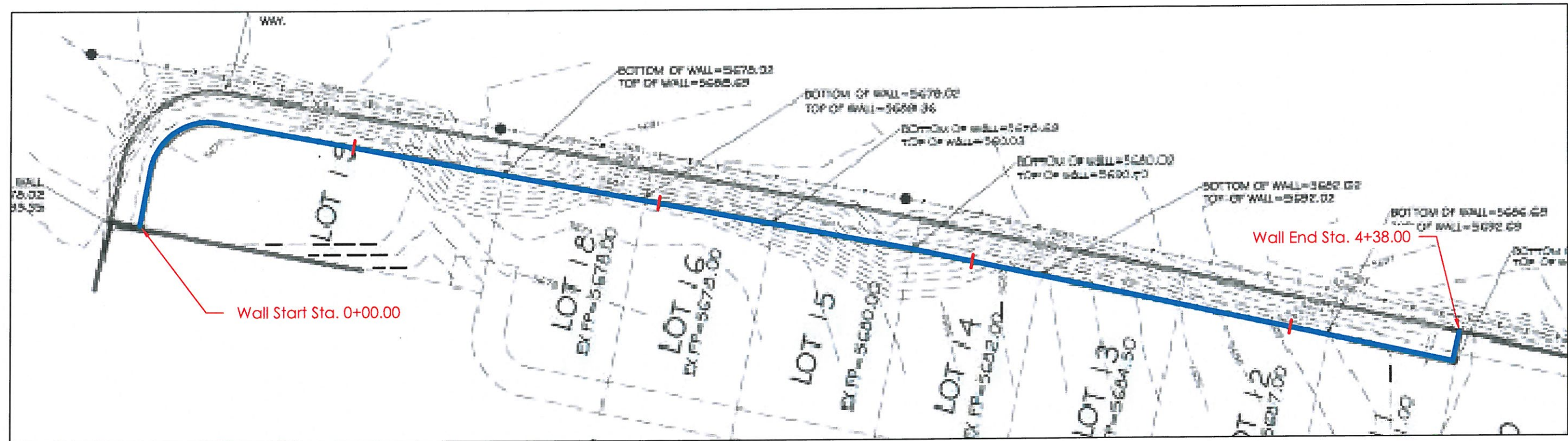
Pohl Design and Construction

Drawn By: JAS  
Checked By: CER

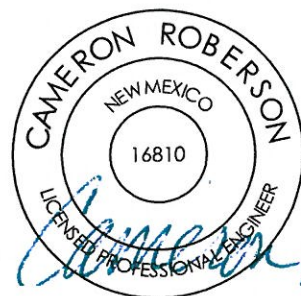
Sheet 1 of 6

Date: 3/26/2014  
Project Number: 13-0354

Covered Wagon Subdivision Wall  
Wall Plan View



Excerpt from Sheet 1 of 1, Wall Plan, by Rio Grande Engineering for the Covered Wagon Subdivision project in Albuquerque, NM, dated 9/10/14.  
Wall alignment is at bottom of wall. Contractor and surveyor must consider batter of wall in determining top of wall alignment.  
Scale: None



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Signature: [Signature]  
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|     |          |                                     |     |
|     |          |                                     |     |
|     |          |                                     |     |

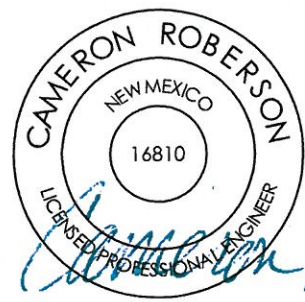
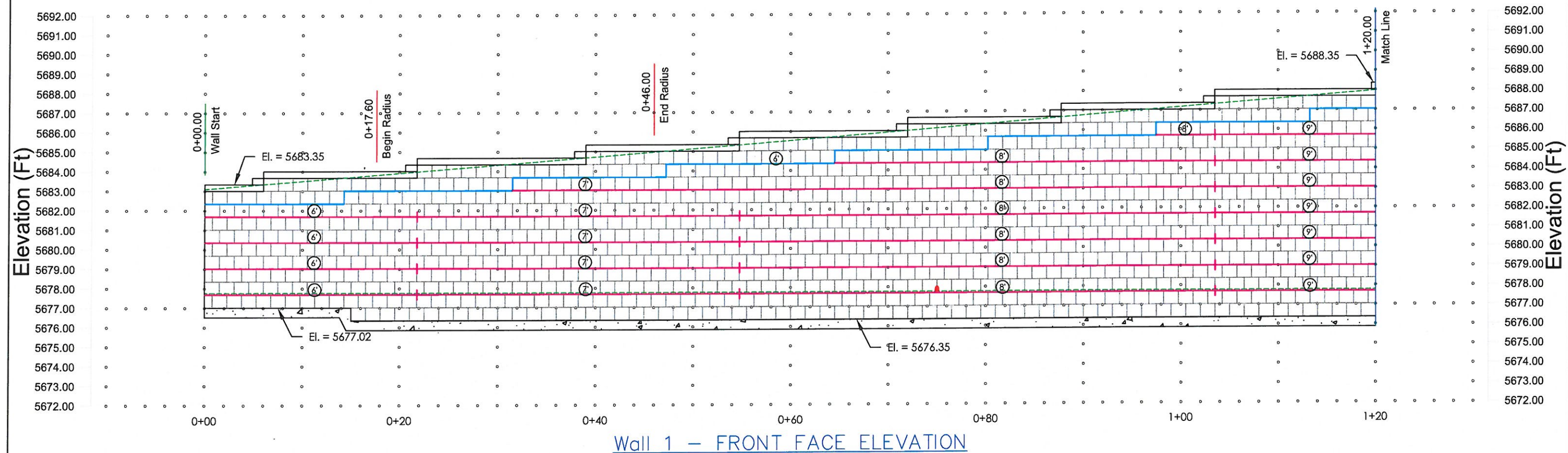


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Fax: 507-529-2879

| Legend                                    |
|-------------------------------------------|
| Wall Alignment                            |
| Approximate Location of Heel Drain Outlet |

|                                                   |                                  |
|---------------------------------------------------|----------------------------------|
| Project Name and Location:                        | Prepared For:                    |
| Covered Wagon Subdivision Wall<br>Albuquerque, NM | Pohl Design and Construction     |
| Drawing Description:                              | Drawn By: JAS<br>Checked By: CER |
| Wall Plan View                                    | Sheet 2 of 6                     |
|                                                   | Date: 3/26/2014                  |
|                                                   | Project Number: 13-0354          |

Covered Wagon Subdivision Wall  
Wall Profile



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|-----|----------|-------------------------------------|-----|
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|     |          |                                     |     |
|     |          |                                     |     |
|     |          |                                     |     |



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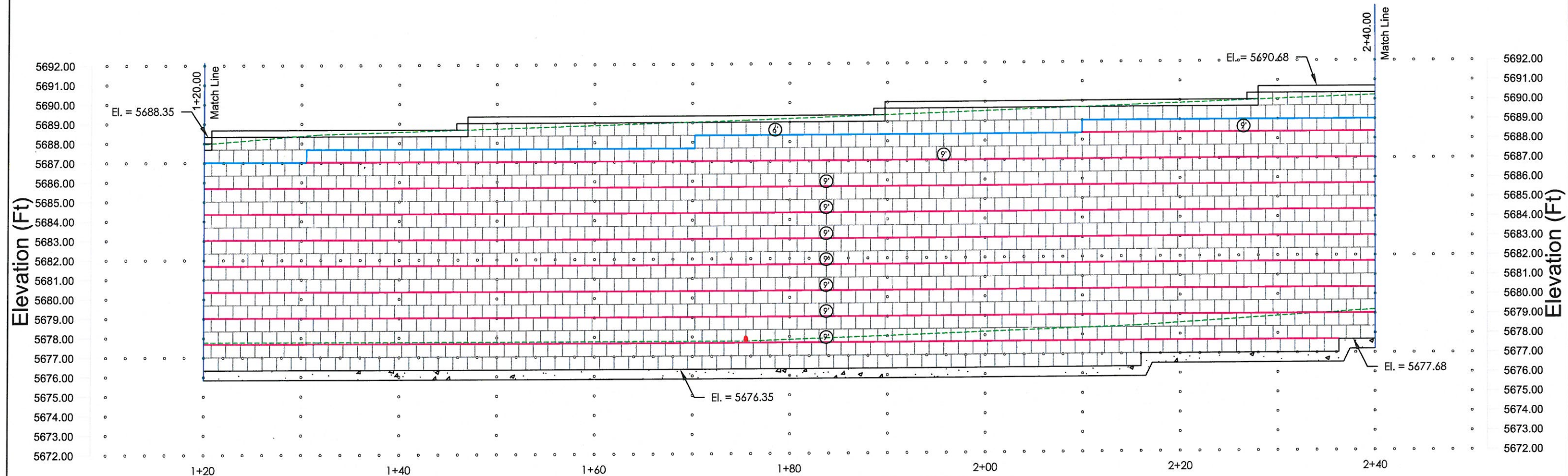
| Legend |                                                 |
|--------|-------------------------------------------------|
|        | Leveling Pad                                    |
|        | Heel Drain Outlet                               |
|        | Stratagrid 200 or equal                         |
|        | Finish Grade                                    |
|        | Mirafi 140N or equal                            |
|        | Grid/Fabric Length (Measured from face of wall) |

|                                                   |  |
|---------------------------------------------------|--|
| Project Name and Location:                        |  |
| Covered Wagon Subdivision Wall<br>Albuquerque, NM |  |
| Drawing Description:                              |  |
| Wall Profile                                      |  |

|                              |             |
|------------------------------|-------------|
| Prepared For:                |             |
| Pohl Design and Construction |             |
| Drawn By:                    | Checked By: |
| JAS                          | CER         |
| Sheet 3 of 6                 |             |
| Date: 3/26/2014              |             |
| Project Number: 13-0354      |             |

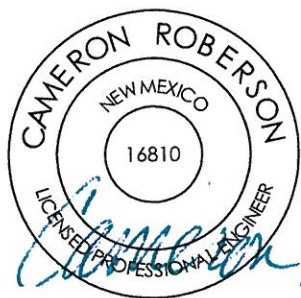
Scale:  
H: 1" = 10'  
V: 1" = 5'

Covered Wagon Subdivision Wall  
Wall Profile



Wall 1 - FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



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|     |          |                                     |     |
|     |          |                                     |     |



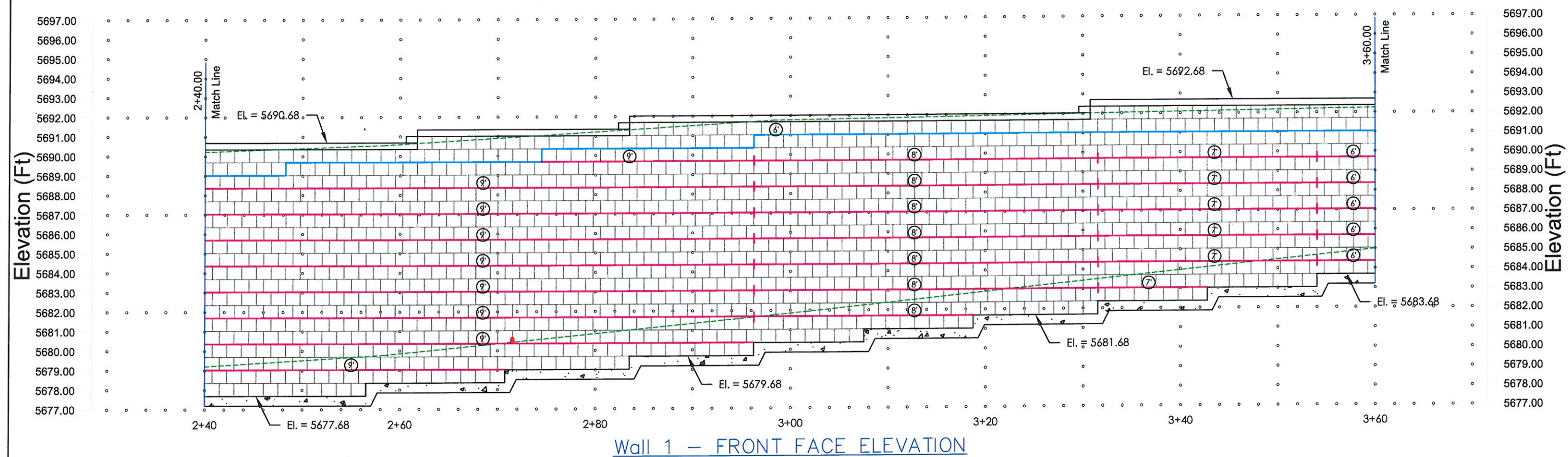
**Mortarless Systems Engineering**  
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Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

| Legend                                          |                         |
|-------------------------------------------------|-------------------------|
| Levelling Pad                                   | Stratagrid 200 or equal |
| Heel Drain Outlet                               | Finish Grade            |
| Grid/Fabric Length (Measured from face of wall) | Mirafi 140N or equal    |

|                                                                                 |  |
|---------------------------------------------------------------------------------|--|
| Project Name and Location:<br>Covered Wagon Subdivision Wall<br>Albuquerque, NM |  |
| Drawing Description:<br>Wall Profile                                            |  |

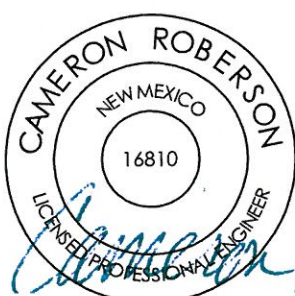
|                                               |                    |
|-----------------------------------------------|--------------------|
| Prepared For:<br>Pohl Design and Construction |                    |
| Drawn By:<br>JAS                              | Checked By:<br>CER |
| Sheet 4 of 6                                  |                    |
| Date: 3/26/2014                               |                    |
| Project Number: 13-0354                       |                    |

Covered Wagon Subdivision Wall  
Wall Profile



Wall 1 - FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



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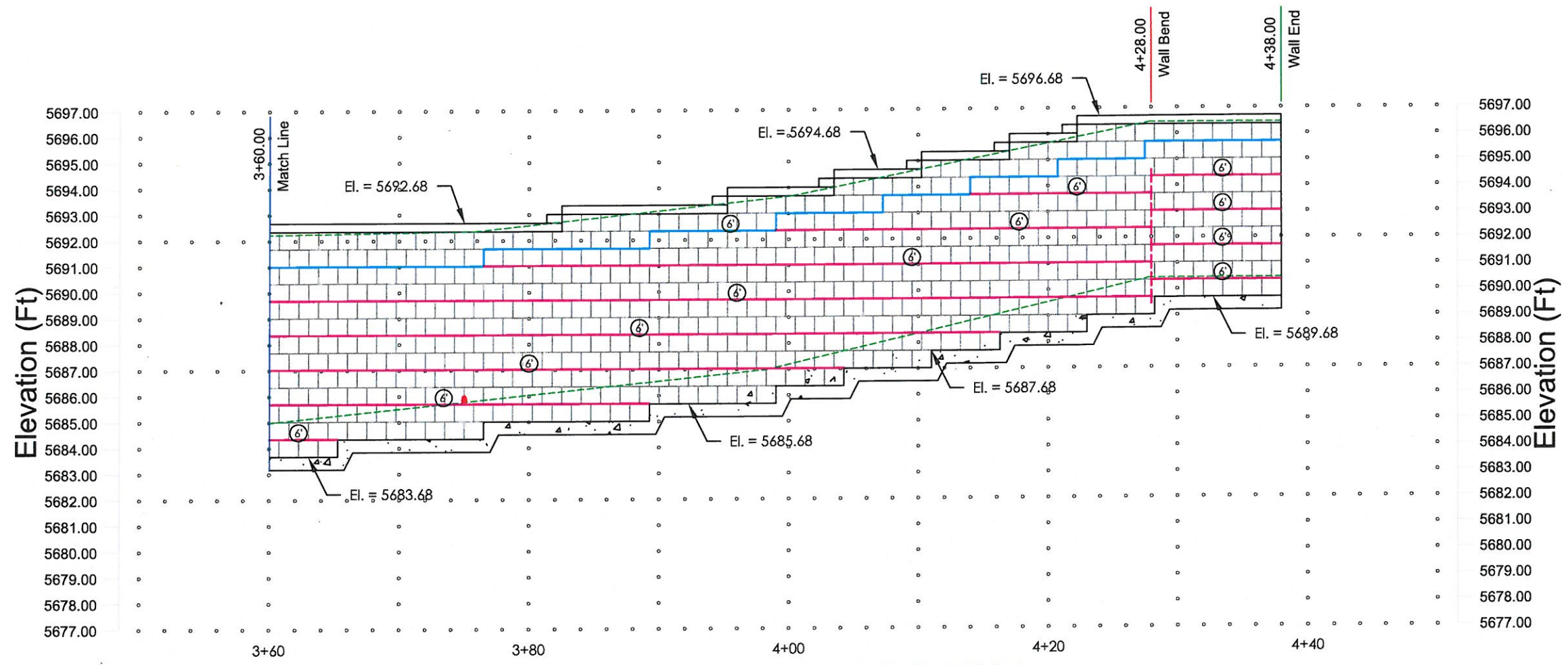
**MSE**  
An SRW Design Firm

**Mortarless Systems Engineering**  
325 Alliance Place NE  
Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

| Legend |                                                 |
|--------|-------------------------------------------------|
|        | Leveling Pad                                    |
|        | Heel Drain Outlet                               |
|        | Stratagrid 200 or equal                         |
|        | Finish Grade                                    |
|        | Mirafi 140N or equal                            |
|        | Grid/Fabric Length (Measured from face of wall) |

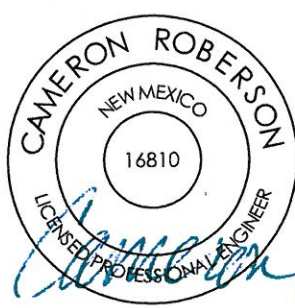
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| Project Name and Location:<br>Covered Wagon Subdivision Wall<br>Albuquerque, NM |  | Prepared For:<br>Pohl Design and Construction |                            |
| Drawing Description:<br>Wall Profile                                            |  | Drawn By:<br>JAS                              | Checked By:<br>CER         |
|                                                                                 |  | Sheet<br>5                                    | of<br>6                    |
|                                                                                 |  | Date:<br>3/26/2014                            | Project Number:<br>13-0354 |

Covered Wagon Subdivision Wall  
Wall Profile



Wall 1 – FRONT FACE ELEVATION

Scale:  
H: 1" = 10'  
V: 1" = 5'



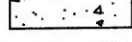
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Signature: *Cameron Roberson*  
Date: 3/26/2014 License # 16810

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|     |          |                                     |     |



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Rochester, MN 55906  
Phone: 507-535-3526  
Fax: 507-529-2879

*An SRW Design Firm*

| Legend                                                                                |                                                 |
|---------------------------------------------------------------------------------------|-------------------------------------------------|
|  | Leveling Pad                                    |
|  | Heel Drain Outlet                               |
|  | Stratagrid 200 or equal                         |
|  | Finish Grade                                    |
|  | Mirafi 140N or equal                            |
|  | Grid/Fabric Length (Measured from face of wall) |

|                                                   |     |                              |     |
|---------------------------------------------------|-----|------------------------------|-----|
| Project Name and Location:                        |     | Prepared For:                |     |
| Covered Wagon Subdivision Wall<br>Albuquerque, NM |     | Post Design and Construction |     |
| Drawn By:                                         | JAS | Checked By:                  | CER |
| Drawing Description:                              |     | Sheet 6 of 6                 |     |
| Wall Profile                                      |     | Date: 3/26/2014              |     |
|                                                   |     | Project Number: 13-0354      |     |

**SRWall (Version 4) Report****Project Identification**

|                  |                                             |
|------------------|---------------------------------------------|
| Project ID       | : 13-0354                                   |
| Project Name     | : Covered Wagon Wall                        |
| Owner            | :                                           |
| Client           | : Pohl Design and Construction              |
| Prepared By      | : JAS                                       |
| Company          | : Mortarless Systems Engineering, Inc.      |
| Address          | : 325 Alliance Place NE Rochester, MN 55906 |
| Telephone        | : 507-535-3502                              |
| Section          | : Sta. 2+00.00                              |
| Project File     | : Wall 1 Sta 2+00.prj                       |
| Vendor Data File | :                                           |
| Date and Time    | : 10/01/2014 04:17:20                       |

---

|                   |                   |
|-------------------|-------------------|
| Type of Structure | : Reinforced Wall |
|-------------------|-------------------|

---

**Wall Geometry**

|                                |         |
|--------------------------------|---------|
| Design Wall Height(ft)         | : 13.33 |
| Embedment Wall Height(ft)      | : 1.67  |
| Exposed Wall Design Height(ft) | : 11.66 |
| Number of Segmental Wall Units | : 20    |
| Wall Inclination(degrees)      | : 7.13  |

---

**Grades**

|                          |         |
|--------------------------|---------|
| Top Slope(degrees)       | : 18.43 |
| Broken Back Distance(ft) | : 14.00 |

---

**Uniform Distributed Surcharge**

|                          |         |
|--------------------------|---------|
| Live Load Surcharge(Psf) | : 75.00 |
| Dead Load Surcharge(Psf) | : 0.00  |

---

**Soil Data**

| Soil Zone         | Description                              | Cohesion (c)<br>(psf) | Friction<br>Angle( $\Phi$ )<br>(degrees) | Unit Weight<br>( $\gamma$ )(pcf) |
|-------------------|------------------------------------------|-----------------------|------------------------------------------|----------------------------------|
| Reinforced Soil   | Silty to Clayey Sand w/Gravely Sand (SM) | N/A                   | 36.00                                    | 125.00                           |
| Retained Soil     | Silty to Clayey Sand w/Gravely Sand (SM) | N/A                   | 36.00                                    | 125.00                           |
| Leveling Pad Soil | Aggregate Base (GM)                      | N/A                   | 45.00                                    | 135.00                           |
| Foundation Soil   | Silty to Clayey Sand w/Gravely Sand (SM) | 200.00                | 36.00                                    | 125.00                           |

**Segmental Unit Data**

Segmental Unit Name : **Classic 8**  
 Cap Height (Inches) : **4.00**  
 Unit Height (Hu)(Inches) : **8.00**  
 Unit Width (Wu)(Inches) : **12.00**  
 Unit Length (Inches) : **18.00**  
 Setback (Inches) : **1.00**  
 Weight (Infilled)(lb) : **118.00**  
 Unit Weight (Infilled)(pcf) : **118.00**  
 Center of Gravity(Inches) : **6.00**

**Geosynthetic Reinforcement Type and Number**

| Supplier | Product Name   | Number |
|----------|----------------|--------|
|          | Stratagrid 200 | 9      |

**Geosynthetic Properties**

| Geosynthetic Product | Tult<br>(lb/ft) | RFcr | RFd  | RFid | LTDS<br>(lb/ft) | Ci   | Cds  |
|----------------------|-----------------|------|------|------|-----------------|------|------|
| Stratagrid 200       | 3600.00         | 1.55 | 1.10 | 1.10 | 1919.49         | 0.95 | 0.95 |

**Unit-Unit Interface Properties**

| Minimum Shear Capacity(lb/ft) | Shear Friction Angle | Maximum Shear Capacity (lb/ft) |
|-------------------------------|----------------------|--------------------------------|
| 585.00                        | 56.00                | 6000.00                        |

**Geosynthetic-SRW Unit Connection Strength properties**

| Geosynthetic Product | Minimum Conn. Capacity (lb/ft) | 1st Inflection Point (lb/ft) |                             | 2nd Inflection Point (lb/ft) |                                |
|----------------------|--------------------------------|------------------------------|-----------------------------|------------------------------|--------------------------------|
|                      |                                | Normal Load (lb/ft)          | Connection Capacity (lb/ft) | Normal Load (lb/ft)          | Max Connection Capacity(lb/ft) |
| Stratagrid 200       | 1198.00                        | 1000.00                      | 1250.41                     | 15512.96                     | 2011.00                        |

**Geosynthetic-SRW Unit Shear Strength properties**

| Geosynthetic Product | Minimum Shear Capacity(lb/ft) | Shear Friction Angle | Maximum Shear Capacity (lb/ft) |
|----------------------|-------------------------------|----------------------|--------------------------------|
| Stratagrid 200       | 1796.20                       | 50.43                | 6000.00                        |

**Design Criteria For External Stability Analysis**

|                                                                  |         |
|------------------------------------------------------------------|---------|
| FOS Sliding                                                      | : 1.50  |
| FOS Overturning                                                  | : 2.00  |
| FOS Bearing Capacity                                             | : 3.00  |
| Base Geosynthetic ratio(L/H)                                     | : 0.60  |
| Reinforced Soil-Retained Soil Interface Friction Factor          | : 1.00  |
| Reinforced Soil-Retained Soil Interface Friction Angle (degrees) | : 36.00 |

**Design Criteria For Internal Stability Analysis**

|                                                      |                |
|------------------------------------------------------|----------------|
| FOS Tensile Overstress                               | : <b>1.50</b>  |
| FOS Pullout                                          | : <b>1.50</b>  |
| Anchorage Length (ft) :                              | : <b>1.00</b>  |
| Wall-Retained Soil Interface Friction Factor         | : <b>0.67</b>  |
| Wall-Retained Soil Interface Friction Angle(degrees) | : <b>24.12</b> |

---

**Design Criteria For Facing Stability Analysis**

|                                 |               |
|---------------------------------|---------------|
| FOS Geosynthetic-WallConnection | : <b>1.50</b> |
| FOS Crest Toppling              | : <b>1.50</b> |
| Max. Reinforcement Spacing      | : <b>2.00</b> |

---

**Vertical Components**

|                                             |              |
|---------------------------------------------|--------------|
| Vertical Components of Earth Pressures Used | : <b>Yes</b> |
|---------------------------------------------|--------------|

---

**Coefficients of Earth Pressure and Failure Plane Orientation**

|                                                                              |                 |
|------------------------------------------------------------------------------|-----------------|
| Reinforcement Soil(Static)(Ka)                                               | : <b>0.209</b>  |
| Reinforcement Soil(Static)(Kah Horizontal Component)                         | : <b>0.200</b>  |
| Internal Modified Back Slope(Bint)                                           | : <b>9.926</b>  |
| Orientation of failure plane from horizontal(degrees) for Internal Stability | : <b>55.266</b> |
| Retained Soil(Static)(Ka)                                                    | : <b>0.204</b>  |
| Retained Soil(Static)(Kah Horizontal Component)                              | : <b>0.179</b>  |
| External Modified Back Slope(Bext)                                           | : <b>6.667</b>  |
| Orientation of failure plane from horizontal(degrees) for External Stability | : <b>54.742</b> |

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**Result of External Stability Static Analysis**

|                                   | Calculated | Design Criteria |
|-----------------------------------|------------|-----------------|
| FOS Sliding                       | 4.19       | > 1.50          |
| FOS Overturning                   | 6.12       | > 2.00          |
| FOS Bearing Capacity              | 23.86      | > 3.00          |
| Base Reinforcement Length (L)(ft) | 9.00       |                 |
| Base Reinforcement Ratio (L/H)    | 0.68       | > 0.60          |

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**Detailed Result of External Stability Analysis**

|                                | Calculated |
|--------------------------------|------------|
| Total Horizontal Force (lb/ft) | 3115.80    |
| Total Vertical Force (lb/ft)   | 17990.05   |
| Sliding Resistance (lb/ft)     | 13070.53   |
| Driving Moment (lb-ft/ft)      | 17317.14   |
| Resisting Moment (lb-ft/ft)    | 105968.31  |
| Bearing Capacity (psf)         | 49672.68   |
| Base Eccentricity (e)(ft.)     | -0.43      |
| Eccentricity Ratio (e/L-2e)    | -0.04      |
| Maximum Bearing Pressure (psf) | 2081.69    |

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**Results of Internal Stability Static Analysis**

| SRW Unit # | Geosynthetic Product | Elevation (ft) | Length (ft) | Anchor Length (ft) | FOS Overstress<br>≥1.50 | FOS Pullout<br>≥1.50 | FOS Slide<br>≥1.50 | Layer Spacing (ft)<br>≥2.00 |
|------------|----------------------|----------------|-------------|--------------------|-------------------------|----------------------|--------------------|-----------------------------|
| 19         | Stratagrid 200       | 12.00          | 9.00        | 1.18               | 24.05                   | 9.57                 | 16.13              | OK                          |
| 17         | Stratagrid 200       | 10.67          | 9.00        | 1.94               | 17.63                   | 15.03                | 12.62              | OK                          |
| 15         | Stratagrid 200       | 9.33           | 9.00        | 2.70               | 12.51                   | 18.37                | 10.39              | OK                          |
| 13         | Stratagrid 200       | 8.00           | 9.00        | 3.45               | 9.74                    | 21.78                | 8.86               | OK                          |
| 11         | Stratagrid 200       | 6.67           | 9.00        | 4.21               | 7.92                    | 25.04                | 7.74               | OK                          |
| 9          | Stratagrid 200       | 5.33           | 9.00        | 4.97               | 6.69                    | 28.44                | 6.87               | OK                          |
| 7          | Stratagrid 200       | 4.00           | 9.00        | 5.73               | 5.82                    | 31.92                | 6.19               | OK                          |
| 5          | Stratagrid 200       | 2.67           | 9.00        | 6.48               | 5.11                    | 35.16                | 5.64               | OK                          |
| 3          | Stratagrid 200       | 1.33           | 9.00        | 7.24               | 2.97                    | 25.08                | 5.19               | OK                          |

**Detailed Results of Internal Stability Analysis**

| SRW Unit # | Geosynthetic Product | Elevation (ft) | Length (ft) | Anchor Length (ft) | LTDS (lb/ft) | Tensile Load (lb/ft) | Pullout capacity (lb/ft) | Sliding Force (lb/ft) | Sliding Capacity (lb/ft) |
|------------|----------------------|----------------|-------------|--------------------|--------------|----------------------|--------------------------|-----------------------|--------------------------|
| 19         | Stratagrid 200       | 12.00          | 9.00        | 1.18               | 1919.49      | 79.80                | 763.56                   | 244.23                | 3938.86                  |
| 17         | Stratagrid 200       | 10.67          | 9.00        | 1.94               | 1919.49      | 108.88               | 1636.09                  | 404.04                | 5100.80                  |
| 15         | Stratagrid 200       | 9.33           | 9.00        | 2.70               | 1919.49      | 153.38               | 2818.16                  | 604.99                | 6286.68                  |
| 13         | Stratagrid 200       | 8.00           | 9.00        | 3.45               | 1919.49      | 197.06               | 4292.14                  | 844.10                | 7478.80                  |
| 11         | Stratagrid 200       | 6.67           | 9.00        | 4.21               | 1919.49      | 242.23               | 6065.72                  | 1122.71               | 8685.96                  |
| 9          | Stratagrid 200       | 5.33           | 9.00        | 4.97               | 1919.49      | 286.73               | 8155.62                  | 1443.37               | 9917.41                  |
| 7          | Stratagrid 200       | 4.00           | 9.00        | 5.73               | 1919.49      | 329.91               | 10530.65                 | 1801.29               | 11154.75                 |
| 5          | Stratagrid 200       | 2.67           | 9.00        | 6.48               | 1919.49      | 375.58               | 13205.29                 | 2198.71               | 12407.14                 |
| 3          | Stratagrid 200       | 1.33           | 9.00        | 7.24               | 1919.49      | 645.94               | 16203.02                 | 2639.07               | 13684.14                 |

**Results of Facing Stability Static Analysis**

| SRW Unit # | Heel Elev (ft) | Geosynthetic Product | FOS Crest Toppling $\geq 1.50$ | FOS Connection $\geq 1.50$ |
|------------|----------------|----------------------|--------------------------------|----------------------------|
| 19         | 12.00          | Stratagrid 200       | 3.98                           | 15.12                      |
| 17         | 10.67          | Stratagrid 200       |                                | 11.15                      |
| 15         | 9.33           | Stratagrid 200       |                                | 7.97                       |
| 13         | 8.00           | Stratagrid 200       |                                | 6.25                       |
| 11         | 6.67           | Stratagrid 200       |                                | 5.12                       |
| 9          | 5.33           | Stratagrid 200       |                                | 4.35                       |
| 7          | 4.00           | Stratagrid 200       |                                | 3.81                       |
| 5          | 2.67           | Stratagrid 200       |                                | 3.37                       |
| 3          | 1.33           | Stratagrid 200       |                                | 1.97                       |

**Results of Facing Stability Analysis(Moment & Connection)**

| SRW Unit # | Heel Elev (ft) | Geosynthetic Product | Drive Moment (lb-ft/ft) | Resist Moment (lb-ft/ft) | Connection Load (lb/ft) | Connection Capacity (lb/ft) |
|------------|----------------|----------------------|-------------------------|--------------------------|-------------------------|-----------------------------|
| 19         | 12.00          | Stratagrid 200       | 23.18                   | 92.38                    | 79.80                   | 1206.25                     |
| 17         | 10.67          | Stratagrid 200       |                         |                          | 108.88                  | 1214.47                     |
| 15         | 9.33           | Stratagrid 200       |                         |                          | 153.38                  | 1222.76                     |
| 13         | 8.00           | Stratagrid 200       |                         |                          | 197.06                  | 1230.98                     |
| 11         | 6.67           | Stratagrid 200       |                         |                          | 242.23                  | 1239.21                     |
| 9          | 5.33           | Stratagrid 200       |                         |                          | 286.73                  | 1247.50                     |
| 7          | 4.00           | Stratagrid 200       |                         |                          | 329.91                  | 1255.72                     |
| 5          | 2.67           | Stratagrid 200       |                         |                          | 375.58                  | 1263.95                     |
| 3          | 1.33           | Stratagrid 200       |                         |                          | 645.94                  | 1272.23                     |

**Internal Compound Stability Result**

| SRW Units | Factor Of Safety | $\Sigma Fr$ (lb/ft) | $\Sigma Vu$ Or $\Sigma Conn$ (lb/ft) | $\Sigma Fs$ (lb/ft) | $\Sigma Fgrid$ (lb/ft) | $\Sigma DynF$ (lb/ft) | $\Sigma Wt$ (lb/ft) | $\Sigma Qi$ (lb/ft) | $\Sigma Qd$ (lb/ft) |
|-----------|------------------|---------------------|--------------------------------------|---------------------|------------------------|-----------------------|---------------------|---------------------|---------------------|
| 1         | 1.771            | 24157               | 2209                                 | 14925               | 60                     | 0                     | 34249               | 813                 | 0                   |
| 2         | 1.793            | 16776               | 2450                                 | 12797               | 3718                   | 0                     | 23850               | 546                 | 0                   |
| 3         | 1.788            | 18692               | 2691                                 | 13041               | 1940                   | 0                     | 27015               | 807                 | 0                   |
| 4         | 1.882            | 15797               | 2216                                 | 11520               | 3667                   | 0                     | 22605               | 667                 | 0                   |
| 5         | 1.874            | 15652               | 2528                                 | 10806               | 2069                   | 0                     | 22420               | 664                 | 0                   |
| 6         | 2.031            | 15933               | 2334                                 | 10096               | 2241                   | 0                     | 22459               | 662                 | 0                   |
| 7         | 2.006            | 14079               | 2511                                 | 9178                | 1818                   | 0                     | 20047               | 660                 | 0                   |
| 8         | 2.132            | 14138               | 2101                                 | 8515                | 1915                   | 0                     | 19908               | 657                 | 0                   |
| 9         | 2.137            | 14285               | 2495                                 | 7865                | 31                     | 0                     | 20011               | 654                 | 0                   |
| 10        | 2.267            | 11304               | 1868                                 | 6700                | 2017                   | 0                     | 15787               | 529                 | 0                   |
| 11        | 2.280            | 11311               | 2478                                 | 6142                | 212                    | 0                     | 15724               | 527                 | 0                   |
| 12        | 2.454            | 9694                | 1635                                 | 5377                | 1863                   | 0                     | 13505               | 524                 | 0                   |
| 13        | 2.468            | 9524                | 2462                                 | 4877                | 50                     | 0                     | 13226               | 522                 | 0                   |
| 14        | 2.690            | 7235                | 1401                                 | 3907                | 1873                   | 0                     | 9992                | 410                 | 0                   |
| 15        | 2.725            | 6975                | 2367                                 | 3488                | 160                    | 0                     | 9607                | 408                 | 0                   |
| 16        | 3.014            | 9417                | 1168                                 | 3654                | 429                    | 0                     | 13157               | 916                 | 0                   |
| 17        | 3.032            | 5393                | 2177                                 | 2498                | 4                      | 0                     | 7430                | 404                 | 0                   |
| 18        | 3.204            | 6679                | 935                                  | 2476                | 319                    | 0                     | 9322                | 765                 | 0                   |
| 19        | 3.449            | 3268                | 1813                                 | 1473                | 0                      | 0                     | 4475                | 304                 | 0                   |
| 20        | 2.880            | 2533                | 702                                  | 1123                | 0                      | 0                     | 3535                | 302                 | 0                   |

**Basic Internal Compound Stability Static Result**

Lowest FOS : 1.771

**Critical Failure Plane Location -**

Height of Exit at Wall Face

SRW Unit : # 1

Elevation : 0.00 ft

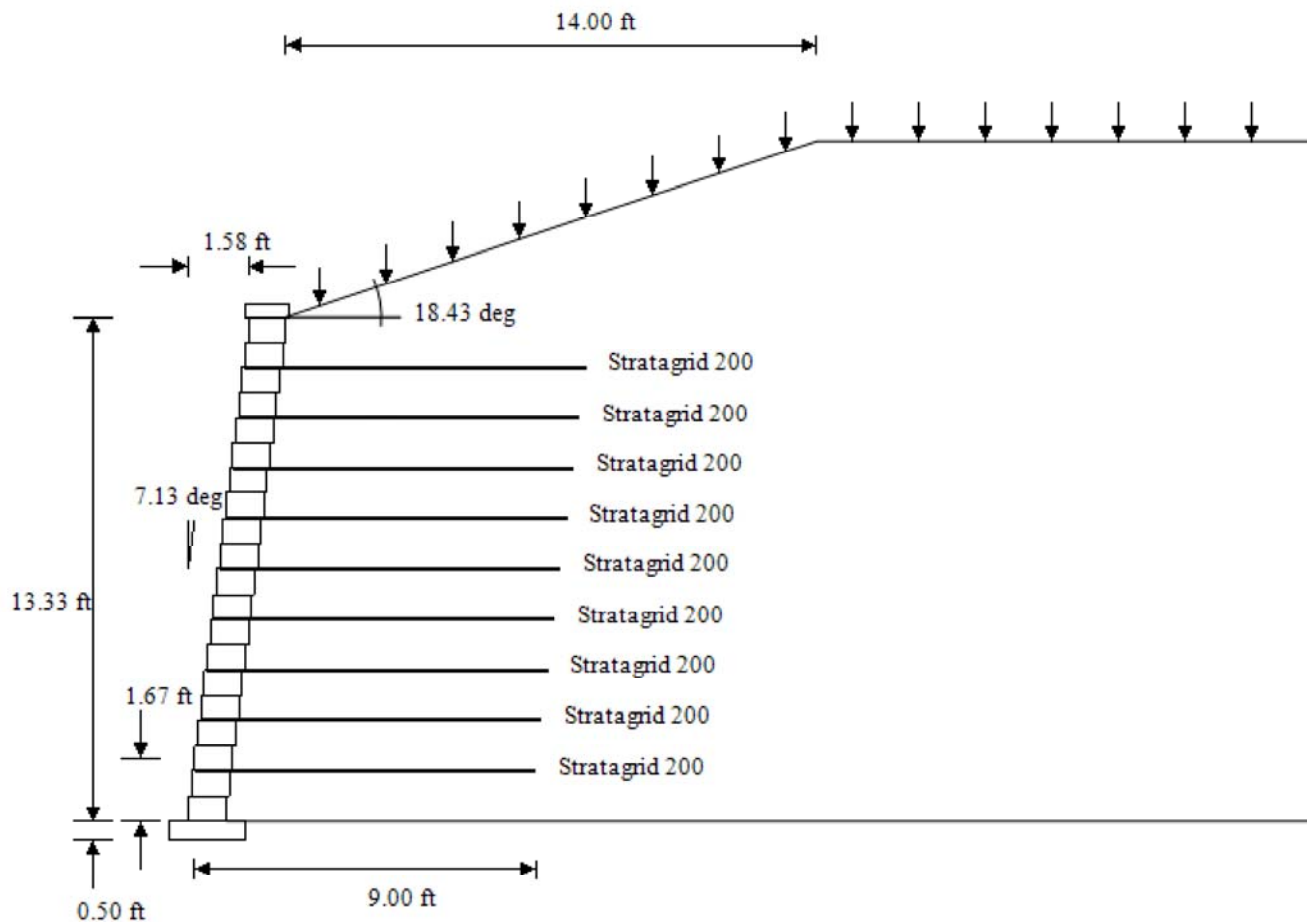
Distance to Entrance at Top Grade : 24.08 ft

**Internal Compound Stability Geometry**

| SRW Units | Factor Of Safety | Arc Center (Xc) | Arc Center (Yc) | Arc Radius (R) | Arc Exit (X2) | Arc Exit (Y2) | Arc Enter (X1) | Arc Enter (Y1) |
|-----------|------------------|-----------------|-----------------|----------------|---------------|---------------|----------------|----------------|
| 1         | 1.771            | 0.000           | 25.101          | 25.101         | 0.000         | 0.000         | 24.075         | 17.999         |
| 2         | 1.793            | -7.620          | 31.072          | 31.366         | 0.083         | 0.667         | 20.892         | 17.999         |
| 3         | 1.788            | -7.240          | 37.442          | 36.860         | 0.167         | 1.333         | 24.075         | 17.999         |
| 4         | 1.882            | -10.416         | 40.270          | 39.729         | 0.250         | 2.000         | 22.483         | 17.999         |

|    |       |        |        |        |       |        |        |        |
|----|-------|--------|--------|--------|-------|--------|--------|--------|
| 5  | 1.874 | -6.481 | 36.177 | 34.196 | 0.333 | 2.667  | 22.483 | 17.999 |
| 6  | 2.031 | -2.842 | 32.171 | 29.022 | 0.417 | 3.333  | 22.483 | 17.999 |
| 7  | 2.006 | -5.722 | 38.031 | 34.595 | 0.500 | 4.000  | 22.483 | 17.999 |
| 8  | 2.132 | -2.379 | 34.187 | 29.668 | 0.583 | 4.667  | 22.483 | 17.999 |
| 9  | 2.137 | 0.667  | 30.456 | 25.123 | 0.667 | 5.333  | 22.483 | 17.999 |
| 10 | 2.267 | -1.916 | 33.381 | 27.510 | 0.750 | 6.000  | 20.892 | 17.999 |
| 11 | 2.280 | 0.833  | 30.085 | 23.418 | 0.833 | 6.667  | 20.892 | 17.999 |
| 12 | 2.454 | -1.453 | 35.810 | 28.576 | 0.917 | 7.333  | 20.892 | 17.999 |
| 13 | 2.468 | 1.000  | 32.786 | 24.786 | 1.000 | 8.000  | 20.892 | 17.999 |
| 14 | 2.690 | -0.990 | 35.161 | 26.575 | 1.083 | 8.667  | 19.300 | 17.999 |
| 15 | 2.725 | 1.167  | 32.639 | 23.306 | 1.167 | 9.333  | 19.300 | 17.999 |
| 16 | 3.014 | 1.250  | 51.266 | 41.266 | 1.250 | 10.000 | 25.667 | 17.999 |
| 17 | 3.032 | 1.333  | 36.346 | 25.679 | 1.333 | 10.667 | 19.300 | 17.999 |
| 18 | 3.204 | 1.417  | 53.179 | 41.845 | 1.417 | 11.333 | 24.075 | 17.999 |
| 19 | 3.449 | 1.500  | 36.897 | 24.897 | 1.500 | 12.000 | 17.708 | 17.999 |
| 20 | 2.880 | 1.583  | 39.715 | 27.049 | 1.583 | 12.667 | 17.708 | 17.999 |

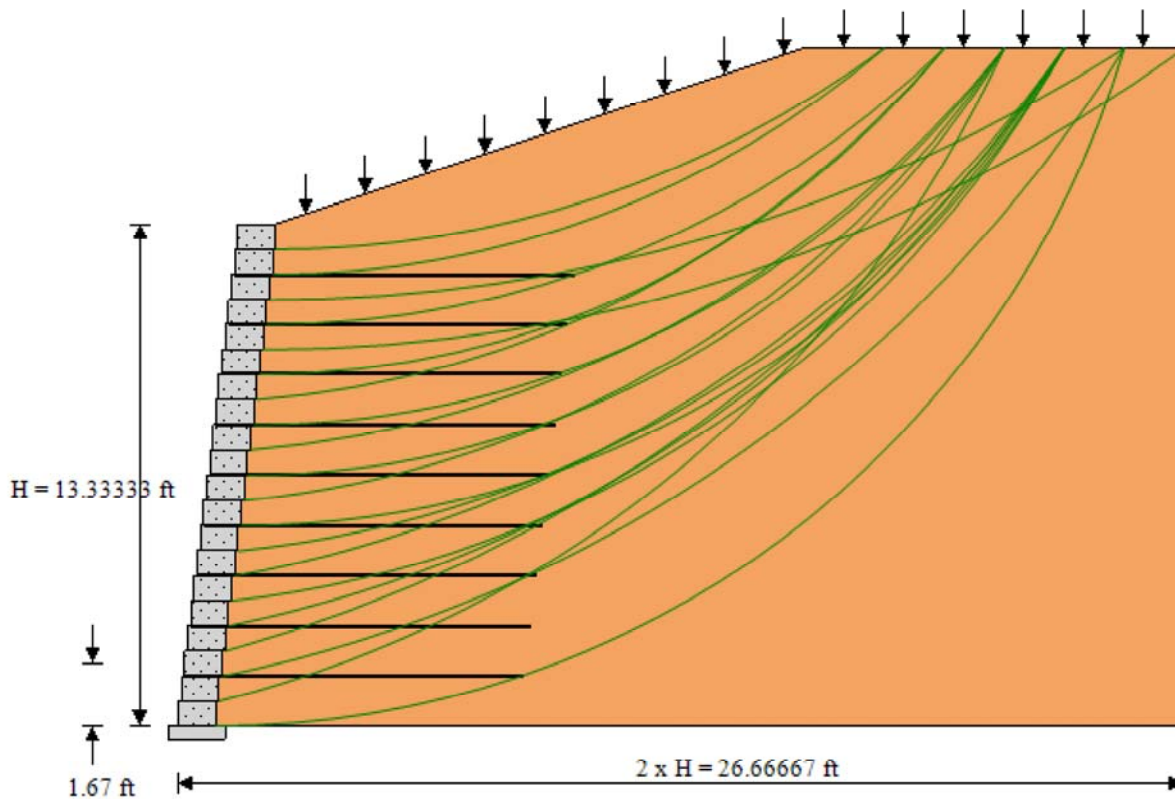
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**Wall Reinforcement Layout****Project Identification**

|                  |                                             |
|------------------|---------------------------------------------|
| Project ID       | : 13-0354                                   |
| Project Name     | : Covered Wagon Wall                        |
| Owner            | :                                           |
| Client           | : Pohl Design and Construction              |
| Prepared By      | : JAS                                       |
| Company          | : Mortarless Systems Engineering, Inc.      |
| Address          | : 325 Alliance Place NE Rochester, MN 55906 |
| Telephone        | : 507-535-3502                              |
| Section          | : Sta. 2+00.00                              |
| Vendor Data File | :                                           |
| Project File     | : Wall 1 Sta 2+00.prj                       |
| Date and Time    | : 10/01/2014 04:17:20                       |

**Internal Compound Stability Graphics**

Lowest FOS : 1.771

**Global Stability has not been addressed****Project Identification**

|                  |                                             |
|------------------|---------------------------------------------|
| Project ID       | : 13-0354                                   |
| Project Name     | : Covered Wagon Wall                        |
| Owner            | :                                           |
| Client           | : Pohl Design and Construction              |
| Prepared By      | : JAS                                       |
| Company          | : Mortarless Systems Engineering, Inc.      |
| Address          | : 325 Alliance Place NE Rochester, MN 55906 |
| Telephone        | : 507-535-3502                              |
| Section          | : Sta. 2+00.00                              |
| Vendor Data File | :                                           |
| Project File     | : Wall 1 Sta 2+00.prj                       |
| Date and Time    | : 10/01/2014 04:17:20                       |

**Project Notes :**

See Wall Profile, Sheet 2 through 5 of 5, by MSE, Revised 10/01/14.

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**Soil Notes :**

Contractor must verify soil parameters prior to construction. See Typical Cross Section, Sheet 1 of 5, by MSE, revised 10/01/14. Global Stability shall be analyzed by project soils engineer.

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**Unit Notes :**

Contractor must place 12" crushed rock (drainage fill material) behind SRW units as shown on Typical Cross Section, Sheet 1 of 5, by MSE, revised 10/01/14.