WYOMING STATE PENITENTIARY
Independent Peer Review Study

2900 South Higley Boulevard
Rawlins, Wyoming 82301

Final Report
July 13, 2017
WJE No. 2017.3123

Prepared for:
Members, Joint Appropriations Committee
State of Wyoming Legislature
200 West 24th Street, Rm 213
Cheyenne, Wyoming 82002

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax

WYOMING STATE PENITENTIARY
Independent Peer Review Study

2900 South Higley Boulevard
Rawlins, Wyoming 82301

John D. Reins, PE

Peter A. Stauffer, PE

Professional Engineer (Civil)
JERRY E. MALY
10030
Date 7-13-17
WYOMING

Jerry E. Maly, PE

Final Report
July 13, 2017
WJE No. 2017.3123

Prepared for:
Members, Joint Appropriations Committee
State of Wyoming Legislature
200 West 24th Street, Rm 213
Cheyenne, Wyoming 82002

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

TABLE OF CONTENTS

WJE | ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

WYOMING STATE PENITENTIARY
Independent Peer Review

2900 South Higley Boulevard
Rawlins, Wyoming 82301

EXECUTIVE SUMMARY

The Wyoming State Penitentiary (WSP) comprises multiple buildings, was constructed from 1998 to 2006, and has been subsequently affected by slab and foundation movements. The South Facility exhibits distress from uplift due to heave of the underlying clays and shallow claystone bedrock beneath this structure, while the Central Production Facility (CPF) and K Unit/Support Building have been affected by settlement of the deeper fill and settlement-prone native soil materials beneath the eastern area of the site.

The penitentiary has been the subject of considerable investigation, testing, analysis, and monitoring by various engineering firms over the past decade. As part of our assignment, we spent three days at the site and we have attempted to review all of the relevant work product generated by others that has been provided to us. Our specific charge has been to conduct an independent peer review and comment upon the Option 1 Remedial Plan proposed by Martin/Martin (M/M) in their Structural Engineering Reconnaissance Study and Conceptual Cost Estimate issued on September 14, 2016.

Based upon our review, we have reached the following conclusions:

- The extent and severity of the distress varies considerably throughout the WSP. There are certainly localized areas that are severely distressed, but there are many areas within the South Facility, the CPF, and the K Unit/Support Building that exhibit no distress.
- Where movements have occurred and collateral damage has developed, in most areas there appears to be a fairly strong correlation with poor water management (grading and drainage) issues associated with the original construction. Some of these issues have been corrected, but there are numerous additional improperly graded and drained areas within and around the site that are still contributing to the wetting of the underlying soils.
- Contrary to one of M/M's conclusions, we believe that the South Facility has been affected by deep-seated heave affecting both the slabs and the drilled pier foundations.
- Concerns with the mud slabs installed beneath the grade beams in the South Facility are misguided. Similarly, concerns with the structural integrity of the original drilled piers are unwarranted.
- Unfortunately, elevation survey measurements, made by Coffey Engineering & Surveying (Coffey) from August 2013 through March 2015, were in large part a poorly executed and imprecise monitoring effort. That said, comparison of those Coffey elevation measurements, which appear to be reliable, with those taken by WJE suggest that significant portions of the South Facility have remained stable, or largely so, since 2013.
- M/M's geotechnical consultant provided predictions of potential additional movement that were understandably conservative and based upon worst-case scenarios. We believe that the magnitudes of likely additional movement are a fraction of those predicted potential movements, especially if the water management issues are promptly and fully addressed.
- The existing distress, distortion and other problems at the penitentiary can be repaired and effectively managed at costs far below the cost to rebuild the penitentiary or the cost to perform the

"universal" repairs recommended by M/M in Option 1; i.e., repairs to areas and building components not significantly affected by movements.

- While we do not endorse the Option 1 approach outlined by M/M, it is our opinion that their calculated cost of $87 million for Option 1 is substantially overestimated.

WJE is recommending, in lieu of M/M's Option 1, the following alternative remedial action plan:

1. Fully correct all of the surface grading and drainage deficiencies, including the enclosed courtyards, recreation yards, and outdoor areas, immediately.
2. Remove and replace only those doors and windows and other operational elements damaged by soil, foundation and slab movements or that are not fully operable.
3. Perform masonry repairs at the limited locations where the distress is significant. Remove the temporary column in the corridor outside of the electrical room in Area F after installation of more appropriate, less conspicuous, and permanent repairs.
4. In most areas the masonry damage (cracking) is minor and largely occurs in non-structurally supported walls where it can be repaired by repointing or, in some cases, by the use of appropriate sealants. Existing joint sealants and backer rods should be removed and replaced in control joints and cracks affected by past movements at both interior and exterior wall surfaces and floor slabs. (It should be noted that properly selected and installed sealant materials cannot be expected to have the same service life as masonry components and will need to be inspected on a periodic basis and removed/replaced as needed.)
5. Perform localized slab-on-ground repairs or replacement in the South Facility at limited selected areas.
6. Mudjack, or grout with polyurethane, the slabs-on-ground in the K Unit dayrooms.
7. Perform reliable and precise elevation surveys and complete condition assessments at six month intervals to define the nature and extent of any ongoing movements. These surveys should be repeated in the areas that have been surveyed in the past, and it may be prudent to include additional inmate housing dayrooms. Continue to monitor groundwater levels as well at quarterly intervals. The data from each of these surveys and assessments should be reviewed by a qualified engineer.
8. Except where deteriorated control joint sealants on exterior wall surfaces may affect the performance of the building envelope, all minor, non-structural, and cosmetic repairs, including much of the minor damage to non-load bearing masonry walls discussed above in Item 4, may be postponed until the recommended surveying and monitoring indicates no appreciable ongoing movements.
9. Develop and implement a snow management system to ensure that plowed snow is not stored near the building foundations.
10. Establish realistic budgets for future maintenance and localized repairs.

Estimated costs to conduct these WJE Option 1 Alternative Repair Recommendations is $7.5 million.

BACKGROUND

The Wyoming State Penitentiary property, located in Rawlins, Wyoming, includes a North Facility and a South Facility. The North Facility opened in about 1980; however, due to safety concerns, the North Facility was abandoned following construction of the South Facility Housing Unit in 2001. The penitentiary buildings currently in use are identified in Figure 1 and now include the following:

- South Facility Housing Unit - herein after referred to as simply the South Facility; the Building Official's certificate of occupancy was issued September 28, 2000, with the exception of Area A, for which the certificate of occupancy was issued March 29, 2001; the Fire Marshall's certificate of occupancy was issued May 25, 2001; inmates were reportedly moved from the North Facility to the South Facility in July 2001;
- Central Production Facility (CPF) - the Fire Marshall's certificate of occupancy was issued on July 31, 2002, and the facility was opened in August 2002 (not 2006 as previously reported by M/M);
- K Unit/Support Building - WJE has not received information documenting the completed and/or occupied date of this building, however we have reason to believe that it was completed and possibly occupied in 2006 (rather than being first occupied in 2009 as previously reported by M/M);
- Industries Building - WJE does not have information regarding the completion and/or occupied date of this building.

It is our understanding that Groathouse Construction, Inc. (Groathouse) served as the General Contractor for both the South Facility and the CPF, and Sletten Construction Co. (Sletten) was the General Contractor for the K Unit/Support Building. Plan One/Architects was the project architect for the South Facility, Tobin & Associates, PC and Associates West, Inc. was the project architect for the CPF, and GSG Architecture with Reilly Johnson Architecture, were the project architects for the K Unit/Support Building. Lower Co. P.C. (Lower) was the Structural Engineer of Record for the South Facility and the CPF, and S. A. Miro, Inc. was the Structural Engineer of Record for the K Unit/Support Building.

Portions of these buildings have been adversely affected by soil movements over the years since they were constructed, and some of the movements have caused both structural and non-structural damage in certain areas. In December 2014, Martin/Martin (M/M) was retained by the State of Wyoming to conduct a comprehensive investigation to determine the cause of the damage and to make recommendations for repair and/or replacement of the affected structures. M/M's report, titled *Wyoming State Penitentiary - Rawlins, Wyoming - Structural Engineering Reconnaissance Study and Conceptual Cost Estimate*, dated September 14, 2016, was generally focused on the South Facility, the CPF, and the K Unit/Support Building, and included the following four options for the repair and/or replacement of the facility.

- Option 1: Repair the South Facility, the CPF, and the K Unit Building
- Option 2: Repair the South Facility except for Housing Pods (Areas) A, B, and C; repair the CPF and K Unit Building; rebuild Housing Pods (Areas) A, B, and C at another on-site or off-site location
- Option 3: Repair the CPF and K Unit Building; rebuild the South Facility at another on-site or off-site location
- Option 4: Rebuild the entire Wyoming State Penitentiary at an off-site location.

WJE was subsequently retained by the State of Wyoming to conduct an independent peer review of the M/M study and cost estimate for Option 1 only. This report details the documents reviewed, summarizes our site visits, describes our analytical studies, and outlines our findings, opinions, and recommendations.

SCOPE

In accordance with the Request for Professional Services (0774) issued by the Wyoming Legislative Service Office (LSO), acting on behalf of the Wyoming State Legislature's Management council, WJE provided a Statement of Qualifications (Appendix A) to conduct an independent peer review of the *Structural Engineering Reconnaissance Study and Conceptual Cost Estimate* report prepared by M/M. A scope of services was outlined in Document 0774 and included the following tasks, which were subsequently completed by WJE:

- An in-depth examination of the observations, investigations, testing programs, conclusions, recommendations, design considerations, and estimated costs to repair the South Facility, CPF, and K Unit/Support Building as described in Option 1 of the M/M report.
- A review of all pertinent and available documentation relevant to the M/M report, including geotechnical studies and reports, and documents pertaining to the design, construction and performance of the affected buildings. A list of the most pertinent documents reviewed by WJE is included in Appendix B.
- Conduct site visits as necessary and in conjunction with the LSO, or other designated agencies, firms or individuals, to investigate the structural condition of the South Facility, CPF and K Unit/Support Building. Representatives of WJE's investigative team visited the site on June 15, 22, and 23, 2017. These representatives included the following individuals with WJE: Mr. Andrew Jenkins, PE, Mr. Jerry Maly, PE, Mr. John Reins, PE, Mr. Peter Stauffer, PE, and Ms. Jennifer Volz, PE. Mr. Don Harrington with Sage Consulting Group, who has provided cost estimating services on this project, also visited the site on June 23, 2017.
- Develop a peer review opinion of M/M's Option 1 related to the South Facility, CPF, and K Unit/Support Building as described in their *Structural Engineering Reconnaissance Study and Conceptual Cost Estimate*.
- Provide revised or alternate recommendations, design considerations, and cost estimates to repair the South Facility, CPF, and K Unit/Support Building, as determined necessary.
- Assist the LSO staff as requested.
- Prepare the results of the project and independent peer review study in a report, and present the final report to the Legislative Committee(s) in Rawlins, Wyoming. A preliminary in-progress draft report was issued on June 30, 2017, and this final report is being issued on July 13, 2017. We currently anticipate presenting a summary of our final report to the Joint Appropriations Committee on July 18, 2017 in Rawlins, Wyoming.

REVIEW OF PERTINENT DOCUMENTS

Terracon Reports

Terracon has been involved from the inception of this project in 1997 and they have performed several subsequent post-construction studies, the most recent of which was conducted in 2015. As such, their reports provide an overall perspective and a good starting point for understanding the soil conditions and history of problems that have developed at WSP.

Geotechnical Engineering Report, Project No. 24965021, Dated October 20, 1997

Neither a specific Terracon project number nor date was identified on the structural plans for the South Facility and the CPF. However, based on the basic soil design criteria provided, it appears that the recommendations in this Terracon report were utilized in the design and construction of the foundation

systems and slab-on-ground floors for the South Facility and possibly for the CPF. Work completed for this study included drilling, sampling and laboratory testing of twenty-three borings for the administration and maintenance buildings, roadways, and for the South Facility. Borings 6 through 15 were drilled in the area currently occupied by the South Facility. The following pertinent citations were taken from this report:

- "**Field and Laboratory Test Results**...the on-site sand displays characteristic consolidation behavior upon wetting and loading. The slightly moist, less dense sands display moderate to high collapse potential when wetted and upon loading. The on-site clay and siltstone/claystone bedrock display moderate to high swell potential when wetted."
- "**Groundwater Conditions**...Groundwater was encountered at a depth of three and one-half (3½) feet below the surface in Boring 1... All remaining Borings were dry during the field investigation... These observations represent only current groundwater conditions, and may not be indicative of other times, or at other locations. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions."
- "**Conclusions and Recommendations**. Present site configuration and grades indicate that cuts and fills will be required to achieve final construction elevation in all the proposed buildings. Final grades will result in expansive bedrock and potential collapsible sands near foundation and slab elevation..., the potentially expansive bedrock and materials which collapse upon elevation in moisture content will require particular attention in the design and construction...Slab-on-grade construction is considered acceptable for use when subgrade soils consist of the on-site sands provided that design and construction recommendations are followed..."
- "**Foundation Systems - All Buildings**...a grade beam and drilled pier foundation system is recommended for support of the proposed structures. Straight shaft piers, drilled a minimum of six (6) feet into firm or harder bedrock, with a minimum shaft length of twenty-four (24) feet are recommended...Uplift forces on piers should be resisted by a combination of dead-load and skin friction...A minimum 6-inch void space should be provided beneath grade beams between piers...To provide increased resistance to potential uplift forces, the sides of each pier should be mechanically roughened in the bedrock bearing strata below a depth of seven (7) feet. This should be accomplished by a roughening tooth placed on the auger..."
- "**Floor Slab Design and Construction**. Due to the moderate expansive potential of the bedrock, differential movement of floor slab-on-grade may occur should the bedrock increase in moisture content. Use of floor systems supported structurally independent of the subgrade is a positive means of eliminating the potentially detrimental effects of floor movement. If the owner selects slab-on-grade construction and is willing to assume the risk of future slab movement and related structural damage, the following recommendations are applicable to all planned slab-on-grade construction."

  One of the seven recommendations for slab-on-grade construction stated the following:

  > "A four (4) foot zone of non-expansive soil should be placed under slab-on-grade construction. A minimum [2] inch void space should be constructed above or below non-bearing partition walls placed on the floor slabs when constructed within six (6) feet of the expansive bedrock stratum. Special framing details should be provided at door jambs and frames within partition walls to avoid potential distortion. Partition wall should be isolated from suspended ceilings."

- "**Drainage - Surface Drainage**...2. In areas where sidewalks or paving do not immediately adjoin the structures, we recommend that protective slopes be provided with a minimum grade of approximately ten (10) percent for at least 10 feet from perimeter walls...3. Gutters should be provided on all roofs, and downspouts, roof drains or scuppers should discharge into splash blocks

or extensions at least ten (10) feet beyond the edges of excavations not protected by exterior slabs or paving..."

Geotechnical Engineering Report, Project No. 24045017, Dated June 2, 2004

This Terracon project number and date are specifically referenced in the General Notes on Structural Drawing Sheet S1.0 for the K Unit and Support Building, and it appears that this report was utilized by the structural engineer for the design of these structures. However, a copy of this report was reportedly not available for our review.

Post Construction Geotechnical Engineering Report, Dated January 11, 2013

This report documents two borings drilled in October 2012, one located in the northwest corner of the gymnasium and one at the west corner of the courtyard northwest of the gymnasium (Courtyard D). The following pertinent citations were taken from this report:

- "**6.0 Conclusions.** The gain in moisture in the weathered bedrock is significant, and likely due from external sources such as precipitation, poor drainage, or broken utility lines. It is Terracon's opinion the piers and grade beams under the north and south gymnasium walls have heaved due to increased moisture introduction into the subsoils and swelling claystone. The north and south walls are in close proximity or directly adjacent to exterior grading, which is flat and exhibits poor or negative drainage. The subsoils at these locations are exposed to a higher potential to increased moisture content in the subsoils due to external conditions. The middle of the east and west walls, being farther away from the moisture source, are displaying relatively less movement. In similar fashion as described for the gymnasium walls, the corridor walls and slabs adjacent to the open triangular area are also experiencing moisture intrusion due to flat grading, and poor drainage in this area."

  "It is likely the heave in these portions of the building will continue at a slower rate. If the drainage is improved and the surrounding exterior areas hardscaped, it would be anticipated that additional heave of the foundation and slabs would diminish with time as the effects of eliminating the water intrusion source or sources is corrected. To date, it appears the movement has not rendered the walls or roof unstable."

- "**7.0 Remediation Recommendations.** Based on the information and data gathered for this study and the conclusions concerning the causes of foundation movement, we believe there are limited cost-effective options for addressing the movement issues of the foundation and slabs. Considering that most of the movement so far is nuisance-related and visually unsettling, no remedial action to stabilize the foundation or slabs is recommended. Repairing cracks and re-adjusting door frames may be necessary until the movement has substantially ceased. This should be confirmed by the structural engineer."

  "A baseline survey of pertinent foundation elements and slab elements in the corridor and gymnasium areas should be performed by a qualified surveyor. Subsequent surveys should be performed quarterly to determine what elements are moving and the rate of movement."

  "The exterior drainage in the open yard area, and the exterior drainage that perimeters the gymnasium should be re-graded to accommodate a positive slope away from the perimeter walls and foundations. These areas should be re-constructed to receive a minimum 6-inch thick Portland cement concrete pavement (PCCP). This PCCP should be sloped a minimum of 3% away from the building. The concrete should be sealed adjacent to building walls. Additionally, control joints that are constructed in the PCCP to accommodate shrinkage should be sealed. An on-going crack-sealing maintenance program should be implemented to reduce runoff moisture from infiltrating

the subgrade. The existing storm drains may need to be adjusted to accommodate a different pavement elevation."

"Some of the slab-on-grade distress suggests a tripping hazard may develop if further movement occurs. After establishing relevant history of survey data and presuming the slab movement has slowed to an acceptable level, select slab-on-grade areas should be removed and replaced. A 2-foot subgrade over excavation should be performed..."

"If movement continues to the point that Lower Co. P.C. deems the walls and roof unstable, or the space un-useable, then underpinning the foundation would likely be required. This would entail installing additional piers or piles in the gymnasium area significantly deeper than the present lengths, to ensure enough friction resistance to counteract the uplift on the piers due to the swelling claystone."

Groundwater Monitoring Study, Dated December 6, 2013

This investigation included completion of three borings located east, west and south of the area encompassing the South Facility, and the CPF and K Unit/Support Building. The following pertinent citations were taken from this report:

- "**2.1 Project Description.** The area under consideration for this groundwater study included the south facility of the Wyoming State Penitentiary...Terracon opines that the building movements are being caused by swelling soils due to an increase in pre-construction soil moisture contents. The increase in moisture content is a result of poor surface water drainage around the perimeter of the building. The purpose of this investigation is to evaluate other possible sources of moisture migration that might be impacting the swelling soils. The borings were converted to piezometers after drilling for future groundwater monitoring events."
- "**3.4 Groundwater.** Groundwater was not encountered immediately after drilling, nor when checked after the piezometer installation. Future quarterly monitoring events will be performed by Wyoming Department of Corrections south facility maintenance personnel. This information will be reported to the remedial design team upon completion."
- "**4.0 Opinions and Conclusions; 4.1 Impact of Off-Site Utilities on Groundwater Migration**. Based on information from the subsurface exploration, initial groundwater measurements, and laboratory testing results, it is our initial opinion and conclusion the nearby subsurface utilities are not contributing to an increase in moisture content of the swelling soils under and adjacent to the buildings and slabs at the south facility. Additional groundwater measurements should be performed by DOC personnel on a quarterly basis to monitor future groundwater impact to the south facility infrastructure."

Site Visit Observations, DRAFT, Dated March 17, 2015

A copy of this report is provided in Appendix C. The following pertinent citations were taken from this report:

- "In the south facility, there has been relative movement occurring in the floors and masonry walls. Indications of movement were observed during the 2012 site visit, and included cracks in masonry walls, displacements at construction (expansion) joints, and binding and/or racked doors. The movement is most pronounced at the north side of the gymnasium, but there has also been significant movement in Area A and along the Northwest Hall, as well as indications of movement elsewhere in the facility."

- "**Baseline and On-Going Survey Data.** A baseline survey of elevations in the South Facility was performed in August 2013. The survey has been repeated about quarterly through October 2014. Coffey surveyors were on site performing another of these surveys during our March 9 site visit...Our review of the survey data through October 2014 indicates that the surveyed elevation results have been somewhat erratic. However, the trends in the data suggest that relative vertical movements of up to1/2" may have occurred over the survey period, with the greatest relative movements being in the Gymnasium area."
- "**Recent Construction at South Facility**. In our January 11, 2013 Report, Terracon recommended that the exterior areas surrounding the corridors and gymnasium be re-graded with positive slopes and that they be hard-scaped with concrete...We were pleased to observe that the outdoor patio and the area immediately adjacent to the east side of the Gymnasium were hard-scaped in 2014. We understand that outdoor areas adjacent to Area A are scheduled to be hard-scaped this year. This hard-scaping program should appreciably reduce moisture infiltration into the subsurface near the portions of the facility that have had the greatest distress....We understand that underfloor utilities have been inspected for leakage and were found to be in good condition. Terracon constructed piezometers in a follow-up geotechnical investigation titled Groundwater Monitoring Study dated December 6, 2013. More piezometers have since been installed by others, and Terracon understands that standing water has been observed in some of the piezometers...We will be pleased to review the water level data as it becomes available."
- **Site Visit Observations**. This section of the report addressed some of the most notable distress that was present at that time, and included the following:
    - Area F: Noticeable distress at the northeast corner and northwest corners of the gymnasium, in the adjacent Hobby/Crafts room and office along the west wall, and elsewhere in this room; mechanical (electrical) room west of the gymnasium and installation of a shoring column in the hallway adjacent to this room.
    - Area A: Noticeable cracking in the window jamb at the northwest corner of the office (A164) immediately east of the Area A entrance hall; significant displacement in the small closet off the southwest corner of the Area A multi-purpose room (A180).
    - Other Locations: Typical displacements in the CMU expansion (control) joints in the northwest hall and in the long east-west hall that passes by the north end of the gymnasium; horizontal cracks in the hallway walls; vertical cracks in the west and north walls at the housing area at the east end of the east-west hall.
    - CPF: In general, the distress is of a somewhat different nature and not as great as in the South Facility. The distress in this facility consists of cracking of concrete floor slabs, distress in joints in CMU walls, and some diagonal cracking across CMU blocks. The most significant distress is in an upper level mechanical room where a horizontal crack of about one-half inch width carries completely through a CMU block that is laid adjacent to a cast-in-place concrete wall...Some of the interior halls are tiled. There are cracks in the floor tiles on either side of some door openings. At an exterior door at the end of a hallway of the east end of the building, it appears that the floor on the right side of the interior of the door has settled somewhat compared to the floor at the left side of the door. A crack stair-steps through the floor tile joints and the door jamb appears to be racked at this location.
- "**Comments on Site Visit Observations - South Facility**. In general the relative displacement and distress that we observed during this site visit were of a similar nature to what we observed in our site visit during 2012, but the distress has increased due to continuing relative movements. At

several locations the displacements have become more dramatic due to spalling of CMU blocks, and the opening of large and very visible cracks. As a result of the additional and on-going movement, a shoring column has been placed in the east-west hall just outside the mechanical room that is immediately west of the gymnasium...It is probable that the newly constructed and planned hard-scaping will minimize surface water infiltration so that over time the amount and rate of relative movement will decrease. With respect to how long the on-going movements will continue, we note that the claystone materials on which the facility is supported is very tight. That is, water moves through these materials very slowly. This is indicated by the fact that movements that [sic] are still continuing fourteen years after facility construction. As it has taken many years for the continuing distress to occur, it could be a number of years before the facility finally stabilizes...Based on our experience with remedial construction in similar facilities impacted by heave of swell potential subsurface materials, it is often cost effective to address specific portions of the structure where the data and observations indicate such repairs are needed. At this time, it is our opinion that if elements need to be underpinned, the underpinning should be planned for the affected locations only rather than for the facility as a whole...During a telephone conversation between our Mr. Attwooll and Mr. Bob Kiser of the State of Wyoming Department of Administration and Information at the conclusion of our March 9, 2015 site visit, Mr. Kiser asked if it were possible that the subsurface water could be coming from native areas uphill of the site and from other natural drainages...Mr. Attwooll expressed his opinion that it was more likely that the subsurface moisture is infiltrating within the area of the greater overall facility footprint. The construction of the overall facility creates many loosened and gravel covered surfaces which allow more of the typical nine inches of annual precipitation that occurs at the site to infiltrate than occurs on nearby native surfaces. The greater transpiration and evaporation from the native surfaces minimizes deep penetration of water into the subsurface compared to the modified surfaces within the overall facility."

- "**Comments on Site Visit Observations - CPF Facility**. Based on our site visit observations, the causes of the distress observed at the CPF Facility are different than at the South Facility. Rather than being the result of heave of the swell potential subsurface materials, the distress appears to be primarily the result of settlement in the fill materials that underlie the facility...Based on our site observations, of the main floor level at the north end of the facility...it appears that the floor slabs have locally settled about one-half inch and possibly up to about one inch relative to the footing [sic] supported walls and structural elements. The differential floor slab settlements are indicated by the cracks in the flooring tile at doorways...The floor slab cracks are a response to the differential settlement between the floors and walls and across the floor themselves. The wall separations at the elevated guard area are likely the result of floor slab settlement under the elevated guard area...There also appears to be some localized differential settlement under the footing [sic] supported structural elements. This displacements observed across CMU wall joints and the cracking through some of the CMU blocks appear to be the result of the response of the relatively rigid structure to the differential settlement. This is also indicated by the racking of some door frames, and the distress in the upper level mechanical room."

Original Drawings and Specifications

South Facility

This building is a one story structure; however, in the prisoner housing areas mezzanines were constructed directly above the main level cells to accommodate a greater inmate population. This building features steel framed roofs and structural concrete mezzanine floors supported primarily by interior and exterior concrete

masonry unit (CMU) walls with isolated columns in some locations. These CMU walls and columns are structurally supported on concrete grade beams and drilled pier foundations. The main level floors are concrete slabs-on-ground that, in general, were isolated from the concrete grade beams and drilled pier foundations to allow differential vertical movements of the floor slabs with respect to the load bearing walls and foundations. However, there are many CMU partition walls supported directly on the slab-on-ground floors; that is, walls not structurally supported by grade beams and drilled pier foundations. These non-structural walls were primarily installed in areas used for offices, classrooms, restrooms, and the like; i.e. non-inmate housing areas. As such, these partitions, like the slabs that support them, may move up or down relative to the structurally supported walls with deep foundations.

In general, it appeared that the foundations and ground-supported components were designed in accordance with the Terracon recommendations; however, we identified a number of locations where the plans did not appear to comply with these recommendations, including the following: 1) Requirements for providing mechanically roughened piers were not included in the drawings and specifications reviewed by WJE. We have not reviewed any project addenda issued during construction by the designers and any requests for information (RFIs) that may have been issued by the contractor during construction, regarding this issue; nor do the Terracon drilled pier observation reports reviewed by WJE mention any such mechanical roughening. 2) The plans and details reviewed by WJE did not appear to have specified 2 inch separations between the top of all non-structurally supported masonry partitions and the above floor or roof in areas where the slab-on-ground floor was constructed within six feet of the expansive bedrock stratum, as recommended by Terracon. Similarly, the construction documents did not appear to have specified special framing details at door jamb and frames located in non-structurally supported CMU partition walls supported by slab-on-ground floors so as to avoid or minimize potential distortion. 3) Supplemental Instructions/Information prepared by Plan One/Architects regarding RFI EH-01, indicated that 'skim slabs' having a thickness of 1½ inch could be installed over the specified void forms, and below the grade beams between piers to facilitate installation of the grade beam forms, provided that these were later broken off fairly flush with the faces of the grade beams. However, as described and discussed by M/M, it appears that not only were these skim slabs (referred to as mud slabs by M/M) not removed, they were found to be about 3 inches thick and extended 3½ inches or more beyond the faces of the grade beams on one or both sides. 4) The Civil plans generally specified 2 percent slopes away from the building for exterior concrete/asphalt flatwork. With respect to exterior grades, these plans specified that all finished subgrades were to slope away from the building; however, specific slopes were generally not indicated despite Terracon's recommendation for exterior slopes of 10 percent within 10 feet of a building.

Various exterior courtyards, recreation yards, and outdoor areas were integrated into the South Facility. These included Courtyard A-F located between Areas A and F, Courtyard B-C between Areas B and C, Courtyard D between Areas C, D, and F, and Courtyard E-H between Areas E and H. Recreation Yards A1, G1, and H1 are associated with Areas A, G, and H, respectively, and Recreation Yards B1 and B2, and C1 and C2 are associated with Areas B and C, respectively. Finally, one Outdoor Area F-G is located between Areas F and G. The architectural plans indicated that, with the exception of small patio slabs at the exterior side of the doors, the courtyards and recreation yards were not to be paved. However, Google Earth imagery appears to indicate that all of the recreation yards were fully paved since the building was constructed; though, these images also appear to indicate that the courtyards and Outdoor Area F-G were initially unpaved. This is consistent with our understanding from WSP personnel who indicated to us that Courtyards D and E-H, and Outdoor Area F-G were fully paved in the summer-fall of 2014. Courtyards B-C and A-F remain unpaved.

CPF

With the exception of two relatively small mechanical mezzanines near the center of the building, the CPF is primarily a one story structure. This building features steel framed roofs and steel framed mezzanine floors, the latter with concrete slabs over metal deck, typically supported by interior steel columns and exterior CMU bearing walls.

These columns and CMU walls are structurally supported on concrete grade beams and drilled pier foundations. The main level floors are concrete slabs-on-ground that, in general, were isolated from the concrete grade beams and drilled pier foundations to allow relative differential vertical movements of the floor slabs with respect to foundation-supported components. However, there are many CMU partition walls supported directly on the slab-on-ground floors, that is walls not structurally supported by grade beams and drilled pier foundations. As such, these partitions, like the slabs that support them, may move up or down relative to the structurally supported walls with deep foundations. The exterior faces of the perimeter CMU walls feature an exterior insulated finish system (EIFS).

As with the South Facility, the civil plans fell short of specifying exterior grades/slopes away from the building that were in accordance with those recommended in the reports prepared by Terracon.

K Unit / Support Building

The K Housing Unit is a two story building that features a steel framed roof structure, and two levels of stacked six-sided precast concrete cell modules. Each cell module includes two housing units. At the main level, the precast cells are supported by concrete grade beams and drilled pier foundations along the front and back, and were installed over 6 inch void forms. The mezzanine level cells are supported directly on top of the main level cells, and include concrete slabs that cantilever 5 feet to create the mezzanine walkways. The exterior walls of the cell modules were fabricated with insulation panels between inner and outer wythes of concrete. With the exception of the precast floors in the cells, the main level floors are concrete slabs-on-ground, isolated from the precast cell walls and the exterior foundation walls. However, these slabs-on-ground were cast continuous over the interior grade beams at door thresholds and at the front walls of the multi-purpose room in each cell pod. Furthermore, while the slabs-on-ground in the two dayrooms were isolated from the precast cell walls and floor slabs, they were supported on top of the grade beams along the front walls of the cells. In the office areas along the primary east-west corridor, there are CMU partition walls supported directly on the slab-on-ground floors. As such, these partitions, like the slabs that support them, may move up or down relative to the structurally supported walls with deep foundations. The exterior faces of the perimeter walls were typically clad with EIFS.

The Support Building is a pre-engineered metal structure with steel frames that span the width of the building, with support provided by concrete grade beams and drilled pier foundations. The floor is a concrete slab-on-ground, isolated from the perimeter grade beams, except at the steel frames where tension tie-beams were provided across the width of the floor. At the interior of the building, which features a central hallway and offices, there are numerous non-bearing partition walls, featuring either CMU or metal studs with gypsum board, supported directly on the floor slab.

As with the South Facility, the civil plans for these buildings fell short of specifying exterior grades/slopes away from the building that were in accordance with those recommended in the reports prepared by Terracon.

Monitoring, Surveying, and Inspection Records and Data

Lower Elevation Surveys

Lower conducted observations and a relative elevation survey of the gymnasium walls (Room F125) in the South Facility in December 2011 and in July 2012. In their letter dated December 23, 2011, Lower indicated that they observed diagonal cracking in the masonry at some locations and distortion in certain door and window frames. Lower also indicated that, based on their measurements, it appeared that the gymnasium walls and floor slab had settled as much as about 2½ inches, with the low points near the center of the east and west walls relative to the north and south ends of the gym. Finally, Lower also stated that, based on reports from staff members who had been at the facility since the building was completed, these movements have been progressing slowly since that time.

Lower's letter dated August 9, 2012 reported that additional settlement had occurred in the west gymnasium wall since December 2011, such that the total vertical displacement was 1⅜ inches at that time; however, Lower also reported that additional movements had not occurred in the east, north, and south walls of the gymnasium over this period of time. In addition, measurements by Lower indicated that certain walls along the corridor south of Area C had moved vertically upward as much as about 1½ to 1¾ inches, and that a window in Room C164 had fractured. Copies of this Lower documentation are included in Appendix D.

It should be noted that WJE and other investigators, including M/M, have subsequently concluded that the movements affecting the gym are related to heave rather than the settlement reported by Lower.

Coffey Elevation Surveys

Based on recommendations made by Terracon in their report dated January 2013, Coffey was retained by the WDOC to conduct baseline elevation surveys of certain foundation elements and slabs-on-ground in the South Facility. These baseline elevation surveys, performed in August 2013, included: 1) the perimeter walls and floor slab in Gymnasium F125; 2) the full length of the walls in the primary northwest corridor that extends from the west exterior walls at Areas A and B to the sally port in Area D; 3) the full length of the walls in the primary north-south corridor that extends from the sally port in Area D to the corridor immediately adjacent to the Control Room in Area G; 4) the walls in the east-west corridor that runs along the north side of the gymnasium; and 5) the floors in the office, storage, multi-purpose rooms, etc. in Area A. The survey points were measured with a combination of a Trimble VX Series Robotic total station and a conventional surveyor's level, with the total station used predominately in hallways and the gymnasium. According to the legend on Sheet 2 of 2 of Coffey's survey plans, dated December 30, 2013, wall elevations were "calculated to top of 2nd block above floor from measured point." A fire hydrant located on the south side of the A-Unit was used as the benchmark for the six surveys. Coffey then conducted five follow-up surveys of these same areas at intervals of approximately three to five months, with their final survey conducted in March 2015. A plan view of the Coffey interior survey points is included in Appendix E.

In their Draft report dated March 17, 2015, Terracon stated the following with respect to the Coffey elevation survey data: *"...Our review of the survey data through October 2014 indicates that the surveyed elevation results have been somewhat erratic. However, the trends in the data suggest that relative vertical movements of up to 1/2" may have occurred over the survey period, with the greatest relative movements being in the Gymnasium area."* On page 5 of the same report, Terracon stated the following: "*We understand that the surveyor, Coffey Engineers, is aware of the erratic elevation data in the previous surveys. We understand that they were making special efforts to assure that the elevations on the current survey will be internally consistent. If, after these efforts, it the elevation data* [sic] *continue to be erratic, it may be because the benchmarks are not stable but are also subject to relative movement. If that is the case, we recommend that stable benchmarks be established at locations not immediately adjacent to the*

Facility. Stable benchmarks are typically established by drilling a boring to about forty foot depth, placing a continuous reinforcing bar within the boring, and backfilling with concrete grout. We can provide details for stable benchmarks if needed and requested."

In email correspondence from John Lund, PE with M/M to Bob Kiser, dated March 2, 2015, Mr. Lund stated the following regarding the protocol for the Coffey elevation surveys: *"1) It appears that Coffey did not close the loops on all their surveys. This is an important aspect of providing control to the surveys. I recommend that all surveys from now on have the loops closed to ensure this level of control. 2) Coffey is using a total station for the survey. This is probably okay given the restrictions of the penitentiary environment, but I would prefer an optical level be used with measurements taken to the nearest 1/1000th of a foot...Alternatively, a total station can continue to be used, but take readings to the nearest thousandth of a foot, if possible. 3) I am still concerned about the reliability of the benchmarks. I suggest we install at least three deep benchmarks (maybe four) at approximately equal distances around the facility (90 degrees or 120 degrees apart). I would use 4½" micropiles...Doug Jobe should review and approve the final micropile installation specifications."*

Storm and Sanitary Sewer Inspections

Based on discussions with Mr. Terry Keys, Facilities Manager for the Wyoming Department of Corrections (WDOC), it is our understanding that all of the underground storm and sanitary sewer lines at the South Facility were inspected using video cameras by WSP maintenance staff in 2014. WJE was provided with copies of annotated plans indicating the specific pipes that were inspected. Mr. Keys reported that no leaks or other serviceability issues with any of these sewer lines were found during their investigations.

Pressurized water lines were not tested at any of the buildings. However, Mr. Keys reported that City of Rawlins domestic water records for the WSP were retrieved and reviewed, and no anomalies in water use were identified.

Crack Monitoring Gauges and Photographic Records

Four crack monitoring gauges, identified as Nos. 1, 2, 3, and 4, were installed in Area F of the South Facility by M/M in August 2015. Three of these gauges were installed over existing cracks in an electrical room (Room F117), with No. 1 located about midway along the east wall, No. 2 was located at the northwest corner, and No. 3 was located at the northeast corner. Copies of photographs taken by others at the time of the initial installation of these cracks are provided in Figures 2A, 3A, and 4A, respectively. Finally, Gauge No. 4 was located over a crack in the east wall of the gymnasium, adjacent to the northeast corner. A copy of a photograph of this gauge taken by others at the time of its installation is provided in Figure 5A.

WJE took photographs of these same four gauges during our site visits on June 15 and 22, 2017. Our photographs of Gauge Nos. 1 through 4 are provided in Figures 2B through 5B, respectively, so that differences in the position of the gauge crosshairs, indicating movements of these cracks over this twenty-two month period, could be identified.

Summary of Reported Damage History, and Past and Ongoing Repairs

Except where noted otherwise, information in this section was taken from either a document titled *WSP Wall Movement History* dated March 31, 2015, the author of which was not indicated, or an undated document prepared by the State of Wyoming, Department of Administration and Information, Construction Management Division, which included a summary of information and a timeline of events related to the construction of the South Facility.

2003 or 2004 (approximate)
Some windows began cracking, floor slabs were heaving, but the superstructure was reportedly not moving.

2010 (approximate)
Cracks were observed on exterior stucco (EIFS).

December 2011
Gym wall stress fractures noted by WSP staff to WDOC central office and A&I.

December 2011
The first bullet point in the *WSP Wall Movement History* document included the following citation: "Initial notification of structural concerns from the facility." This citation could suggest that structural issues were first identified in December 2011, and that prior to that time there was no awareness of movements or distress within the building. However, in addition to the above noted reports of distress in 2003, 2004, and 2010, the December 23, 2011 letter by Lower makes it clear that certain staff members were aware that movements had been occurring gradually since the building was completed approximately eleven years earlier.

Lower visited the site in December 2011 and July 2012, and wrote letters documenting observations and measurements pertaining to building movements in the gymnasium and the corridor south of Area C.

September 2012
Maintenance staff reported areas of concern in several exterior areas.

January 2013
Terracon recommended a baseline survey of the facility to monitor movements over time.

January - March 2013
Cracking was observed in masonry at the mechanical mezzanine in K Unit. The project architect, GSG Architecture, was contacted by WSP, who then contacted the structural Engineer of Record, S. A. Miro. S.A. Miro responded via email; the response included the following statement: *"The observed distress does not currently impact the structural adequacy of the wall to safely carry the supported loads."* S.A. Miro recommended that the condition be monitored, followed by repairs if the condition stabilizes or an investigation if movements continue.

February 2014
Cracking was observed in the A Unit area.

March - May 2014
WSP maintenance staff conducted video inspections of sanitary and storm sewer lines at South Facility.

August - November 2014
Concrete paving and drainage repairs were performed in Courtyards D and E-H, and Outdoor Recreation Yard A.

At the Area A recreation yard, the original concrete slab was removed and replaced. It is our understanding that Courtyards D and E-H were originally constructed without concrete slabs-on-ground. In Courtyard D, the finished grade reportedly consisted of gravel, the top of which was reportedly below the drain inlet elevation. Repairs in Courtyards D and E-H included installation of concrete slabs and new drain inlets.

December 2014
Lower again visited the facility and recommended structural repairs to damaged masonry in Area F, Electrical Room F116 that included repairs to the south wall and repairs to address damaged masonry supporting a steel beam at the north (front) wall (see Figures 29A and 29B). In lieu of the Lower-

recommended repairs at the north wall, WSP staff installed a temporary support column in the hallway outside the electrical room. Lower reported signs of additional movement at the east wall of the gymnasium, including binding of the exit door near the northeast corner.

During this same visit, Lower also reported signs of movement in Area A. These included: 1) masonry damage in Sally Port A158 where a separation at the joint between a non-structurally supported masonry wall and a structurally supported concrete column was noted; and 2) movement of non-structurally supported masonry in Storage Closet A180 (see Figures 10A and 10B), and in Counselor Offices A174 and A177.

July - August 2015
Doors and windows were reportedly becoming a growing concern at the facility. J. Heier expressed concern with a certain (unidentified) control room to the structural engineer. Discussion began with a detention contractor regarding potential repairs to security doors and windows.

November 2015
Roof repairs were made over the 'certain' control room to insure roof membrane integrity over the winter.

June 2017
WJE noted that structural repairs were in progress at the northeast corner of the gymnasium foundation during our site visits.

M/M Structural Engineering Reconnaissance Study and Conceptual Cost Estimate

M/M Findings

Under M/M's direction, numerous observation pits were excavated adjacent to the foundation grade beams at various locations around the facility. Based on their observations at these pits, mud slabs were noted at the grade beams associated with the South Facility and the CPF, but were not observed at the K Unit/Support Building. As discussed previously, these mud slabs were constructed on top of the void forms, between drilled piers, were about 3 inches thick, and extended about 3½ inches or more beyond the faces of the grade beams on one or both sides. Because the void forms beneath the mud slabs were only as wide as the grade beams themselves, M/M expressed concerns that expansive soils beneath the outer edges of the mud slabs "reduce the downward load on the drilled piers, increase the upward load on the drilled piers, and can allow the grade beams to be lifted by upward movement of the expansive soils." However, M/M also stated the following: "No structurally significant cracking of the concrete grade beams or separation of the drilled pier from the foundation wall was observed at any of the excavation locations. Normally, when damaging pier heave or grade beam movement occurs, there is resultant cracking observed in the grade beam. The fact that this has not occurred indicates that most of the damage has been caused by slab-on-grade movement, and differential movement between the slabs-on-grade and foundation walls, as opposed to foundation movement alone. Foundation movement has undoubtedly caused some of the damage at the facility, and will continue to cause damage, but does not appear to be the most significant causal factor for the observed distress and related damage at the WSP facility."

With respect to the void forms, M/M stated only that the void form in one excavation location at the K Unit building was found to be collapsed over about half of the span for that particular grade beam; they also indicated that they observed locations where concrete overpour or seepage from the forms of the concrete grade beam was noted. With respect to the collapsed void, they indicated that the void form collapse was the result of original construction activities, in which wet concrete caused the void to fail, and then completely filled the void. Because M/M's report did not include observations of the general condition of the void forms discovered throughout the WSP facility, WJE contacted Mr. John Lund with M/M by

telephone on June 28, 2017. Mr. Lund informed us that six (6) inches tall void forms were observed at all excavations. Nowhere in any of their exploratory excavations at the South Facility did M/M identify any locations where the height of the void was compromised, reduced, or filled in any significant way to something less than 6 inches by swelling soils. Similarly, Mr. Lund indicated that at the CPF and K Unit/Support Building, the originally installed 6 inch tall voids were still 6 inches tall.

Olson Testing

M/M retained the services of Olson Engineering (Olson) in June 2015 to assess the length and integrity of fifteen (15) drilled pier shafts, supporting various buildings throughout the WSP, using Sonic Echo/Impulse Response (SE/IR) testing techniques. This testing was documented in a report addressed to M/M dated June 22, 2015, and was subsequently included in the M/M report. The piers that were selected for testing were located at pits that were excavated by M/M to examine other aspects of the foundation construction, discussed above. As reported by M/M, Olson found that 13 of the 15 piers tested appeared to have lengths equal to or greater than the anticipated minimum length of 21 feet from top to bottom, or from top to a potential crack or other irregularity along the length of the shaft. Testing on the other two piers indicated apparent lengths of 13.6 feet for the pier identified as at Location 6 at Courtyard B-C, and 19.5 feet for the pier located at Location 12 at the CPF Boiler House. M/M stated that the pier at Location 6, having an apparent length of only 13.6 feet, was of particular concern. M/M also stated that these lengths less than 21 feet may be a result of improper installation, i.e. the piers were simply installed too short, or a result of a break or crack in the piers at the lengths indicated by the testing.

In June 2017, Olson conducted additional SE/IR testing on three drilled piers that were exposed in the vicinity of the northeast corner of the gymnasium as part of other structural repair work being performed in this area. This testing is documented in a report prepared by Olson and issued to M/M on June 20, 2017. One of the three piers was located directly at the northeast corner of the gymnasium, and was one of the fifteen piers previously tested in 2015. During the 2015 testing, Olson reported an apparent length of 28.8 feet for this corner pier, at Location 4; however, Olson's report for the recent testing indicated an apparent length of only 25.3 feet for this same pier.

CTL/Thompson Studies

CTL/Thompson, Inc. (CTL) drilled two borings on July 22, 2014. One of the borings is located west of the South Facility and the other is in the courtyard southeast of the gymnasium, i.e. Courtyard E-H. These borings were included in the documents provided for our review, but do not appear to have been included and summarized in a geotechnical report.

Recently, CTL/Thompson (CTL) completed a geotechnical investigation at the South Facility, and the CPF and K Unit/Support Building, as documented in their report titled *Geotechnical Consultation, Building Movement, Wyoming State Penitentiary*, Project No. DN47,925-149, dated December 18, 2015 (a copy of which was included in the M/M report). This investigation included drilling, sampling and laboratory testing of nine borings, five at and around the South Facility, and four at and around the CPF and K Unit/Support Building. Laboratory testing of samples included swell-consolidation testing and soil suction measurements.

JMB Cost Estimate

M/M retained the services of JMB Consulting Group (JMB) to prepare a cost estimate for M/M Options 1 through 4, a copy of which was included in the M/M report. JMB's total cost estimate for the M/M proposed repairs for Option 1 is $87,232,454.

WJE FIELD INVESTIGATION

South Facility

Interior Observations

Area A

WJE personnel entered Dayroom/Cell Pods A1 and A2, and walked the floors at both levels; however we did not enter any individual cells. We also entered and observed a large majority of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area A.

In general the slab-on-ground floors were in good condition. There was some evidence of modest heave in the Dayroom/Cell Pods. This was most apparent where there was evidence that the slab surface had been ground down slightly at doors (Figure 6), along cracks parallel to the front walls of the cells and roughly coinciding with the edges of the mezzanine floors above (Figure 7), as well as at the interior floor slab adjacent to the outdoor recreation yard (Figure 8).

The masonry in the Dayroom/Cell Pods was generally in good condition, with some modest cracks at wall intersections. Numerous cracks were observed in the office areas where CMU walls supported directly on the floor slabs intersect with other masonry walls (either structurally supported or non-structurally supported) or columns. The most significant masonry damage was observed in Room A164 where the face shells of four stacked masonry units were dislodged in the bearing wall along the corridor at the intersection with a non-bearing wall (Figures 9A and 9B), and distress in the floor slab and masonry at the entrance to Area A at Corridor A181, immediately adjacent to Room A164. A portion of the floor slab was removed in A164 and a soil boring had been taken, with the bore hole subsequently converted to a piezometer. The most significant masonry separation was observed in Room A180, a triangular storage room that exhibited a ± 1 inch wide gap at what appeared to be a control joint at the intersection of a non-structurally supported wall and a structurally supported wall (Figures 10A and 10B). Failures of control joint sealants were noted in several masonry walls.

Some doors were racked, and others exhibited offsets in, or modifications to, the strike plate holes. A number of security glass windows exhibited crazing.

The rooms specifically observed in Area A, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-2.

Area B

WJE personnel entered Dayroom/Cell Pods B1 and B2, and walked the floors at both levels; however, we entered only a single individual cell. We also entered and observed a majority of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area B.

In general, the slabs-on-ground floors were in good condition, with limited cracking. There was some evidence of modest floor heave in the Dayroom/Cell Pods. This was most apparent along cracks parallel to the front walls of the cells and roughly coinciding with the edges of the mezzanine floors above, as well as at the interior floor slab adjacent to the recreation yard associated with Pod B2 (Figure 11).

The masonry in the Dayroom/Cell Pods was generally in good condition, with a few modest cracks at wall intersections. Numerous cracks were observed in the office areas where non-structurally supported masonry walls intersect with other masonry walls (either structurally supported or non-structurally supported) or columns. The most significant masonry crack was observed in a structurally supported wall in Room B171 where a non-structurally supported partition intersects this wall (Figures 12A and 12B). Failures of the masonry wall control joint sealants were noted in some locations. The most significant distress of this type was observed in the southwest corner of the outdoor recreation yard associated with Pod B1 (Figure 13).

In the Area B rotunda, a weld was broken and a steel plate modestly buckled in the steel framed wall separating the rotunda from Control Room B159 (Figure 14). Some doors were racked, and others exhibited offsets in, or modifications to, the strike plate holes. Some security glass windows exhibited crazing (Figure 15).

The rooms specifically observed in Area B, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-3.

Area C

WJE personnel entered Dayroom/Cell Pods C1 and C2, and walked the floors at both levels; however we did not enter any individual cells. We also entered and observed a majority of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area C.

In general, the slab-on-ground floors were in good condition. However, there was some floor cracking and evidence of modest heave in the Dayroom/Cell Pods. This was most apparent where there was evidence that the slab surface had been ground down slightly at cell doors, along cracks parallel to the front walls of the cells and roughly coinciding with the edges of the mezzanine floors above.

The masonry in the Dayroom/Cell Pods was generally in good condition, with some modest cracks at wall intersections. Numerous cracks were observed in the office areas where non-structurally supported masonry walls intersect with other masonry walls (either structurally supported or non-structurally supported) or columns. Some of the most significant masonry damage was observed above Door C167A, along Corridor D151 where the door was racked and the masonry at the adjacent control joint was displaced and cracked (Figure 16); inside Vestibule C167 (adjacent to Door C167A) where a crack was observed in a non-structurally supported partition at its intersection with the structurally supported wall along Corridor D151 (Figures 17A and 17B); and in Room C161 where a crack was observed in a non-structurally supported wall at its intersection with the structurally supported wall adjacent to the outdoor recreation yard associated with Pod C1 (Figure 18). Sealant failures were noted in some of the control joints in the masonry walls.

A few doors were racked, and others exhibited offsets in, or modifications to, the strike plate holes. Some security glass windows exhibited crazing.

The rooms specifically observed in Area C, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-4.

Area D

WJE personnel entered and observed the vast majority of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area D. There are no inmate housing areas in Area D.

In general the slab-on-ground floors appeared to be in good condition; however, it was apparent that the floor slabs in this area have experienced some heave. This is because a majority of the masonry walls are non-structurally supported partitions, i.e. walls supported directly on the slab-on-ground floor, and, as such, there is a significant amount of cracking and other distress where these partitions intersect with other masonry walls (either structurally supported or non-structurally supported). Typical examples of the distress are shown in Figure 19 and Figure 20. Cracking was noted in the floor tile over the concrete slab in Waiting Area D108 (Figure 21). Failures of control joint sealant were noted in certain masonry walls.

Some doors were racked, and others exhibited offsets in, or modifications to, the strike plate holes. Door frame D151 in Corridor D151 exhibits slight buckling where the jamb meets the header at the center of the frame (Figures 22A and 22B).

The rooms specifically observed in Area D, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-5.

Area E

WJE personnel entered Dayroom/Cell Pods E1, E2 and E3, and walked the floors at both levels; however we entered only a single individual cell. We also entered and observed most of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area E.

In general, the slab-on-ground floors were in good condition. There was some floor cracking and evidence of modest heave in the Dayroom/Cell Pods.

The masonry in the Dayroom/Cell Pods was generally in good condition, with some modest cracks at wall intersections. Numerous cracks were observed in the office areas where non-structurally supported masonry walls intersect with other masonry walls (either structurally supported or non-structurally supported) or columns. Failures of masonry wall control joint sealants were noted in some locations.

Some doors were racked, and others exhibited offsets in, or modifications to, the strike plate holes.

The rooms specifically observed in Area E, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-6.

Area F

WJE personnel entered and observed the majority of the rooms throughout Area D that includes the gymnasium, various mechanical and receiving rooms, and smaller rooms associated with the kitchen, gymnasium offices, and the electrical room. There are no inmate housing areas in Area F.

In general the slab-on-ground floors appeared to be in good condition; however, it was apparent that the floor slabs, as well as some of the bearing walls in the gymnasium and electrical room in this area, have heaved. As previously discussed, three crack gauges were installed by M/M in August 2015, in the electrical room and one in the gymnasium. Photographs were taken by WJE of these same gauges during our recent site visits. Comparisons of these photographs with the photographs taken by M/M are shown in Figures 2A and 2B through 5A and 5B. Other cracks in the gymnasium and in the corridor immediately outside the Electrical Room F116 were also photographed previously by others and by WJE during our recent site visits. Comparisons of some of these gymnasium cracks are provided in Figures 23A and 23B through 28A and 28B, and a comparison of masonry distress adjacent to a temporary shoring column outside of Electrical Room F116 is provided in Figures 29A and 29B.

The rooms specifically observed in Area F, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-7.

Area G-H

WJE personnel entered Dayroom/Cell Pods G1 and G2, and walked the floors at both levels; however we did not enter any individual cells. We also entered about a dozen of the relatively small, individual offices, storage rooms, multi-purpose rooms, etc. throughout Area G. However, we did not enter either of the two Dayroom/Cell Pods, which essentially make up the entirety of Area H.

The slab-on-ground floors and masonry walls were in good condition in the Area G Dayroom/Cell Pods. However, as we observed in Areas A, B, C, and D, there were some cracks in the office areas where non-structurally supported masonry walls intersect with other masonry walls or columns.

The rooms specifically observed in Area G-H, and locations where masonry cracking and other distress were noted are identified in Appendix F, Exhibits F-1 and F-8.

Exterior Observations and Surveys

Based on our observations and discussions with WSP personnel while at the site, the following is our understanding of the existing slab and drainage conditions at the exterior courtyards, recreation yards, and the outdoor area. See Exhibit F-1 in Appendix A.

- Courtyards and Outdoor Areas: None of the courtyards and outdoor areas were paved at the time of original construction; however, two drain inlets were installed in each. Courtyards D and E-H, and Outdoor Area F-G were subsequently paved in 2014; a third drain inlet was installed in Courtyard D at that time. Courtyards B-C and A-F remain unpaved.
- Recreation yards: All of the recreation yards were paved at the time of original construction, and each included a single drainage inlet. Recreation Yard A1 was repaved in 2014.

Surface grading around the South Facility was typically very poor; i.e., grades immediately adjacent to the building were flat and did not provide positive drainage away from the exterior grade beams.

On June 23, 2017, WJE also performed a limited relative elevation survey of the Courtyard E-H slab-on-ground. A Hixon 32X Auto Level and telescoping rod were used.

In many locations, the concrete slabs adjacent to egress doors have either been damaged or removed and replaced with gravel. It is our understanding that these slabs had moved upward relative to the door threshold in some locations, which did not allow the doors to open outward. Therefore, portions of the slabs were chipped away to allow the doors to operate properly (Figures 35 and 36).

The entrance to the South Facility features split face CMU, while the remainder of the perimeter CMU walls are clad with EIFS. In general, the EIFS was in good condition. However, water staining was noted below first floor windows, around lighting fixtures, and at overflow scuppers (Figure 30). In addition, minor cracking was observed at window corners (Figure 31) and reentrant corners. A series of three vertical cracks was also observed on the northwest elevation of Area B (Figure 32). Joint sealants were present around windows and in vertical control joints. Much of the sealant had been poorly installed and appeared to be reaching the end of its service life. Numerous instances of adhesion and cohesion failures in the sealant joints were observed (Figures 33 and 34).

According to the project specifications, the roofing system consists of a ballasted EPDM single-ply membrane having a thickness of 60 mils, with a fifteen year warranty. WJE personnel observed the roof during our June 15, 2017 site visit, and noted that the ballast consists of a continuous layer of precast concrete pavers (Figures 37 and 38). These pavers have deteriorated from repeated freeze-thaw cycles since their installation about seventeen years ago. Expansion of the pavers has also caused them to buckle in numerous areas throughout the roof. This paver distress is unrelated to building movements. While WJE is not aware of problems with roof leaks, this type of roof has an expected service life of fifteen to twenty years.

Interior Elevation Surveys

On June 22 and 23, 2017, WJE performed a relative elevation survey of certain interior areas of the South Facility using a Hixon 32X Auto Level. The purposes of the survey were to try to make sense out of and/or understand Coffey's measurements and, if possible, to estimate the nature, magnitude, and extent of any ongoing movements.

Unlike Coffey's surveys, WJE's survey was not tied to a benchmark. However, WJE was able to locate and take measurements at Coffey's Control Points 20 and 21, which had been etched into the concrete slabs with "X"s. In addition, where possible, measurements were taken at survey points previously established by Coffey. In hallways, the locations of Coffey's survey points were typically indicated on the walls with

a black permanent marker and were readily apparent. The locations of Coffey's points in the Gymnasium, Hobby Room (now the Cardio Room), the Kitchen Hallway (hallway leading to the kitchen), and within Unit A were not typically marked; therefore, in these areas, WJE used unique architectural features (e.g. doorways, windows, and turns in the walls) to estimate the locations of the survey points established by Coffey. This was more difficult in the Gymnasium due to its large size and lack of consistently spaced markings within the field of the floor. Floor slab elevations were measured to the thousandths of a foot with a telescoping aluminum rod. Wall elevations were measured to the nearest sixteenth of an inch using a folding ruler.

It was unclear to WJE where Coffey measured the elevations at walls. Therefore, WJE recorded measurements on the floor and on the walls at the top of the sixth course of CMU above the slab. Typically, these measurements were taken at every other Coffey survey point location.

Finally, due to construction barricades in the hallways adjacent to the northeast corner of the gymnasium, WJE was unable to directly tie the survey points in the northern portion of the east hall and the eastern portion of the hall north of the gymnasium to the remainder of the survey.

CPF and K Unit/Support Building

Interior Observations

Laundry
In general, the floor slab was in very good condition. The most pronounced distress was minor settlement and vertical offsets across a slab crack near the door in the southwest corner of this large room. No significant distress was noted in any of the perimeter bearing walls.

Office/Vestibule/Break Room
There was minor slab distress in the handicap ramp leading up to the office and miscellaneous cracking distress in certain CMU partition walls. A small portion of the slab in the vestibule had been removed and replaced, ostensibly to repair a sewer line break.

Covered Loading Docks
There were indications of minor foundation movements that has produced some diagonal cracking distress in the CMU block walls between the overhead doors and cracks in the ceiling adjacent to these walls. The personnel door exiting the building was racked.

Kitchen
Given the usage and heavy traffic within this space, the slab was in good condition. We noted signs of some slab settlement and cracking as well as ceiling cracks and minor distress in certain half-height CMU divider walls in the food prep area. It was apparent that considerable volumes of water are introduced onto the floor slab on a regular basis as a result of food preparation efforts, dishwashing, and daily "hose down" clean-ups. This underscored the importance of maintaining good underslab drain systems that do not leak and to maintain reasonable levels of water tightness in the control joints provided in the slab.

Ramp from CPF to K Unit
Minor slab settlement and cracks in the CMU walls were noted along this ramp.

Main Hallway to and through K Unit
There were persistent signs of slab settlement and lateral gaps developing between the hallway slab and the CMU walls along each side of the hallway. The vinyl composition tile along the edges of the slab had been replaced, apparently as a consequence of these differential movements.

K-1 Cell Block
Minor slab settlement and crowned floors were noted in this area. The door to the computer/exercise room was beginning to rub against the floor slab. Minor distress had developed in the showers and common rooms on the mezzanine level.

K-2 Cell Block
There was widespread evidence of moderate slab movement and cracking throughout this space. The uneven profile of the slab has resulted in certain cell doors rubbing against the floor. In addition, there were issues with differential movements affecting the precast cell units; e.g. racking doors, separations at joints, cracking distress.

Gymnasium
The slab in this open area was in very good condition with no significant offsets between the slab and the perimeter foundations.

Industries Building (Shop)
The slab in this open space was in good condition but with some indications of significant differential settlement relative to the perimeter foundations.

Hallway between Gym and Shop
At the far eastern end of the hallway, localized settlement had produced slab distress and distortion of the frame around the personnel door exiting the building.

Mechanical Rooms above Hallway
CMU cracks documented by previous investigators appeared to be unchanged. See Figure 39. These cracks are a pronounced but structurally insignificant consequence of differential movements that were not properly accommodated due to the lack of slip/soft joints in the original design and construction.

Specific locations where masonry cracking and other distress was noted in the CPF and K Unit/Support Building are identified in Appendix F, Exhibits F-9 and F-10, respectively.

Exterior Observations

Sitework
There were a number of locations where the concrete flatwork surrounding CPF and K Unit/Support Building had settled and cracked, producing vertical offsets and potential trip hazards. Surface grading around these buildings was typically very poor; i.e., grades immediately adjacent to the buildings often sloped toward the foundation. Downspouts typically discharged directly next to the building and, where splashblocks were provided, they were not positioned or sized to effectively direct water well away from the buildings.

Exterior Walls
For reasons that were not apparent, a number of the vertical control joints in the exterior EIFS panels did not extend for the full height of the wall. However, these discontinuities have not produced any significant consequences and the sealant joints in the EIFS walls were typically in fair condition. Vertical joints between precast panels on the east face of K-2 exhibited signs of movement and/or both cohesive and adhesive failures in the sealant. Some cracks ranging from minor to moderate had developed in certain CMU walls at and around the Support Building.

Interior Elevation Surveys

On June 23, 2017, WJE performed a relative elevation survey of portions of the interior of the CPF and K Unit/Support Building, using a Hixon 32X Auto Level. The purpose of this survey was to determine the out-of-levelness of the slabs for comparison with the areas of known distress and to determine the elevation differentials between exposed grade beams and slabs-on-ground.

We understand that the interior slabs-on-ground have recently been surveyed by another firm; however, the locations of the survey points and their respective elevations have not been provided to WJE. Nonetheless, WJE was able to locate approximately sixteen control points established by the prior surveyor who etched "X"s into the concrete slabs at certain locations. Most of these control points were also outlined in blue tape (Figure 40). WJE recorded over 100 slab elevations in the laundry room, the hall between the laundry and kitchen, the hall in the K Unit, Area K-2, the gymnasium, and the print shop. In addition to measuring the elevations of the slabs-on-ground, where possible, WJE also measured the relative elevations at the known control points and, within the gymnasium and print shop, elevations were recorded on the tops of exposed grade beams adjacent to slab measurements to determine the vertical offsets.

Floor slab elevations were measured to the thousandths of a foot with a telescoping aluminum rod. In a few locations, wall elevations were measured to the nearest sixteenth of an inch using a folding ruler at the top of the sixth course of CMU block above the floor slab.

WJE FINDINGS AND DISCUSSION

Foundation Issues

South Facility

M/M reported that they did not observe any significant cracking of the grade beams or separations of the drilled piers from the grade beams in those portions of the foundations exposed in their excavations. Similarly, M/M reported to us during a telephone call that the original 6 inch voids appeared to have remained fully intact, without being compromised, filled, or exhausted in any meaningful way by swelling soils, in the locations observed in their excavations. Finally, in general we did not observe any significant indications that the floor slabs have moved differentially with respect to the immediately adjacent structurally supported masonry walls. As such, we believe that the heave affecting certain portions of the South Facility is deep-seated; i.e. the swelling is occurring at sufficient depths that both the slabs-on-ground and the drilled piers are being lifted together.

With respect to the mud slab extensions, while we agree with M/M that they should have been removed during construction, we do not believe that expansive soils have exerted any significant uplift forces on these unreinforced mud slab extensions, thereby lifting the grade beams. This is substantiated based on the fact that M/M observed no significant cracking in any of the grade beams exposed in their excavations, together with the fact that the 6 in. voids observed by M/M in these same excavations appeared to be fully intact. We also believe that any uplift forces that could be generated against these mud slabs would likely be nominal, causing them to fail before they could exert significant uplift forces on the grade beams. While the strength of the concrete used for these mud slabs was not addressed in the Architects Supplemental Instructions or the RFI that permitted them to be installed by the contractor, because these slabs were intended to be broken off at the face of the grade beams prior to placement of backfill, it is reasonable to assume that the 'concrete' would have been a low strength material. In our experience, it would be common to use a cementitious flowable fill material having a compressive strength in the range of 100 to 200 psi for this type of application. This appears to be consistent with M/M's statement that mud slabs are made using lean concrete mixes (see M/M report page 4 of 284). Given the evidence that the foundation movements

are deep-seated, there is no compelling reason for the mud slab extensions to be removed at this time. Simply stated, in our opinion, the foundation movements that have occurred to date would likely not be significantly different if the mud slabs had been removed during construction.

With respect to the questions raised by Olson and M/M regarding the length and structural integrity of certain drilled piers, we have reviewed a small portion of the drilled pier installation observation reports prepared by Terracon during construction. In all cases, these records indicate pier lengths greater than the minimum specified length of 21 feet. The Terracon report for the South Facility indicated that the longitudinal reinforcing steel in the piers was to be determined based on the design tensile force, calculated per Terracon's recommendations. The drawings prepared by Lower for the South Facility specified that all 18 inch diameter piers were to be reinforced with four No. 6 bars, and all 24 inch diameter piers were to be reinforced with six No. 6 bars. As such, if a horizontal crack developed through the cross section of a pier because of uplift, the steel would transfer the tension across the crack. Given the foregoing, we do not find M/M's concern about a possible short pier (13.6 feet) at Excavation Location 6 in Courtyard B-C compelling. Similarly, we do not find compelling any concern about the pier at Excavation Location 4, a pier that is believed to have an installation length of 28.8 feet, and that may have developed a horizontal crack at a depth of 25.3 feet. Simply stated, the structural integrity of the drilled piers has not been compromised by deep-seated heave or by tension cracks that have developed after installation.

CPF and K Unit/Support Building

We concur with M/M that the CPF and K Unit/Support Building have been affected by settlement of the deeper fills and settlement-prone native soil materials in this area of the site. This is especially true in the Support Building where it appears that settlements on the order of several inches have affected both the slab-on-ground and the perimeter foundations from the south wall to the north wall. While these movements are significant, the magnitude and extent of associated distress are minimal.

Modest to moderate settlements of the slabs-on-ground appear to have developed in the K Unit dayrooms. These movements may be affecting the operation of some cell module doors, which is believed to be due to the fact that dayroom slabs are supported on the grade beams along the front walls of the cells.

Estimates of Future Movement

Subsurface information collected as part of the geotechnical investigations identified above is summarized in Table G-1 in Appendix G. Soil and bedrock materials beneath the South Facility and CPF and K Unit/Support Building exhibit both swell and consolidation when wetted at overburden stresses in the laboratory. The laboratory test results summarized in Table 1 also indicate that moisture contents have increased since construction. (Locations of the post-construction borings taken across the site are shown in Exhibit G-1 in Appendix G.) The average pre-construction moisture content profile in the South Facility area (Terracon, October 20, 1997) is plotted along with post-construction moisture contents from recent borings completed at the South Facility on Exhibit G-2 in Appendix G, and on Exhibit G-3 for the CPF and K Unit/Support Building. These plots clearly show that the moisture contents of subsurface soil and bedrock materials have increased since construction. Plots of percent saturation versus depth provided on Exhibits G-4 and G-5 indicate increased saturation consistent with the increased moisture contents. This wetting has caused some ground heave beneath the South Facility and settlement beneath the CPF and K Unit/Support Building, with resulting areas of distress.

Swell/consolidation tests completed for the recent CTL investigation indicate the following volume change characteristics when existing subsurface materials are wetted: fill materials exhibited very low swell to very low compression; native sand and clay soils exhibited low swell to low-to-moderate compression; claystone

bedrock exhibited moderate to very high swell potential; and the sandstone bedrock was non-expansive. Based on these results, there is the potential for additional heave to occur at the South Facility and the potential for additional settlement to occur at CPF and K Unit/Support Building if additional subsurface wetting occurs.

We performed independent heave/settlement computations using the CTL swell/consolidation test results, as presented in Tables G-2 and G-3 in Appendix G. These calculations assume additional wetting will occur to a depth of 20 feet. The results are summarized as follows:

- The western subsurface profile, typified by relatively shallow claystone bedrock at about 13 feet depth and shallower to the west and north (CTL borings TH-6, TH-7 and TH-5), exhibits future heave potential of 1.6 inches at TH-6 located at the northeast corner of the gymnasium, 3.4 inches at TH-7 located in the western portion of the South Facility, and 8.5 inches at TH-5 located outside and to the north of the South Facility. These calculated heave potentials vary from CTL's estimates to a modest degree.
- The eastern subsurface profile, typified by top of bedrock depths greater than approximately 15 feet, becoming deeper to the east (CTL borings TH-1, TH-2, TH-3, TH-4, TH-8 and TH-9), exhibits minor settlement potential ranging from essentially no settlement to 0.9 inch of settlement. These calculated settlement potentials vary from CTL's estimates by a considerable degree; i.e., WJE's estimates of potential settlement are substantially less.
- It should be noted that these are conservative estimates of potential movements. The likely movements that will occur are significantly less.

Groundwater was encountered at a depth of 3½ feet in Boring 1 at the Administration Building, but not in any of the remaining 22 borings drilled for the original geotechnical investigation (Terracon, October 20, 1997), when checked one day after drilling. Logs for borings completed in 2012 and 2013 (Terracon, January 11, 2013 and Terracon, December 6, 2013), and 2014 (CTL, July 22, 2014) indicate that groundwater was not encountered in any of these borings when checked one day after drilling. Subsequently, groundwater has been measured in piezometers installed in two of these borings. Groundwater was encountered in two of the five borings completed at the South Facility, and in two of the four borings at the CPF and K Unit/Support Building, at the time of drilling (CTL, December 18, 2015).

Periodic water level measurements have been obtained at six piezometers at the South Facility beginning in 2014 at some locations. However, it should be noted that two of the original six piezometers, i.e. #4 and #6, have been abandoned and are no longer available. Recent measurements were taken at three of the remaining four piezometers, i.e. #1, #3, and #7 that were accessible during WJE's site visits. The available readings indicate relatively stable water levels in "Bore Hole #1 Monitoring Well" located outside and to the southeast of the South Facility, and in "Bore Hole #5 Monitoring Well" located in the courtyard southeast of the gymnasium. (Note: Bore Hole #5 was not accessible during our site visits.) However, water levels measured in "Bore Hole #3 Monitoring Well" located outside and immediately west of Area B, and in "Bore Hole #7 Monitoring Well" located in the hallway between Area B and Area A, showed significant increases when measured during our June 2017 site visit, i.e. 7.3 feet and 5 feet, respectively. Monitoring of groundwater levels in all four of the remaining piezometers should resume and continue. Response testing of the "Bore Hole #3 Monitoring Well" and "Bore Hole #7 Monitoring Well" may be warranted to confirm that these piezometers are performing as intended. See Appendix H for the piezometer locations and water level data.

Interior Elevation Surveys at South Facility

WJE performed a location-by-location comparison of the elevation measurements performed by Lower, Coffey, and WJE. Our comparisons considered that the benchmark used by Coffey may not have been reliable. In doing so, we reduced each data set down by a uniform elevation offset (e.g. 6746.69 feet) and converted the elevations from feet to inches for easier comparison. The elevation offset for each data set varied slightly and was chosen to achieve the best fit between data sets closest together in time (e.g. December 2013 to August 2013). This alteration converted the benchmarked surveys to "relative" surveys, or surveys that are considered relative to each other and not referenced to a location with a known stable elevation.

Our analysis confirmed Terracon's and Martin/Martin's opinions that portions of the Coffey data were unreliable. Specifically, portions of the October 2014 and March 2015 data did not align with either previous Coffey results or WJE's later results. This was most prevalent in the Area A - Northwest Corridor, the Pod A Hall, the Multi-Purpose Room, Closet A170, and Control Room Area A, as defined by Coffey. Given the close proximity of these areas, it appears that there may have been turning point errors during those surveys.

When the questionable data was removed from consideration, good correlation between Coffey and WJE's surveys was obtained. In many locations, the comparisons fell within reasonable survey tolerance, which we estimate to be +/- 1/4 inch to +/- 1/2 inch considering the difficulties of this particular survey and the equipment used by Coffey. Where the measured changes fall within those ranges, ongoing movement is unlikely, but cannot be ruled out based on the survey data alone. In other locations, such as the Hobby Room (now the Cardio Room), Gymnasium, East Hall (i.e. north-south corridor between Areas E and F), and the North Hall along the Gymnasium (i.e. east-west corridor between Areas D and E/F), the data indicates that modest movements have likely occurred since August 2013. Exhibits I-1 and I-2 in Appendix I provide a topographic comparison of the relative floor elevation results from Coffey's August 2013 and WJE's June 2017 surveys in the gymnasium.

A review of the interior elevation surveys in the gymnasium indicate that vertical movements of the perimeter walls, all of which were structurally supported, have been similar to the vertical movements of the slab where it is adjacent to the perimeter walls, even though the grade beams supporting the walls are isolated from the floor slab, as shown in Exhibit I-3. This comparison also indicates that, with the possible exception of the northwest corner, the relative elevations of the floor have remained fairly stable.

Exhibits I-4 and I-5 provide a graphic comparison of the relative elevation results of the wall measurements in the Northwest Corridor from Coffey's August 2013 and WJE's June 2017 surveys, respectively. WJE's June 2017 floor elevation survey results are illustrated in Exhibit I-6. A comparison of survey results between portions of the structurally supported corridor masonry walls and the immediately adjacent slabs-on-ground reveal similar consistencies, as indicated in Exhibit I-7.

Within the Pod A Hall (Area A entrance corridor), the Area A Multi-Purpose Room, and Area A Control Room, Exhibits I-8 and I-9 illustrate Coffey's March 2014 and WJE's June 2017 relative floor elevation results. Coffey's August 2013 results were not used in this comparison due to concerns related to the reliability of a select number of survey points. In December 2013, Coffey did not survey the Multi-Purpose Room; therefore, these results were not considered. A comparison of these two exhibits indicates that additional movement may have occurred since March 2014 - specifically starting in the Pod A Hall (Area A entrance corridor) and moving eastward into the Area A Multi-Purpose Room. However, because a comparison with Coffey's 2015 data was not possible, it is unclear how much, if any, movement has occurred since March 2015 in this particular area of the South Facility.

Exterior Elevation Surveys at South Facility

WJE's survey of Courtyard E-H indicated that the slab-on-ground had adequate slope to the two interior drains. The high point was located beneath the stairwell at the southwest corner of the courtyard. Additionally, the concrete was in good condition and the control joints appeared to be performing well.

Interior Elevation Surveys at CPF and K Unit/Support Building

Our analysis indicates that the elevation of the slab-on-ground within the laundry room and hallway to the kitchen varies by approximately 1 7/8 inches. Given the large area, this amount of out-of-levelness is arguably within construction tolerances; however, there are indications of modest slab movement in the past. Given the lack of historical survey data for this building, it is not possible to determine when the movement occurred and if it is ongoing.

The K Unit, inclusive of the Housing and Support areas, was measured to be approximately 5 1/2 inches out-of-level. Most of this differential occurs across the footprint of the print shop at the northeast corner of the building. In addition, the tops of exposed grade beams were measured to be up to 1¼ inches above the adjacent slab-on-ground. Within the gymnasium, the top of grade beams were located within 1/4 inch of adjacent slab measurements. At this point, we do not have a good explanation for the significant elevation differentials measured across the print shop, without any corresponding significant manifestations of distress in the slab or the perimeter walls.

Exhibits I-10 and I-11 in Appendix I graphically illustrate our elevation survey results for the CPF and K Unit/Support Building, respectively. It should be noted that these are relative surveys and, as such, the high point in each building was normalized to a value of 0 inch.

WJE OPINIONS AND CONCLUSIONS REGARDING M/M REPORT - OPTION 1

An initial notification of structural concerns pertaining to the WSP was apparently provided in December 2011 (see the document titled "WSP Wall Movement History: March 31, 2015"); however, it is likely that these movements began soon after construction of the South Facility was completed in 2000 (see the letter by Lower dated December 23, 2011). Commencement of foundation and slab movements soon after construction is entirely consistent with WJE's many years of experience with buildings supported on expansive soils. Furthermore, while it is apparent that many portions of the WSP have been adversely affected by soil movements, the extent and severity of the distress vary greatly throughout the penitentiary and there are many areas that exhibit no distress.

South Facility

We agree with M/M that swelling of expansive soils has been the primary cause of building movements at the South Facility. However, we do not agree with M/M's conclusion that the vertical movements at the South Facility are predominately the result of slab-on-ground movements, with vertical movements of the drilled piers playing a smaller part. Rather, our studies indicate that the swelling soils most affecting this facility are deep-seated, i.e. located sufficiently below the main level floor and exterior grade, such that the entire structure, including the drilled pier foundations, is being lifted in certain locations. For reasons discussed previously, it is our opinion that M/M's concerns about mud slabs and the structural integrity of the drilled piers are misguided.

The portions of the building that appear to have been most adversely affected by the swelling soils include: 1) the Area A offices, especially the area adjacent to the Area A entrance corridor; 2) the juncture of the primary northwest corridor, which extends diagonally from the west exterior wall between Areas A and B

to the sally port in Area D, with the east-west corridor that extends along the south side of Areas D, including the Area C offices adjacent to this juncture; 3) Area F, including the gymnasium and electrical room; and 4) the Area D offices. In addition to the very poor drainage surrounding the entire building, in our opinion there is a strong correlation between these most adversely affected areas of the building and the locations of unpaved and poorly drained Courtyards B-C and A-F, and Courtyards D and E-H that were unpaved and poorly drained until about November 2014. See Exhibit F-1 in Appendix F. Improving the drainage in these courtyards and around the perimeter of the building will directly affect (reduce) the amount of water that infiltrates the subgrade soils and claystone, thereby reducing the extent and magnitudes of future heave.

A comparison of WJE's recent elevation survey data with Coffey's earliest reliable elevation survey data indicate that the changes in the gymnasium floor, the Northwest Corridor, and the Area A entrance and offices are modest. The Lower elevation survey data collected in 2011 and 2012 indicated a maximum relative difference in elevations of about 2½ inches around the perimeter gymnasium walls and the 2017 WJE data indicate relative elevation differences of about 3 inches around these walls. Furthermore, crack monitoring gauges that were installed by M/M over cracks in the walls of the electrical room in Area F in August 2015 indicate no meaningful increases in width over the twenty-two months since they were installed (Figures 2A and 2B through 4A and 4B). Similarly, the crack monitoring gauge installed by M/M over a diagonal crack in the east wall of the gymnasium indicates maximum movements of about 2 mm, or about 1/16 inch, since it was installed about twenty two months ago (Figures 5A and 5B). Additionally, photographs of certain distressed conditions taken throughout the buildings by WJE in June 2017 have been compared with photographs of the same conditions taken previously by others (see Figures 9, 10, 12, 17, 22 through 29, and 39). Most of these indicate modest, if any, changes.

Simply stated, our detailed comparison of observations over time and our elevation survey measurements suggest that the most significant movements have long since occurred, and the rates of ongoing movements appear to diminishing and, in many locations, have essentially abated.

Based on our independent computations, using the CTL swell/consolidation test results, we agree with the M/M and CTL conclusion that the potential future heave of the expansive soils beneath the South Facility is in the range of 3 to 3.5 inches. However, it is our opinion that the likely future heave of these soils will be significantly less than 3 to 3.5 inches, especially if the water management issues at the site are promptly and fully addressed.

CPF and K Unit/Support Building

We agree with M/M that the CPF and K Unit/Support Building have been affected by settlement of the deeper fill and settlement-prone native soil materials beneath the eastern areas of the site. However, we do not agree with M/M's recommendation for compaction grouting below the full extent of these buildings to an average depth of 20 feet. This is based on our observations and findings that: 1) there are numerous areas within these buildings that exhibit little, if any, meaningful distress, and 2) our estimate of the remaining settlement potential of the soils underlying these buildings is in the range of no settlement to a maximum of 1 inch., which is substantially less than the 3½ inch settlement potential calculated by M/M and CTL. As stated above with respect to the expansive soils at the South Facility, it is our opinion that the likely future settlements will be less than the potential estimates.

Conclusion

While some movements, and resulting damage, would almost certainly have occurred to buildings on this site even if the best of efforts had been made during design and construction to minimize them, the very

poor site drainage conditions are believed to be the primary cause of the ongoing movements and distress. However, in our opinion, the movements that have affected the various buildings at the WSP since completion of construction have clearly begun to abate, even considering the poor drainage conditions that exist around the perimeter of many of these structures.

As such, we cannot endorse the Option 1 Remedial Plan recommended by M/M that includes complete removal of the slab-on-ground floors in the South Facility and replacement with structural floors, and the complete compaction grouting to depths of 20 feet below the CPF and K Unit/Support Building. Rather, we are confident that the water management and drainage problems can be corrected, and the existing distress can be repaired and managed at costs significantly below the estimates provided by M/M.

Cost Estimate

JMB's total cost estimate for the M/M proposed repairs for Option 1 is $87,232,454. While WJE does not endorse the Option 1 approach outlined by M/M, our sub consultant, Sage Consulting Group (Sage), prepared a cost estimate for the Option 1 scope of work recommended by M/M. Sage's total cost estimate for the M/M proposed repairs for Option 1 is $60,063,024 for the same scope of work included in JMB's estimate. However, it is important to note that JMB's estimate includes costs for work to repair various components of the building that are not the result of building movements. These include the roofing, roof drain work, replacement of air handling units (AHUs), and replacement of the programmable logic controller (PLC) platform. When these items are excluded from Sage's estimate for Option 1, the total estimated cost is reduced to $50,364,587. See Appendix J for a description of Sage's approach, costs, etc., as well as their breakdown documentation and spreadsheets.

WJE OPTION 1 ALTERNATIVE REPAIR RECOMMENDATIONS

WJE Recommendations

1. Fully and immediately correct all of the surface grading and drainage deficiencies, including the enclosed courtyards, outdoor recreation yards, and outdoor areas. This work should include achieving positive drainage away from all buildings for a distance of not less than 10 feet, with minimum slopes of 5 percent in graded areas and 2 percent in concrete paved areas. Downspouts, roof drains and scuppers should discharge no less than 10 feet from building foundations. Provide drain inlets and storm sewers as necessary to carry storm water to the existing detention pond located well away from the buildings.
2. Remove and replace only those doors and windows and other operational elements damaged by excessive movement or that are not fully operable. For cost estimating purposes, we have included the same number of doors and windows included in the M/M Option 1 cost estimate.
3. Perform masonry repairs at the limited locations where the distress is significant and/or occurs in structurally supported walls. These include: 1) the damaged masonry in the vicinity of the entrance to Area A and the adjacent Room A164; 2) the damaged masonry in the northwest diagonal corridor in the vicinity of Door C167A and Vestibule C167 in Area C; and 3) remove the temporary column in the corridor outside of Electrical Room F116 in Area F after installation of permanent masonry repairs at the north and south walls. The locations of these areas are identified in Appendix F, Exhibits F-1 through F-10 (For cost estimating purposes, the repairs in Electrical Room F116 are based on the recommendations in the Lower report dated December 30, 2014, included in Appendix D.)
4. Where the masonry damage (primarily cracking) is minor and occurs in non-structurally supported walls, repair by repointing or with appropriate sealants. Existing joint sealants and backer rods

should be removed and replaced in control joints and cracks affected by past movements at both interior and exterior wall surfaces and floor slabs. For cost estimating purposes, these repairs are based on the distress locations identified in Appendix F, Exhibits F-1 through F-10. It should be noted that properly selected and installed sealant materials cannot be expected to have the same service life as masonry components and will need to be inspected on a periodic basis and removed/replaced as needed.

5. Perform localized slab-on-ground replacement in the South Facility at limited selected areas. While about 100 sq. feet of the floor slab in Room A164 is the only area in need of immediate replacement, for cost estimating purposes, we have assumed 500 sq. feet for each area; i.e. Areas A, B, C, D, E, F, and G-H.
6. Mudjack, or grout with polyurethane, to fill voids and partially relevel the slabs-on-ground in the dayrooms in K Unit.
7. Perform reliable and precise elevation surveys and complete condition assessments at six month intervals to define the nature and extent of any ongoing movements. These surveys should be repeated in the areas that have been surveyed in the past, and it may be prudent to include additional inmate housing dayrooms. Continue to monitor groundwater levels as well at quarterly intervals. The data from each of these surveys and assessments should be reviewed by a qualified engineer and the results reported to the Owner in writing.
8. Except where deteriorated control joint sealants on exterior wall surfaces may affect the performance of the building envelope, all minor, non-structural, and cosmetic repairs, including much of the minor damage to non-load bearing masonry walls discussed above in Item 4, may be postponed until the recommended surveying and monitoring indicates no appreciable ongoing movements in a particular area of a building.
9. Develop and implement a snow management system to ensure that plowed snow is not stored near building foundations or at any locations where moisture from snow melt can migrate toward the buildings.
10. Establish realistic budgets for future maintenance and localized repairs. The following items have been included in our cost estimate:
    - Future adjustments and/or replacement of doors and replacement of damaged windows using one-half the value for Item 2 above.
    - Minor repairs to non-structural masonry damage and joint sealants using one-half the value for Item 4 above.
    - Future replacement of slab-on-ground floors has been included using 1000 sq. feet per year for five years.
    - Elevation surveys and condition assessments at six month intervals over the next five years, as indicated in Item 7 above; groundwater monitoring in the existing piezometers at quarterly intervals over the next five years, as indicated in Item 7; and written reports of the data and results from each of these studies shall be prepared and provided to the Owner.

Cost Estimate

Sage has prepared a cost estimate for the WJE Option 1 Alternate Repair Recommendations outlined above. Sage's total cost estimate for our proposed repairs is $7,464,769. It should be noted that Sage's estimate does not include costs for work to repair various components of the building discussed above that are not the result of building movements. These include the roofing, roof drain work, replacement of AHUs, and replacement of the PLC Platform that were included in JMB's cost estimate for M/M's Option 1 Remedial

Repair Recommendations. See Appendix J for a description of Sage's approach, costs, etc., as well as their breakdown documentation and spreadsheets.

FIGURES

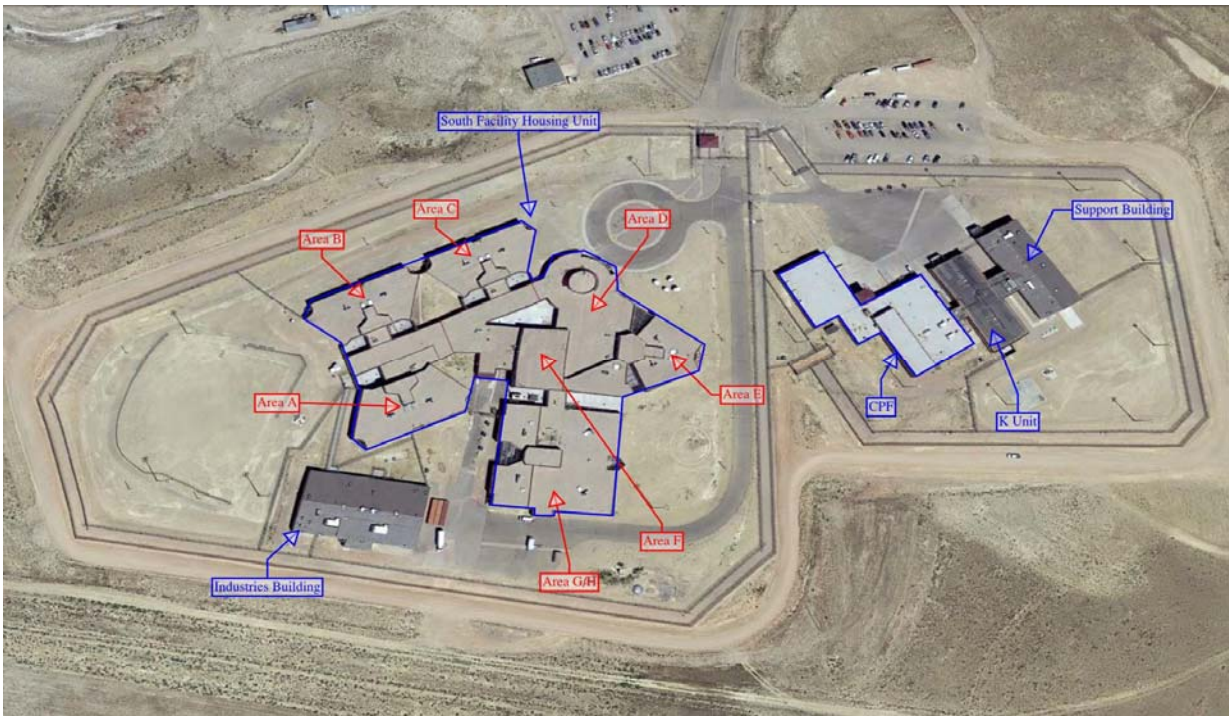


Figure 1. Building identification, with Areas in the South Facility Housing Unit

Figure 2A. Crack Gauge 1 - Area F along east wall of Electrical Room F116.
M/M WSP Crack Monitor Comparison, page 1 of 4, photo date 8/11/15

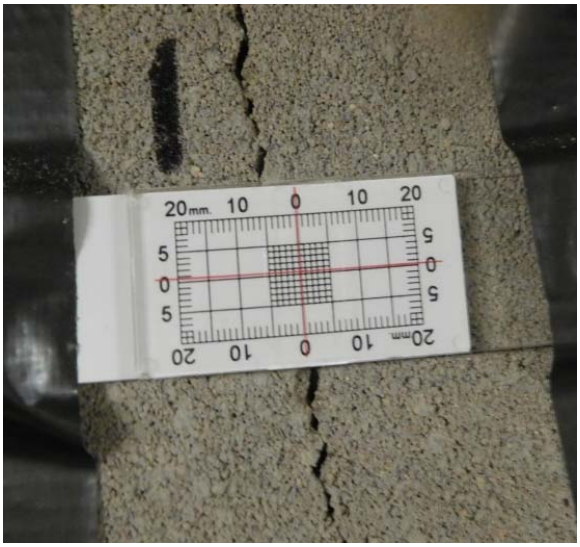


Figure 2B. Crack Gauge 1 - Area F along east wall of Electrical Room F116.

WJE Photo DSCN1284, date 6/15/17

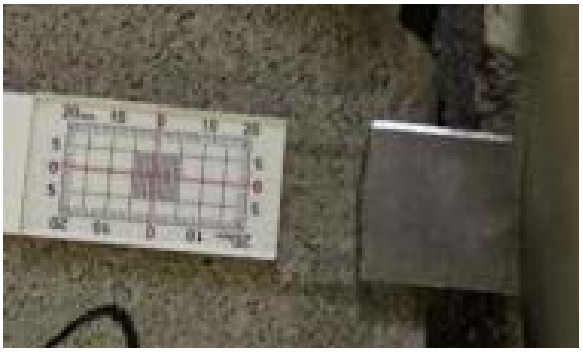


Figure 3A. Crack Gauge 2 - Area F near NW corner of Electrical Room F116.
M/M WSP Crack Monitor Comparison, page 2 of 4, photo date 8/11/15

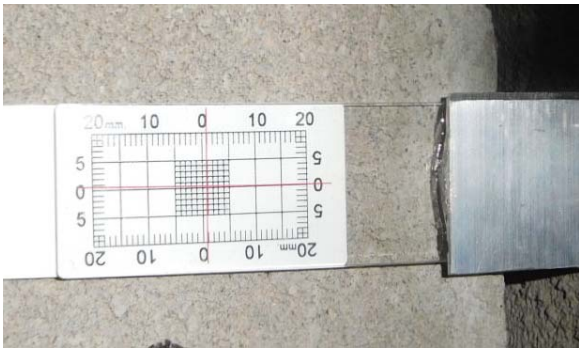


Figure 3B. Crack Gauge 2 - Area F near NE corner of Electrical Room F116.

WJE Photo DSCN1288, date 6/15/17

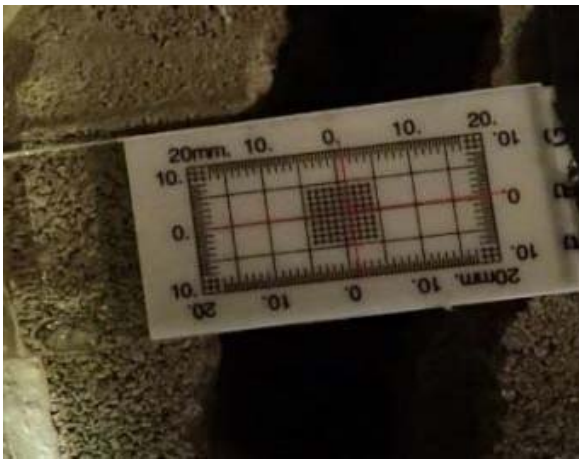


Figure 4A. Crack gauge 3 - Area F Near NE corner of Electrical Room F116.
M/M WSP Crack Monitor Comparison, page 3 of 4, photo date 8/11/15

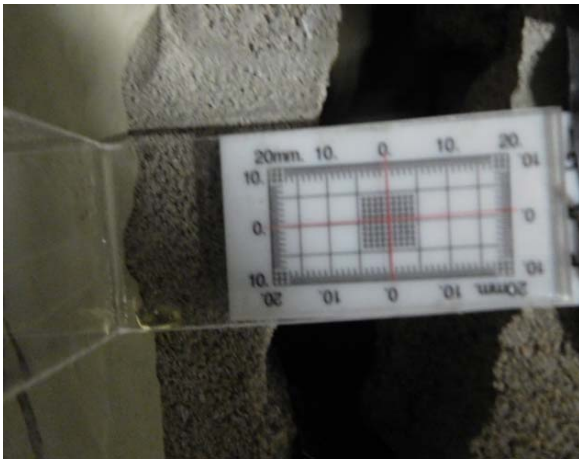


Figure 4B. Crack gauge 3 - Area F Near NE corner of Electrical Room F116.

WJE Photo DSCN1280, dated 6/15/17

Figure 5A. Crack gauge 4 - Area F near NE corner of Gymnasium, Room F125.
M/M WSP Crack Monitor Comparison, page 4 of 4, photo date 8/11/15

Figure 5B. Crack gauge 4 - Area F near NE corner of Gymnasium, Room F125.

WJE Photo DSCN1467, date 6/22/17

Figure 6. Indication of past grinding of slab surface to facilitate door operation

Figure 7. Slab crack in cell Dayroom parallel to front wall of cells

Figure 8. Interior floor slab cracking in Pod A1 adjacent to courtyard

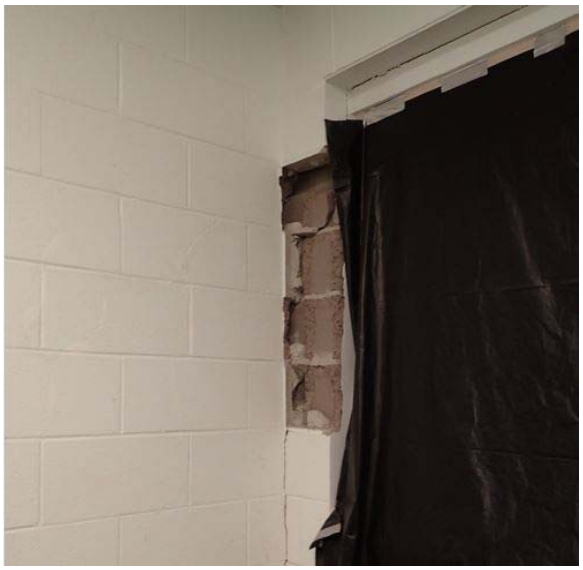


Figure 9A. Masonry distress at window opening in north wall of Room A164.
M/M Presentation, slide 12, photo date 1/4/16

Figure 9B. Masonry distress at window opening in north wall of Room A164.
WJE Photo DSCN1335, date 6/22/17

Figure 10A. Separation in masonry at joint between non-bearing (left) and bearing wall (right) in Storage Room A180.
M/M Rpt. page 37 of 284, photo date 1/27/15

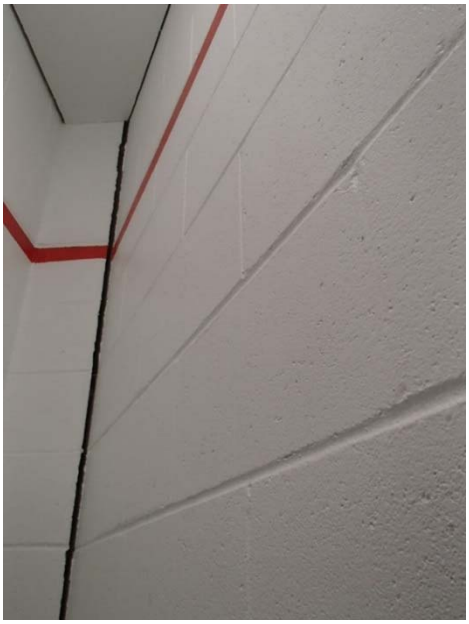


Figure 10B. Separation in masonry at joint between non-bearing (left) and bearing wall (right) in Storage Room A180.
WJE Photo P6150294, date 6/15/17

Figure 11. Interior floor slab cracking in Pod B2 adjacent to courtyard

Figure 12A. Cracking in north bearing wall near joint with non-bearing wall in Room B171. M/M Presentation, slide 17, photo date 1/4/16

Figure 12B. Cracking in north bearing wall near joint with non-bearing wall in Room B171. WJE Photo P6150269, date 6/15/17

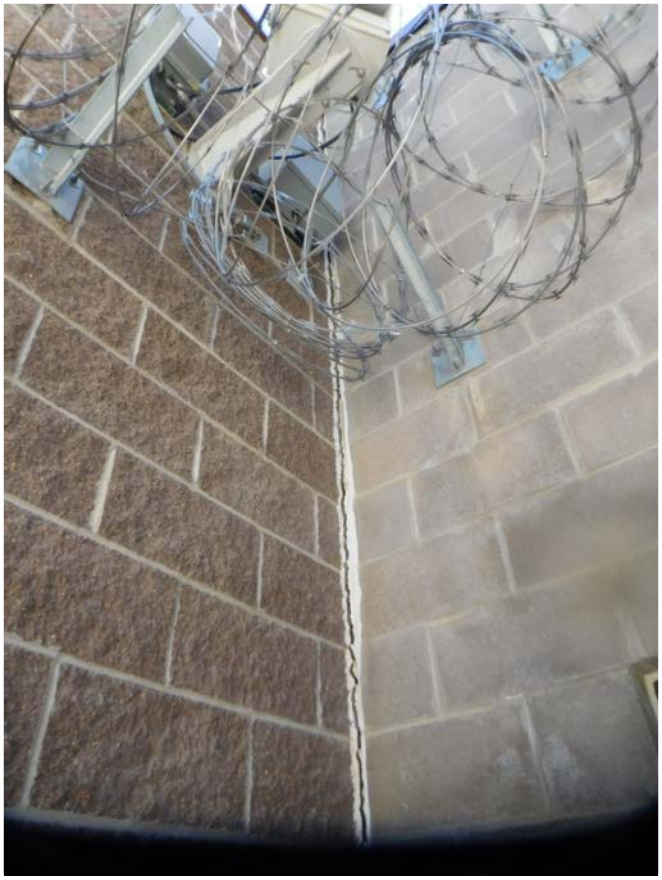


Figure 13. Control joint sealant failure in courtyard associated with Pod B1

Figure 14. Broken weld and buckled steel plate at Pod B rotunda

Figure 15. Broken glass window in Pod B rotunda

Figure 16. Racked door and distressed masonry

Figure 17A. Cracking in west non-bearing wall at juncture with bearing wall in Room B167. M/M Rpt. page 36 of 284, photo date 1/27/15

Figure 17B. Cracking in west non-bearing wall at juncture with bearing wall in Room B167. WJE Photo DSCN1226, date 6/15/17

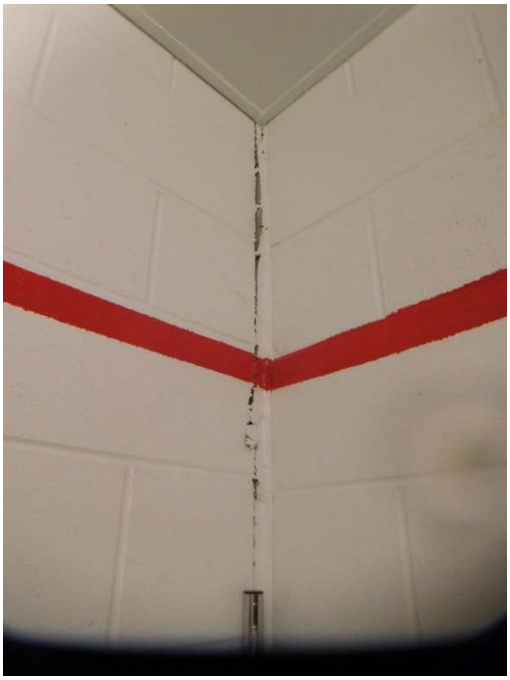


Figure 18. Vertical crack at intersection of non-bearing partition and bearing wall in Room C161

Figure 19. Vertical crack at intersection of non-bearing partition and bearing wall in Room D173

Figure 20. Vertical crack at intersection of non-bearing partition and column in Room D144

Figure 21. Floor tile cracking in Waiting Area D108

Figure 22A. Buckled metal door frame D151 in Corridor D151.
WSP Wall Movement History Rpt. March 31, 2015, page 76 of 141, photo date July 2013

Figure 22B. Buckled metal door frame D151 in Corridor D151.

WJE Photo DSCN1225, dated 6/15/17

Figure 23A. Cracking in east wall of Gymnasium near NE corner, Room F125.

M/M Rpt. page 34 of 284, photo date 1/27/15

Figure 23B. Cracking in east wall of Gymnasium near NE corner, Room F125. (Note Crack Gauge No. 4 at lower left.)
WJE Photo P6150249, date 6/15/17

Figure 24A. Crack adjacent to vent in northwest corner of Gymnasium, Room F125.
WSP Wall Movement History Rpt. page 67 of 141, photo date 12/12/2011

Figure 24B. Repaired (caulked) crack adjacent to vent in northwest corner of Gymnasium, Room F125.
WJE Photo DSCN1446, date 6/22/2017

Figure 25A. Crack in CMU wall at entrance to Hobby/Craft Room F117.
WSP Wall Movement History Rpt. page 67 of 141, photo date 12/12/2011

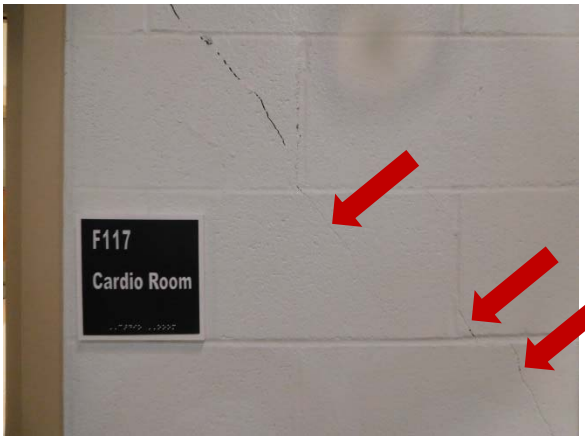


Figure 25B. Partially repaired crack in CMU wall at entrance to Cardio Room (formerly Hobby/Craft) Room F117 (red arrows denote location of repaired crack in 25A).
WJE Photo DSCN1435, date 6/22/2017

Figure 26A. Vertical crack in north wall of Gymnasium, Room F125, as viewed from Corridor F127.
WSP Wall Movement History Rpt. page 67 of 141, photo date 1/7/2013

Figure 26B. Vertical crack in north wall of Gymnasium, Room F125, as viewed from Corridor F127.

WJE Photo DSCN1196, date 6/15/2017

Figure 27A. Horizontal crack in masonry below window opening in Room F118.
WSP Wall Movement History Rpt. March 31, 2015, page 3 of 141, photo date 12/12/11

Figure 27B. Horizontal crack in masonry below window opening in Room F118.

WJE Photo DSCN1263, dated 6/15/17

Figure 28A. Masonry cracking in east wall of Room F117.
WSP Wall Movement History Rpt. March 31, 2015, page 3 of 141, photo date 12/12/11

Figure 28B. Masonry cracking in east wall of Room F117.

WJE Photo DSCN1267, date 6/15/17

Figure 29A. Distressed masonry beneath steel beam bearing near new column in Corridor F127.
M/M Rpt. page 33 of 284, photo date 1/27/15

Figure 29B. Distressed masonry beneath steel beam bearing near new column in Corridor F127.
WJE Photo DSCN1302, date 6/15/17

Figure 30. Water staining below windows and at light fixture.

Figure 31. Crack at lower corner of window.

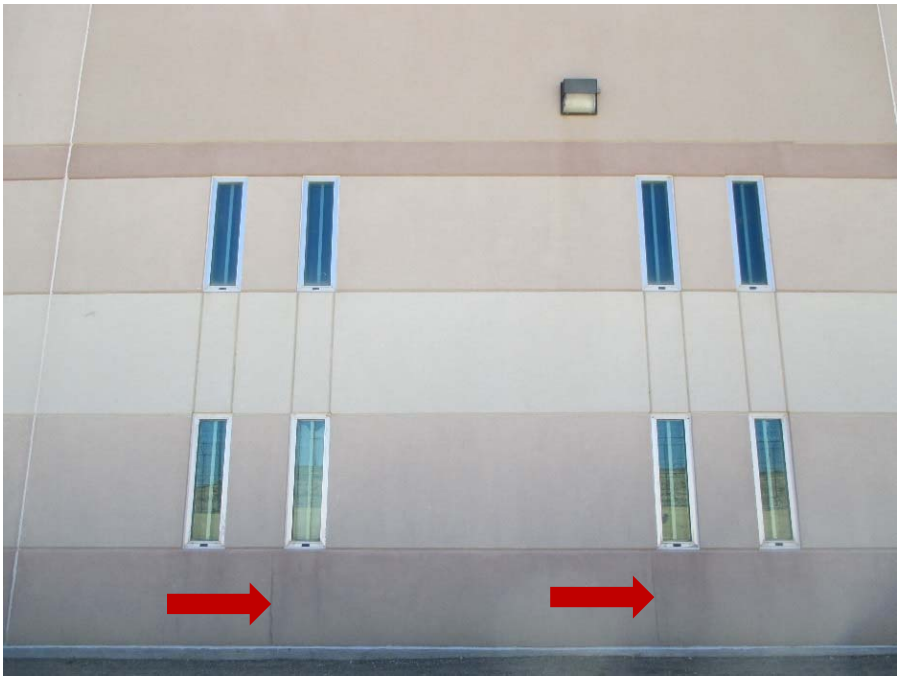


Figure 32. Vertical cracks in EIFS along exterior of Area B

Figure 33. Failed joint sealant at window.

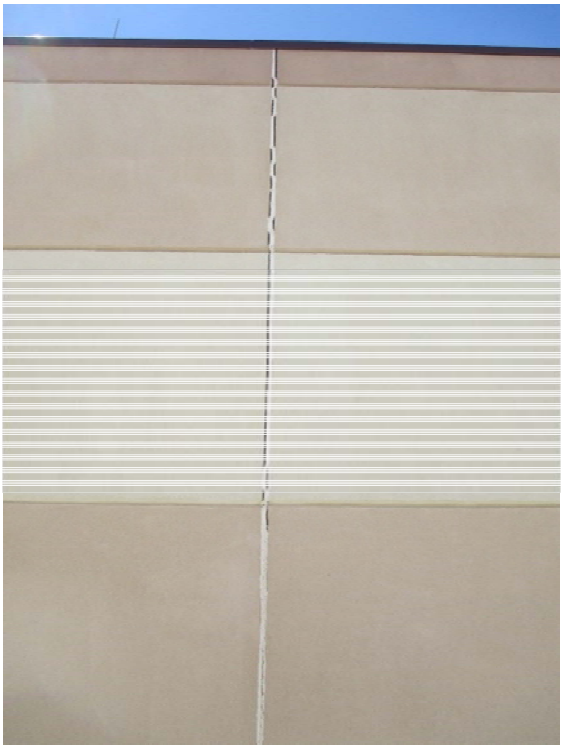


Figure 34. Failed vertical joint sealant in control joint.

Figure 35. Location where exterior slab was removed and replaced with gravel.

Figure 36. Exterior slab altered to allow egress door to operate.

Figure 37. Distressed roofing pavers at South Facility

Figure 38. Distressed and buckled roofing pavers at South Facility

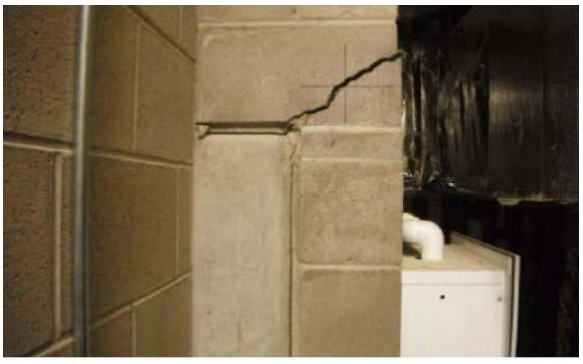


Figure 39A. Fractured masonry pilaster in Mechanical Room 204 in K Unit.
WSP Wall Movement History Rpt. March 31, 2015, page 81of 141, photo date July 2013

Figure 39B. Fractured masonry pilaster in Mechanical Room 204 in K Unit.

WJE Photo P6150215, date 6/15/17

Figure 40. Typical observed control point within the K Unit/Support Building.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

APPENDIX A - WJE STATEMENT OF QUALIFICATIONS

WYOMING STATE PENITENTIARY
STATEMENT OF INTEREST AND QUALIFICATIONS FOR INDEPENDENT PEER REVIEW STUDY

Rawlins, Wyoming


Google Earth Image of Wyoming State Penitentiary

May 31, 2017
WJE No. 2017.3123.P

Prepared for:
State of Wyoming
Department of Administration and Information
700 West 21st Street
Cheyenne, Wyoming 82002

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

TABLE OF CONTENTS

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

LETTER OF INTEREST

May 31, 2017

Brenda Crozier
State of Wyoming
Department of Administration and Information
Procurement Section
700 West 21st Street
Cheyenne, Wyoming 82002

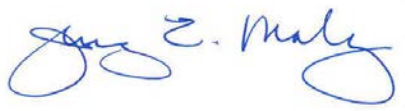
Re: Letter of Interest
Wyoming State Penitentiary - Independent Peer Review Study
WJE No. 2017.3123.P

Dear Ms. Crozier:

Wiss, Janney, Elstner Associates, Inc. (WJE) is pleased to submit this letter of interest and the attached statement of qualifications for conducting an independent and rigorous peer review study of the Structural Engineering Reconnaissance Study and Conceptual Cost Estimate prepared by Martin/Martin Wyoming, dated September 14, 2016, as outlined in the *General Information and Statement of Qualifications Instructions* prepared by the Wyoming Legislative Service Office. Mr. Jerry Maly, PE will serve as WJE's primary contact with respect to this project. Mr. Maly's contact information is provided below.

Very truly yours,

WISS, JANNEY, ELSTNER ASSOCIATES, INC.



Jerry E. Maly, PE
Principal

Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
Email: jmaly@wje.com
Phone: 303-914-4300
Fax: 303-914-3000

WJE ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

ASSOCIATED FIRMS

Sage Consulting Group will be the sub-consultant who will provide cost estimating services for this project.

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, Colorado 80202
303-571-0237

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

BUSINESS ENTITY WYOMING ENGINEERING LICENSE

RECEIPT

THE WYOMING BOARD OF
PROFESSIONAL ENGINEERS AND PROFESSIONAL LAND SURVEYORS

REGISTRATION NO. E-0625 DATE 12/22/2015 RECEIPT NO. 062934
CORPORATION RENEWAL 90.00 TOTAL 90.00

CURRENT CPC Hrs.
CARRY OVER CPC Hrs.

RECEIVED FROM:

By:
Executive Director

WISS, JANNEY, ELSTNER ASSOCIATES, INC.
Beton Cook Jerry Maly
330 Pfingsten Rd.
Northbrook IL 60062-2095

THE WYOMING BOARD OF
PROFESSIONAL ENGINEERS
AND PROFESSIONAL LAND SURVEYORS
THIS IS TO CERTIFY THAT
WISS, JANNEY, ELSTNER ASSOCIATES, INC.
SUBJECT TO THE CONDITIONS PRESCRIBED BY LAW, IS AUTHORIZED
TO PRACTICE PROFESSIONAL ENGINEERING IN THE STATE OF
WYOMING UNDER REGISTRATION CERTIFICATE
NUMBER E-0625 EXPIRING 12/31/2017

Executive Director

ID CARD
DETACH AND CARRY WITH YOU

STATE OF WYOMING
Office of the Secretary of State

I, ED MURRAY, SECRETARY OF STATE of the STATE OF WYOMING, do hereby certify that according to the records of this office,

Wiss, Janney, Elstner Associates, Inc.

is a

Profit Corporation

formed or qualified under the laws of Illinois did on December 11, 2001 , comply with all applicable requirements of this office. Its period of duration is Perpetual. This entity has been assigned entity identification number 2001-000427659.

This entity is in existence and in good standing in this office and has filed all annual reports and paid all annual license taxes to date, or is not yet required to file such annual reports; and has not filed an Application for Certificate of Withdrawal.

I have affixed hereto the Great Seal of the State of Wyoming and duly generated, executed, authenticated, issued, delivered and communicated this official certificate at Cheyenne, Wyoming on this 30th day of May, 2017 at 9:31 AM. This certificate is assigned 023211014.

Secretary of State

Notice: A certificate issued electronically from the Wyoming Secretary of State's web site is immediately valid and effective. The validity of a certificate may be established by viewing the Certificate Confirmation screen of the Secretary of State's website http://wyobiz.wy.gov and following the instructions displayed under Validate Certificate.

WJE ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

KEY PERSONNEL TO BE ASSIGNED TO PROJECT AND QUALIFICATIONS

Project Manager: Jerry E. Maly, PE

Jerry Maly began his career as a structural engineer in 1976, working for a prominent structural engineering design firm in Denver, Colorado. In the mid 1980's, his primary focus began to shift from the design of new structures to the inspection, investigation and repair of existing buildings. Mr. Maly joined WJE in 2000 bringing his experience in the design of new buildings in addition to his experience in the evaluation, rehabilitation, and repair of existing structures. Much of his work includes the assessment and investigation of damage resulting from expansive and collapsible soils, construction and design errors, corrosion, fire, and snow. In many instances, these assignments include the preparation of construction documents for repairs. Currently, Mr. Maly is assessing damage to about sixteen single-family homes in Gillette, Wyoming that have been adversely affected by both expansive and collapsible soils.

Mr. Maly is a Registered Professional Engineer in the State of Wyoming, and his resume follows.

Project Advisor - Structural: John D. Reins, PE

John Reins has been involved, for more than forty years, in the analysis, testing, inspection, monitoring, and repair of structural and architectural systems. He first joined WJE in 1977 as a Project Engineer in Northbrook, Illinois. He participated in the establishment of the WJE Denver office in 1982 and since moving to Colorado, Mr. Reins has devoted a significant portion of his time to the evaluation of structural distress due to unstable soils. He has investigated and repaired numerous commercial, municipal, and residential structures damaged by expansive and collapsing soils. In 1983, WJE was retained by the State of Wyoming to investigate foundation movements affecting the then newly constructed North Penitentiary facility in Rawlins. As part of this assignment, Mr. Reins supervised substantial underpinning and compaction grouting work performed during the summers of 1985, 1986 and 1987. In addition to his extensive involvement with the Wyoming State Penitentiary, he has worked on a number of other high security facilities, including the Marvin Foote Youth Detention Center in Centennial, Colorado as well as the Arapahoe County Detention Facility and the Adams County Jail, both in Colorado.

Mr. Reins is a Registered Professional Engineer in the State of Colorado, and his resume follows.

Project Advisor - Geotechnical: Michael W. West, PhD, PE, PG

Michael West was retained in 1986 by Design Professionals Insurance Corporation and its local counsel, Murane & Bostwick, on behalf of the Deines, Myrick, McClain & Associates, AIA, the Architect of Record for the "new" Wyoming State Penitentiary near Rawlins. In addition to site-specific studies at the Wyoming State Penitentiary, Dr. West completed his doctoral research on the Bear River fault zone, a major seismogenic fault near Evanston, Wyoming. Dr. West has also worked as geological/geotechnical subcontractor on several Wyoming Water Development Commission projects, including the City of Buffalo water supply project, the Greybull project, and the Upper Bear-West Fork project. Most recently, Dr. West has participated in additional studies of the Bear River fault zone in cooperation with the U.S. Geological Survey and Wyoming Geological Survey. His experience includes numerous other projects in Wyoming related to mining, water resource development, and geological hazards.

Dr. West is a Registered Professional Geologist in the State of Wyoming, and his resume follows.

Project Engineer - Structural: Jennifer J. Volz, PE

Jennifer Volz has been with WJE for over thirteen years. Although she has worked on thousands of projects, during her time with WJE her focus has been on residential, commercial, retail, and governmental structures affected by foundation movements. Specifically, she has evaluated steel, concrete, wood, and masonry buildings affected by expansive or hydro-collapsible soils in the western United States. In addition, she has prepared documents for ongoing monitoring and/or repair of such projects. Ms. Volz is currently assisting Mr. Maly with the assessment of single-family homes in Gillette, Wyoming that have been affected by soil movements.

Ms. Volz is a Registered Professional Engineer in the State of Wyoming, and her resume follows.

Project Engineer - Geotechnical: Peter A. Stauffer, PE

Peter Stauffer recently joined WJE as part of the Michael W. West & Associates geo-engineering group that was acquired by WJE. He has extensive experience investigating and repairing buildings founded on swelling and collapsing soils that have experienced differential foundation movement. Recently he provided forensic geotechnical engineering services that included recommendations for repair of three commercial buildings in Gillette, Wyoming where long term wetting, causing differential settlement, had occurred.

Mr. Stauffer is a Registered Professional Engineer in the State of Wyoming, and his resume follows.

PERSONNEL QUALIFICATIONS

Jerry E. Maly | Principal

EDUCATION

- The University of Cincinnati
  - Bachelor of Science, Civil Engineering, 1975
- University of Colorado Boulder
  - Master of Science, Civil Engineering, 1979

PRACTICE AREAS

- Failure Investigation
- Structural Evaluation
- Repair and Rehabilitation Design
- Structural Analysis
- Fire Damage Investigation
- Damage Assessment and Documentation
- Code Compliance Review and Peer Review
- Historic Structures

REGISTRATIONS

- Professional Engineer in CO, TN, and WY

CONTACT

jmaly@wje.com
303.914.4300
www.wje.com

EXPERIENCE

Jerry Maly joined WJE in 2000, bringing his experience in the design of new buildings in addition to the evaluation, rehabilitation, and repair of existing structures. Much of his work has included the evaluation of structural capacity and the assessment and investigation of damage, deterioration, and failures in steel, wood, concrete, and masonry buildings resulting from construction and design errors, corrosion, decay, fire, snow, wind, and expansive soils. In many instances, these assignments have included the preparation of construction documents for strengthening and/or repairs. Mr. Maly's experience includes review of construction documents for compliance with structural building code provisions, visual grading of wood framing, nondestructive evaluation, and seismic evaluation of existing buildings.

Prior to joining WJE, Mr. Maly worked at several Denver-area structural engineering firms where he acquired a broad range of design experience in residential buildings; office, commercial, educational, and convention facilities; and mid-rise and high-rise structures.

REPRESENTATIVE PROJECTS

Failure Investigation

- The Arrabelle at Vail Square - Vail, CO: Steel-framed connection failures
- West River Dairy - Morris, MN: Collapse of pre-engineered metal building
- Whitestone Farms - Holly, CO: Collapse of wood-framed roof trusses

Structural Evaluation

- One Cherry Center - Denver, CO: Evaluation of precast concrete plaza for new planter/landscape loads
- St. Michael Catholic Church - Canon City, CO: Stability analysis of wood dome roof structure
- Wazee Exchange Building - Denver, CO: Structural evaluation and repair recommendations for historic brick and wood-framed structure built in 1871

Repair and Rehabilitation Design

- St. John Vianney Seminary - Denver, CO: Building systems modernizing for historic structures
- Heart Mountain Relocation Center - Powell, WY: Rehabilitation and seismic retrofit of historic smokestack
- Mesa Verde National Park - CO: Repair designs for historic wood-framed structures and foundations

Fire Damage Investigation

- Cabin Creek Hydroelectric Facility - Georgetown, CO: 4,000-lineal-foot steel and concrete penstock
- Precast Concrete Warehouse - Castle Rock, CO: Damage assessment and repair recommendations

Damage Assessment and Documentation

- Colorado State University Shortgrass Steppe Research and Interpretation Center - Nunn, CO: Assessment of foundation movement
- Cheyenne Civic Center - Cheyenne, WY: Structural evaluation and assessment of flood damage
- Worland High School Natatorium - Worland, WY: Assessment of 132-foot-diameter wood dome structure

PROFESSIONAL AFFILIATIONS

- American Institute of Steel Construction
- Colorado Association of Geotechnical Engineers
- National Council of Structural Engineers Association
- Structural Engineers Association of Colorado, past president

TECHNICAL COMMITTEES

- NCSEA - Existing Buildings/Structural Retrofit Committee
- SEAC - Denver Building Department Liaison Committee
- Building Code Revision Committee, City and County of Denver
- Board of Appeals, City and County of Denver

PERSONNEL QUALIFICATIONS

John Reins | Principal

EDUCATION

- University of Notre Dame
  - Bachelor of Science, Civil Engineering, 1975
- University of Illinois
  - Master of Science, Structural Engineering, 1977

PRACTICE AREAS

- Failure Investigation
- Peer Review
- Field Monitoring
- Load Testing
- Repair and Rehabilitation Design

REGISTRATIONS

- Professional Engineer in CO

PROFESSIONAL AFFILIATIONS

- American Concrete Institute
- American Society of Civil Engineers
- Colorado Association of Geotechnical Engineers, past director
- Deep Foundations Institute
- Structural Engineers Association of Colorado, past president

TECHNICAL COMMITTEES

- ASCE - Standard of Care

CONTACT

jreins@wje.com
303.914.4300
www.wje.com

EXPERIENCE

John Reins has been involved for more than thirty-five years in the analysis, testing, inspection, monitoring, and repair of structural and architectural systems. He first joined WJE in 1977 as a project engineer in Northbrook, Illinois. He participated in the establishment of the WJE Denver office in 1982 and served as its branch manager through 1987. After working for two other consulting firms, Mr. Reins returned to WJE in 2000.

Mr. Reins has investigated numerous structural failures. In addition, he has performed many field and laboratory tests on structural systems involving a wide range of building materials. Since moving to Colorado in 1982, Mr. Reins has devoted a significant portion of his time to the evaluation of structural distress due to unstable soils. He has investigated and repaired numerous commercial, municipal, and residential structures damaged by expansive and collapsing soils.

REPRESENTATIVE PROJECTS

Failure Investigations

- Monroe Street Parking Garage - Chicago, IL: Punching shear failure of concrete flat slab
- Pleasants Power Plant - Willow Island, WV: Collapse of hyperbolic concrete cooling tower during construction
- Kemper Arena - Kansas City, MO: Collapse of steel roof structure
- Horizon Stadium - Rosemont, IL: Roof collapse involving long-span glulam arches
- John Purdue Block - West Lafayette, IN: Failure of masonry bearing walls
- Walnut Street Viaduct - Denver, CO: Collapse of concrete pier support during erection of precast girders
- University Hills Baptist Church - Denver, CO: Long-span steel roof truss failure
- Howelsen Hill Ski Lodge - Steamboat Springs, CO: Failure of timber log structure
- Moore Haven Bridge - Moore Haven, FL: Collapse of long-span precast bridge girders during erection
- Grand Timber Lodge - Breckenridge, CO: Failure of underground parking structure
- C470/I70 Bridge - Golden, CO: Collapse of steel bridge girders shortly after erection

Repair and Rehabilitation Design

- Soldier Field - Chicago, IL: Structural rehabilitation and strengthening
- John Purdue Block - West Lafayette, IN: Post-collapse repair of historic structure
- Wyoming State Penitentiary - Rawlins, WY: Underpinning and compaction grouting
- Grand Timber Lodge - Breckenridge, CO: Post-collapse repairs and stabilization of adjacent structures
- Level (3) Communications - Broomfield, CO: Foundation, slab, and drain system repairs
- Southlands Shopping Mall - Aurora, CO: Installation of dewatering wells along with structural and cosmetic repairs
- Carrara Place - Greenwood Village, CO: Post-tensioned parking garage repairs
- Fadden Building - Galveston, TX: Jet grouting beneath historic structure
- Hundreds of residential and commercial buildings affected by expansive and collapsing soils

Peer Review

- 2555 Grand Building - Kansas City, MO
- Crown Center Link System - Kansas City, MO
- Hallmark Warehouse - Leavenworth, KS
- United States Embassy - Conakry, Guinea
- Grand Vacations - Peak 8 - Breckenridge, CO
- United States Embassy - Santo Domingo, Dominican Republic
- Pecan Park Apartments - La Porte, TX

Load Testing

- George Washington Bridge - New York, NY
- TRESTLE - Kirtland Air Force Base, NM
- Monroe Street Parking Garage - Chicago, IL
- Farm Credit Bureau Building - Denver, CO
- 23rd & Blake Building - Denver, CO

Field Monitoring

- WHO Headquarters - Geneva, Switzerland
- Hyatt Regency Hotel - Kansas City, MO
- Procter & Gamble Garage - Cincinnati, OH
- Westminster City Hall - Westminster, CO
- Thornton Civic Center - Thornton, CO
- Laramie Building - Golden, CO
- Mile High Stadium - Denver, CO
- Safeway Store - Aurora, CO

PERSONNEL QUALIFICATIONS

Michael W. West | Principal

EDUCATION

- Colorado School of Mines
  - Professional Degree in Geological Engineering, 1970
  - Master of Science, Geological Engineering, 1977
  - Doctor of Philosophy, Geological Engineering, 1989
- U.S. Army Engineer School, Graduate of Engineer Officer Basic Course, 1971

PRACTICE AREAS

- Geological/Geotechnical Site Characterization
- Seismic Risk Assessment
- Geologic Hazard/Risk Assessment
- Mine Infrastructure Development
- Failure Analysis
- Litigation Consulting

REGISTRATIONS

- Professional Engineer in CO, WY
- Professional Geological Engineer in NE, AZ
- Professional Geologist in CA, WY

PROFESSIONAL AFFILIATIONS

- Association of Engineering Geologists
- Geological Society of America
- Seismological Society of America

CONTACT

mwest@wje.com
303.914.4300
www.wje.com

EXPERIENCE

Michael West has over 40 years of experience in the field of geotechnical and geological engineering. Over his career, he has engineered geological, geophysical and seismological studies for dams, tunnels, power plants, mining projects and other major engineering structures. Mr. West has also provided specialized technical services in earthquake hazard analyses for dams and other critical facilities, forensic geological and geotechnical engineering, rock slope stability investigations, and dam safety evaluations; as well as performed numerous hydrogeological and environmental studies for mine/industrial sites and other land developments.

Prior to joining WJE, Mr. West's experience spanned over thirty years as an owner and operator of his own firm, Michael W. West & Associates. He also was chief of the earthquake hazards group with The Bureau of Reclamation, and worked with various state and private firms.

REPRESENTATIVE PROJECTS

Geological/Geotechnical Site Characterization

- Keren and the Upper Mereb River water supply projects - Eritrea, East Africa: Engineering geological, geotechnical, and seismic hazard studies
- Black Canyon Lake Dam - Navajo County, AZ: Filter and drainage design, embankment stability analysis, spillway enlargement
- Fossil Trace Golf Course - Golden, CO: Stability evaluations, instrumentation, construction phase services/rock scaling

Seismic Risk Assessment

- Loup River Power District Facilities - Genoa, Nebraska: FERC-mandated seismic hazard analysis
- Meeks Cabin, Stateline, Upper Bear, Senac, Rock Creek and O'Sullivan dams - North Central Utah: Seismotectonic hazard studies
- Genesee No. 2 Dam - Jefferson County, CO: Probabilistic seismic hazard study, geologic engineering subsurface investigation, geologic mapping, and construction phase services

Geologic Hazard/Risk Assessment

- Keystone Mountain House - Summit County, CO: Geological, geotechnical and slope stability studies for redevelopment of the base area
- Sterling Ranch, Douglas County, CO: Geologic hazard assessments for residential development including evaluation of swelling and collapsing soils, slope stability, rockfall, potential radiation hazard, and steeply dipping bedrock
- Silver Sage Estates - Jefferson County, CO: Geologic mapping, subsurface investigation, groundwater monitoring, and/or slope stability analysis for development within mapped landslide areas

Mine Infrastructure Development

- Toromocho copper mine - Central Peru: Geologic hazard/risk assessment
- La Colosa gold project - Colombia: Tailings dam site selection/evaluation
- Constancia project - Southern Peru: Mine infrastructure development

Failure Analysis

- Swift No. 2 Power canal and forebay - Lewis River, Cowlitz County, Washington: Geological/geotechnical studies related to failure, redesign, and reconstruction
- Walgreens Retaining Wall - Dillon, CO: Slope stability analysis, multi-phase repair design, and construction observation

Litigation Consulting

- Heritage at Vista Ridge Filings 1B-a and 1B-b - Erie, CO: Geotechnical investigation, standard of care assessment, expert witness
- Wyoming State Penitentiary - Rawlins, WY: Assessed natural causes of foundation and ground water damage; offered opinion on liability of parties involved in design and construction of the facilities
- Ponds at Blue River - Silverthorne, CO: Forensic geotechnical investigation, numerical model assessment, instrumentation installation and monitoring, expert witness

PERSONNEL QUALIFICATIONS

Jennifer Volz | Senior Associate

EDUCATION

- Colorado State University
  - Bachelor of Science, Civil Engineering, 2000
- The Pennsylvania State University
  - Master of Science, Architectural Engineering, 2003

PRACTICE AREAS

- Failure Investigation
- Field Monitoring
- Structural Analysis/ Computer Modeling
- Repair and Rehabilitation Design
- Construction Observation Services

REGISTRATIONS

- Professional (Structural) Engineer in AZ and WY
- Professional Engineer in CO, KS, ND, and NM

PROFESSIONAL AFFILIATIONS

- Colorado Association of Geotechnical Engineers (CAGE)
- Structural Engineers Association of Colorado (SEAC)

CONTACT

jvolz@wje.com
303.914.4300
www.wje.com

EXPERIENCE

Since joining the Denver office of WJE in 2004, Jennifer Volz has been involved in a wide array of structural design, investigation, and repair and rehabilitation projects. As part of these projects, she performs finite element analyses, designs repairs, and develops construction documents for existing and new structures. Ms. Volz also performs construction observation services for a number of projects to promote quality assurance and to document conditions for subsequent litigation.

Ms. Volz began her career as a design engineer for Leslie E. Robertson Associates, Inc. She was involved in the analysis and design of concrete, masonry, steel, aluminum and wood structures ranging from museums and high-rise buildings to single-family homes throughout the United States and abroad.

REPRESENTATIVE PROJECTS

Failure Investigation

- HPI Storage Tank Collapse - Saint Joseph, MO: Investigation into the cause of the failure of a steel storage tank structure
- Jamestown Fire Investigation - Jamestown, CO: Investigation to determine the cause of failure of a steel and aluminum high-power electrical line

Field Monitoring

- Nationwide Retail Store - Thornton, CO: Periodic monitoring of structure experiencing soil movement
- Pike's Peak Summit House - Colorado Springs, CO: Annual monitoring of structure experiencing foundation movements
- Colorado State Bank Building - Denver: Annual monitoring of parking garage

Structural Analysis/Computer Analysis

- Colorado State Bank and Trust - Greenwood Village, CO: Analysis of an existing post-tensioned concrete slab to support a proposed vault
- St. Michael's Church - Canon City, CO: Analysis of dome roof structure to determine structural stability
- Three Lakes Water Treatment Plant - Grand Lake, CO: Analysis of a concrete tank wall to determine the bending stresses associated with various loading conditions

Repair and Rehabilitation Design

- Denver Federal Center - CO: Structural rehabilitation of distressed concrete slab due to collapsing soils
- Several residential and commercial buildings affected by expansive and collapsing soils

Construction Observation Services

- Columbine Water Treatment Plant - Thornton, CO: Observation of the installation of coatings within several water filters and processing tanks
- Denver Human Services Parking Garage - CO: Observation of the replacement of failed sealant joints and the epoxy injection of cracked concrete members

PERSONNEL QUALIFICATIONS

Peter A. Stauffer | Associate Principal

EDUCATION

- University of Colorado
  - Bachelor of Science, Civil Engineering, 1978
- University of Texas at Austin
  - Master of Science, Geotechnical Engineering, 1986

PRACTICE AREAS

- Foundation and Retaining Walls
- Mine Development
- Water Resource Dams and Canals
- Earth Retention and Slope Stabilization
- Transportation

REGISTRATIONS

- Professional Engineer in CO, WY

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers, Co-chair biennial continuing education seminars
- United State Society on Dams (USSD)
- International Society of Soil Mechanics and Foundation Engineering
- Colorado Association of Geotechnical Engineers, Board of Directors

CONTACT

pstauffer@wje.com
303.914.4300
www.wje.com

EXPERIENCE

Peter Stauffer has over 34 years of experience in geotechnical engineering including field and laboratory investigations, engineering analysis and design, preparation of construction documents and construction phase services.

Mr. Stauffer has worked on a wide range of projects including foundations, transportation facilities, single family subdivision, commercial and industrial buildings, water treatment plants, investigation of damaged structures, static and seismic stability evaluations, landslide analysis and design of stabilization measures, earth and earth-rock dams, roller-compacted-concrete dams, and mine facilities and tailing impoundments. He has managed projects ranging from small geotechnical investigations to large multi-discipline design and construction projects overseas. He is skilled in the identification and implementation of innovative and cost effective solutions to client problems.

REPRESENTATIVE PROJECTS

Foundation and Retaining Walls

- United States Postal Service - Rocky Mountain Region: Geotechnical engineering and foundation design
- Commercial Buildings – Gillette, WY: Geotechnical and forensic engineering services for three buildings that experienced differential settlement
- Signature Centre – Golden, CO: Geotechnical investigations, foundation remediation design, and forensic engineering
- Residential/commercial properties - Front Range, CO: Foundation investigations, design and construction recommendations, construction phase services
- Construction Defects Litigation: Consultation and expert witness involving structures damaged by swelling and collapsing soils

Mine Development

- Morenci, Chino, Tyrone and Ajo mines - AZ and NM: Design and construction of new tailing impoundment, stability and erosion control evaluations, geotechnical studies
- Mount Emmons Project - Colorado: Construction phase services for water storage ponds, water treatment plant, and tailing dams reclamation
- Toquepala and Cuajone Mines - Peru: Managed development of new tailing disposal facility
- Kennecott Utah Copper Mine - Salt Lake Valley, UT: Geotechnical, seismicity and hydrology studies, and design of new tailing impoundment

Water Resource Dams and Canals

- Button Rock Dam - Longmont, CO: Directed geologic and geotechnical studies
- New Waddell Dam - Maricopa Count, AZ: Deformation studies
- Kansas Power & Light - Topeka, KS: Geotechnical investigation and resident engineer for repair of failed earth dam
- Hog Park Dam – Carbon County, WY: Resident geotechnical engineer during construction
- North Village Reservoir, Crested Butte, CO: Geotechnical investigations and landslide evaluation at right abutment
- Upper Highline Dam – Mesa County, CO: Geotechnical investigations, instrumentation and monitoring

Earth Retention and Slope Stabilization

- Telluride Airport Landslide - Telluride, CO: Field investigation, laboratory testing and analysis, and expert witness services
- Keystone Ski Area – CO: Geologic and geotechnical investigations and slope stability analyses to evaluate landslide area above Mountain House development
- RidgeGate Subdivision – Lone Tree, CO – Engineering geological and slope stability assessment
- 4th Street Bridge – Pueblo, CO: Geological engineering and slope stability analyses for southwest abutment
- County Landfill Landslide - South Dakota: Installation of inclinometers, review of monitoring data, recommendations for modifications to landfill operations

Transportation

- I-15 - Salt Lake City, UT: Technical assistance in evaluation of foundation treatment alternatives for new embankment sections

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

EXPERIENCE IN INVESTIGATIVE/FORENSIC ENGINEERING AND BUILDING REHABILITATION

General

"Ask the structure." This simple statement holds as true today as it did when founder Jack Janney said it decades ago. Wiss, Janney, Elstner Associates, Inc. (WJE) was founded in 1956 on the principle that delivering better solutions requires a better understanding of the problem. Materials, technologies, and structures will continue to change, but our basic philosophy won't. Where there's a construction related problem, **we'll find the right solution**.

KEY FACTS

- Founded in 1956
- Employee-owned
- 23 offices/annexes nationwide
- Headquartered in Northbrook, IL
- Over 600 employees
- 190 Licensed Structural Engineers
- More than 125,000 investigations worldwide
- 7,000 projects annually

WJE is an interdisciplinary firm of engineers, architects, and materials scientists that specializes in the investigation, analysis, testing, and design of repairs for historic and contemporary structures. WJE focuses on delivering practical, innovative, and technically sound solutions across all areas of new and existing construction. Since the firm's founding sixty-one years ago, WJE has focused on delivering practical, innovative, and technically sound solutions across all areas of new and existing construction. Our specialists bring the collective experience gained from conducting more than 125,000 investigations worldwide to every construction challenge. With global capabilities, WJE can respond quickly to assignments around the world. WJE combines state-of-the-art laboratory and testing facilities, global offices, and knowledge sharing systems to provide solutions for the built world. WJE is headquartered in Northbrook, Illinois, and has offices and annexes in 23 cities throughout the United States. With a current staff of more than 600 professionals and technical experts, WJE completes approximately 7,000 projects annually for building owners, property managers, developers, insurance companies, universities, law firms, and government agencies. For more information, please visit wje.com.

WJE is unique because **we provide structural, geotechnical, architectural, conservation, and materials science services within one firm**, with a staff that includes nationally recognized experts in their practice areas. Our multi-disciplinary organization allows us to collaborate more intensively than typical firms, and to provide more tightly coordinated designs. WJE's engineers, architects, and materials scientists specialize in services for existing buildings and structures, are exceptionally qualified to provide engineering and architectural services for the repair and stabilization of buildings, and take great pride in developing solutions that minimize the disruption of day-to-day functions within buildings undergoing repairs.

Soils and Geotechnical Engineering

The Denver office of WJE has considerable experience in the investigation, assessment, and monitoring of a wide variety of structures damaged by movements of underlying expansive and/or compressible soils. We also have a successful track record of developing practical and cost-effective designs for mitigation and/or stabilization of buildings affected by soil movements. This experience includes thousands of buildings, from residential structures to schools, commercial buildings and industrial facilities, damaged by earth movements.

WJE has recently acquired Michael W. West and Associates, Inc. (MWWAI), a small, specialized geotechnical and geological consulting firm located in the greater Denver area. MWWAI's principle areas of practice include geotechnical engineering, engineering geology, environmental geology, ground water hydrology, geological hazard evaluations, earthquake engineering, and forensic engineering. Over the past three and a half decades, MWWAI has provided technical consulting services on a large number of projects

locally and internationally. Projects range from geological and hydrological studies for residential, commercial, and industrial developments to forensic investigations of dam failures and structures damaged by swelling and collapsing soils.

Our firm now offers the following **unique qualifications for building structures** adversely affected by expansive and/or collapsible soils:

- Extensive past project experience in the investigation, assessment, monitoring, and development of repair recommendations and designs for structures affected by soil movements
- In-house geotechnical engineering expertise
- National experts in nondestructive testing techniques and ground penetrating radar analysis of existing concrete and foundations.

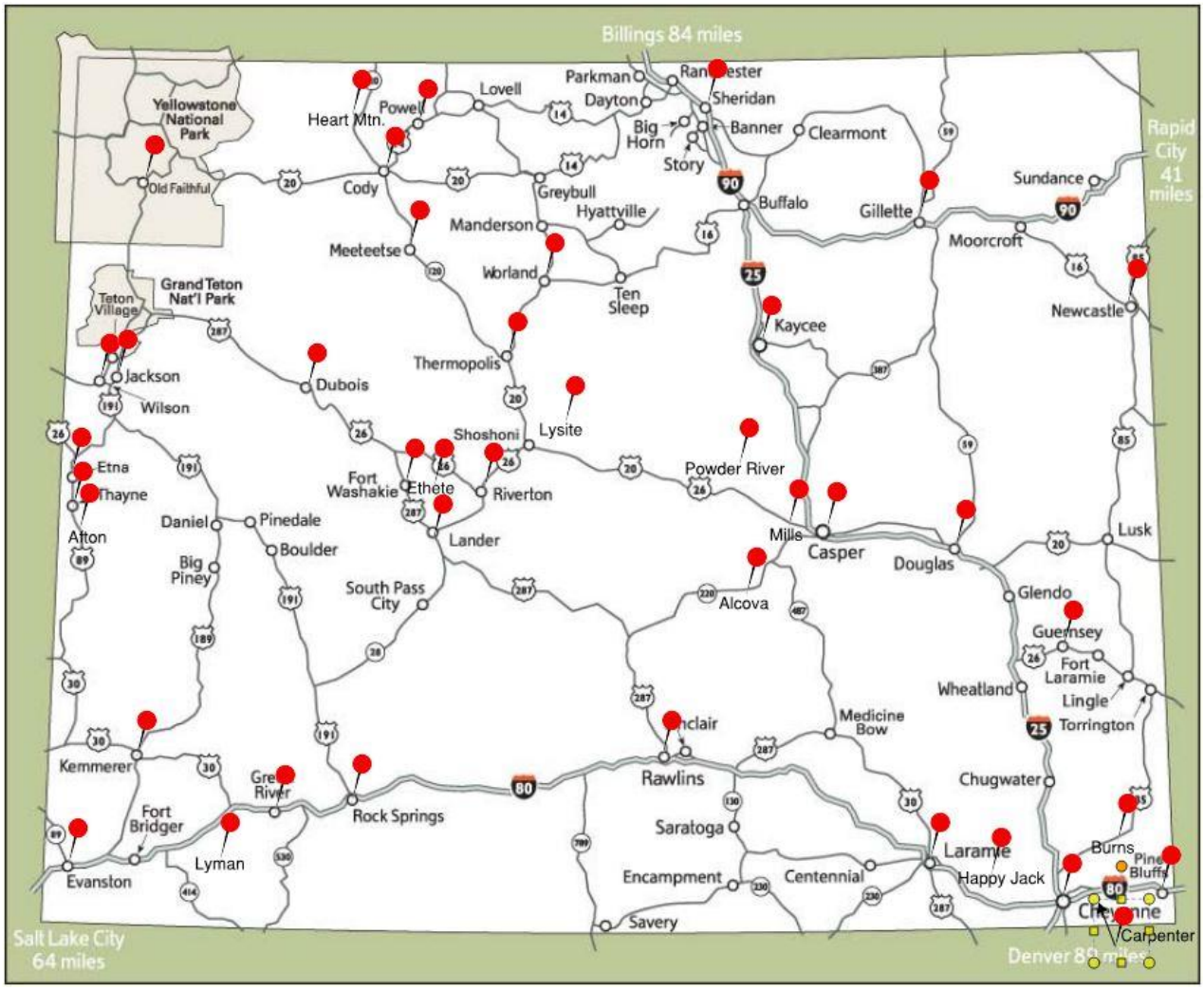
Wyoming

WJE

WJE's Denver office was established in 1982, and shortly thereafter began working on projects in the State of Wyoming. Since that time, WJE has worked for a wide variety of clients, both public and private, in the State of Wyoming. Public agency collaborations have included the State of Wyoming, the University of Wyoming, the Wyoming Department of Transportation, the Wyoming State Historic Preservation Office, and the Wyoming Department of Education School Facilities Commission (through our client, MGT of America, Inc.).

In 1983, WJE was retained by Mr. Ed Samuelson with the State of Wyoming to investigate and remediate foundation and slab movements affecting the Wyoming State Penitentiary North Facility, which was completed and first occupied in 1980. Affected buildings included several of the cellblock pods as well as the administration building. As part of this assignment, WJE was the Engineer of Record for substantial underpinning and compaction grouting work performed during the summers of 1985, 1986 and 1987. As a result of those efforts, the affected buildings were stabilized as confirmed by subsequent elevation surveys and other periodic monitoring performed by WJE.

A list of the projects for which WJE provided services to State of Wyoming agencies can be found in the section of this submittal titled "Volume of Work Previously Awarded to WJE by the State of Wyoming." A map of the State of Wyoming indicating the cities and towns in which WJE has performed services for both public and private clients follows. A complete list of these projects, with additional details, can be found in Appendix A.



Locations of all WJE services provided in the State of Wyoming

MWWAI

Dr. Michael West with MWWAI was retained in 1986 by Design Professionals Insurance Corporation and its local counsel, Murane & Bostwick, on behalf of the Deines, Myrick, McClain & Associates, AIA, the Architect of Record for the **"new" Wyoming State Penitentiary** near Rawlins. The primary objectives of Dr. West's work on this project were:

- To assess the nature causes of foundation and ground water damage to buildings, basements, and underground utility tunnels in the Penitentiary compound, and
- To offer independent, professional opinions on liability of parties involved in design and construction of the facilities.

Studies included geologic mapping of the Penitentiary site; drilling, logging and sampling of 33 test holes in the Penitentiary compound and outside the construction area to assess pre-construction and post-construction geotechnical conditions; completion of the test borings as screened and gravel-packed monitoring wells; excavation of 4 test pits adjacent to cell block footings to assess in-situ density and degree of compaction; and extensive laboratory testing to characterize index properties and consolidation

characteristic of site soils. Based on these investigations, MWWAI concluded that damage at the Penitentiary was related principally to the following three factors:

- Unrecognized collapsible alluvial soils at the site, which consolidate rapidly on wetting following construction and occupation of the site.
- Failure to characterize pre-construction ground water conditions and fluctuations related to subsurface geology at the site.
- Inadequate quality assurance/control testing related to preparation of foundations, compounded by fast track construction during winter months.

In addition to site-specific studies at the Wyoming State Penitentiary, Dr. West completed his doctoral research on the Bear River fault zone, a major seismogenic fault near Evanston, Wyoming. Dr. West has also worked as geological/geotechnical subcontractor on several Wyoming Water Development Commission projects, including the City of Buffalo water supply project, the Greybull project, and the Upper Bear-West Fork project. Most recently, Dr. West has participated in additional studies of the Bear River fault zone in cooperation with the U.S. Geological Survey and Wyoming Geological Survey. His experience includes numerous other projects in Wyoming related to mining, water resource development, and geological hazards.

Given our background and experience, we are confident that we can conduct an independent and rigorous peer review of the study performed by Martin/Martin, as outlined in the *General Information and Statement of Qualifications Instructions* prepared by the Wyoming Legislative Service Office, to determine the most practical, economical, and technically sound recommendations and solution(s) to the problems affecting the buildings at the Wyoming State Penitentiary.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

EXPERIENCE WITH HIGH SECURITY COMPLEX FACILITIES

WJE personnel have conducted a wide variety of engineering, architectural, and materials investigations and/or rehabilitation designs at **over 140 correctional facilities** throughout the United States since 1983. These engineering assignments have included foundation movement studies and underpinning, slab-on-ground cracking and movement problems, impact echo testing of concrete structures, masonry wall distress evaluations, and development of seismic upgrades. Architectural assignments have included glazing failures and security glass investigations, flooring problems, moisture intrusion and window water leakage investigations, roofing failures, mortar analyses and masonry wall tuckpointing, and building enclosure studies. Materials assignments have included petrographic studies of various concrete components, debonding and delamination of flooring materials, paint and coating failures and evaluations, stone and masonry facade distress investigations, and exterior precast wall panel durability studies.

Some of the most pertinent engineering assignments are included on the following list of correction facility projects performed by WJE.

ARAPAHOE COUNTY DETENTION FACILITY
Centennial, CO
- Structural Investigation and Litigation Support (2004)

BAYSIDE STATE PRISON
Leesburg, NJ
- Repair Design (2002)

BEXAR COUNTY JAIL
San Antonio, TX
- Debonded Floor Tile Study; Petrographic and Chemical Analysis (1988)
- Chemical Studies of Debonding (1989)

BURBANK POLICE AND FIRE FACILITY
Burbank, CA
- Investigation of Surface Pop-outs and Blistering on Jail Floor (2007)

CALIFORNIA DEPARTMENT OF CORRECTIONS REHABILITATION HEALTH CARE FACILITY
Folsom, CA
- Envelope Peer Review Consulting Services (2014)

CHAMPAIGN COUNTY SATELLITE JAIL
Urbana, IL
- Evaluation Exterior Wall Panel Cracking (2014)

CLARE COUNTY JAIL
Harrison, MI
- Assessment of Masonry Damage (2017)

COOK COUNTY JAIL
Chicago, IL
- Debonded Overlay Inspection (1991)
- Impact Echo Testing (1991)
- Investigation of Floor Slab Cracking (1994)

DC CENTRAL JAIL FACILITY
Washington, D.C.
- Caisson Consulting Services (2013)

DENVER JAIL
Denver, CO
- Assessment of Strength and Durability Issues (2011)

DUPAGE COUNTY JAIL
Wheaton, IL
- Periodic Field Observation of Repair Work (1988)

EL DORADO MAXIMUM SECURITY PRISON
El Dorado, KS
- Petrographic Studies (1990)

FEDERAL CORRECTIONAL INSTITUTION
Atlanta, GA
- Low Strength Concrete Studies (1989)

FEDERAL PRISON
Inez, KY
- Evaluation of Structural Settlement Issues (2002)

FLORENCE PENITENTIARY
Florence, CO
- Grade Beam Design for Tower Garage (1991)

FOX LAKE CORRECTIONAL INSTITUTION
Fox Lake, WI
- Evaluation of Fire and Explosion Damage (2011)

GATESVILLE PRISON WOMEN'S UNIT
Gatesville, TX
- Petrographic Study of Concrete Cores (1995)

HUNT COUNTY JAIL
Greenville, TX
- Investigation of Foundation Problems (2008)

HUNTSVILLE PRISON
Huntsville, TX
- Masonry Wall Evaluation (2002)

IOWA CORRECTIONAL INSTITUTION FOR WOMEN
Mitchville, IA
- Evaluation of Foundation Design (2011)

JAMES B. ALLRED UNIT
Wichita Falls, TX
- Slab-on-Grade Cracking Investigations (1994)

JAMESTOWN AND SUSANVILLE PRISONS
Jamestown, CA
- Structural Review (1985)

JESUP FEDERAL CORRECTIONAL INSTITUTE
Jesup, GA
- Structural Load Testing (1989)

LAKE COUNTY JAIL AND COURTS FACILITY
Waukegan, IL
- Structural Investigation and Litigation Support (1992)

LOS ANGELES COUNTY JAIL
Los Angeles, CA
- Slab Investigation (1991)

MARVIN FOOTE YOUTH DETENTION CENTER
Centennial, CO
- Investigation of Foundation and Slab Movements Triggered by Fire Line Break (2001)
- Engineer-of-Record for Extensive Foundation Repairs
- Litigation Support

MINNESOTA CORRECTIONAL FACILITY
Bayport, MN
- Concrete Topping Investigation (2007)

MONMOUTH COUNTY CORRECTIONAL INSTITUTION
Freehold, NJ
- Concrete Masonry Distress Investigation (2005)

NEW YORK I N S CORRECTIONS FACILITY
Jamaica, NY
- Evaluation of Repairs for Settled Slab-on-Grade (2004)

NORTH BRANCH CORRECTIONAL INSTITUTE (2004)
Cumberland, MD
- Slab-on-Grade Cracking Investigation

PENDLETON CORRECTION FACILITY
Pendleton, IN
- CMU Cracking Investigation (1999)
- Exterior Roofing and Structural Repairs for Gymnasium (2015)

PULASKI COUNTY REGIONAL DETENTION CENTER
Little Rock, AR
- Investigation of Slab Movement (2000)

SANTA CRUZ COUNTY JAIL
Santa Cruz, CA
- Investigation of Floor and Wall Distress (2011)

SOUTHPORT CORRECTIONAL FACILITY
Elmira, NY
- Impact Echo Testing (1998)

STERLING JAIL
Sterling, CO
- Concrete Durability Testing (1997)

TELFAIR STATE PRISON
Helena, GA
- Evaluation of Prestressed Hollow Core Slabs (2010)

TEXAS DEPARTMENT OF CORRECTIONS
Houston, TX
- Petrographic Studies of Concrete (1986)

TRINIDAD CORRECTIONAL FACILITY
Model, CO
- Evaluation of Concrete Issues (1998)

VAN BUREN COUNTY JAIL ADDITION
Paw Paw, MI
- Limited Foundation Design Review (2016)

WASHINGTON DEPARTMENT OF CORRECTION - SPOKANE
Airway Heights, WA
- Investigation of Concrete Block Wall Performance (1999)

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

COST ESTIMATING EXPERIENCE

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, CO 80202-1337

Telephone: (303)571-0237
Facsimile: (303)893-2849
Mailbox@SageConsulting.com

May 24, 2017 *Email: jmaly@wje.com*

Mr. Jerry Maly, PE
Wiss, Janney, Elstner Associates, Inc.
3609 S. Wadsworth Blvd., Suite 400
Lakewood, CO 80235

RE: Wyoming State Penitentiary (WSP) Independent Peer Review Study

Dear Mr. Maly:

Sage Consulting Group would be pleased to work with Wiss Janney Elstner to provide cost estimating services relative to an independent peer review of the Structural Engineering Reconnaissance Study and Conceptual Cost Estimate of the WSP, dated September 14, 2016.

Sage provides cost estimating and construction consulting services nationally, including Wyoming. Our experience and reference materials allow Sage to review and estimate construction costs in virtually any location throughout the United States. Sage has estimated costs and consulted on projects in Wyoming in the Evanston, Cheyenne, Wheatland, Rock Springs, and Jackson areas. Sage has estimated costs and consulted on power plants, highways, buildings, residential and prison projects in nearly every state. Some of our typical projects and clients are listed below:

- Arapahoe County Detention Facility
- State of Colorado Prison Facility in Ordway
- Wyoming Department of Transportation
- Oil Field Facilities in Rock Springs
- Cable project in Evanston
- Building construction in Gillette
- Multiple projects in Jackson
- Casinos
- Colorado State University Stadium
- Denver International Airport (including the terminal, concourses and runways)
- Numerous condominium projects
- Miami International Airport
- Colorado Department of Transportation
- Utah Department of Transportation

- Florida Department of Transportation
- General Services Administration
- Sureties (including Safeco Insurance Company of America and Travelers Insurance)
- Laramie River Power Station
- Intermountain Power Station

Sage has the ability and experience to review and/or estimate costs on virtually any type of project in any location. Sage has the resources and ability to provide testimony at trial and arbitration proceedings as necessary.

Our rates are shown on the attached schedule. Additional information can be found on our website, www.sageconsulting.com. Should you have any questions please not hesitate to contact me at any time.

Sincerely

SAGE CONSULTING GROUP

Donald Harrington
DH/kac
Attachments

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, CO 80202-1337

Telephone: (303)571-0237
Facsimile: (303)893-2849
BillS@SageConsulting.com

WILLIAM SCHWARTZKOPF

EDUCATION:

Bachelor of Science, Electrical Engineering 1973
Juris Doctor - 1976
Both degrees from the University of Nebraska

PROFESSIONAL AFFILIATIONS:

Registered Professional Engineer - Nebraska
Member, Nebraska State Bar Association
National Society of Professional Engineers
Panel of Arbitrators, American Arbitration Association
American Bar Association

WORK HISTORY:

January 1989-Present:

President, Sage Consulting Group.

April 1985-December 1988:

Vice President, Operations, Denver West Ltd.

April 1983-April 1985:

Vice President, General Manager, Olson Construction Company, Denver Division.

April 1981-April 1983:

Vice president, General Manager Lincoln Division and Corporate Secretary, Olson Construction Company.

June 1973-April 1981:

Commonwealth Electric Company, Lincoln, Nebraska. Various job titles including Project Manager, Vice President, General Counsel, Corporate Secretary.

PUBLICATIONS:

Co-Author of "Calculating Construction Damages" 1st Edition, Copyright 1992, John Wiley & Sons
Co-Author of "Calculating Construction Damages" 2nd Edition, Copyright 2001, Aspen Publishers
Author of "Calculating Lost Labor Productivity in Construction Claims" 1st Edition, Copyright 1995, John Wiley & Sons
Author of "Calculating Lost Labor Productivity in Construction Claims" 2nd Edition, Copyright 2004, Aspen Publishers
Co-Author of "Practical Guide to Construction Contract Surety Claims" Copyright 1997, John Wiley & Sons
Author of "Practical Guide to Construction Contract Surety Claims" 2nd Edition, Copyright 2005, Aspen Publishers

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, CO 80202-1337

Telephone: (303)571-0237
Facsimile: (303)893-2849
DonH@SageConsulting.com

DONALD B. HARRINGTON

EDUCATION:

B.S. Degree, Civil Engineering, University of CO, Boulder, Colorado, 1979.

PROFESSIONAL AFFILIATIONS:

Construction Supervisor Class B Certificate, Denver and Aurora.
American Institute of Constructors
Construction Financial Management Association
Certified Professional Constructor
Association for Advancement of Cost Engineering

WORK HISTORY:

1994 to Present:
Vice President, Sage Consulting Group, Denver, CO
Preparation and resolution of contract dispute claims.

1987 - 1994:
Senior Consultant - Okes & Associates, Inc., Englewood, CO.
Preparation and resolution of contract dispute claims.

1984 - 1987:
Construction Manager - Lincoln Property Company, Englewood, CO.
Managed the Construction Division of property development.

1980 - 1984:
Senior Engineer - Kellogg Corporation, Littleton, CO.
Preparation and resolution of contract dispute claims.

1978 - 1980:
Construction Manager - Western Heritage Company, Lakewood, CO.

1975 - 1978:
President - KB Enterprises, Boulder, CO.
Builder of residential and light commercial projects.

1971 - 1975:
Carpenter Foreman - Various construction companies.

PUBLICATIONS:

"Construction Contract Claims, Changes, and Dispute Resolution," Third Edition, Published by the American Society of Civil Engineers, Copyright 2016, Co-Authored Chapter 11: Pricing Construction Claims and Change Orders

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, CO 80202-1337

Telephone: (303)571-0237
Facsimile: (303)893-2849
BeckyS@SageConsulting.com

REBECCA SMITH

EDUCATION:

Master of Science, Civil Engineering (Construction Management) Clemson University 1997
Bachelor of Science, Civil Engineering, University of Colorado, Boulder, Colorado 1993
Activities: Air Force Reserve Officer Training Corps

PROFESSIONAL AFFILIATIONS:

Professional Engineer, Colorado (#41278), 2007
PADI-Certified Scuba Diver
Previous TS/SCI Clearance

WORK HISTORY:

January 2012-Present:

Sage Consulting Group. Providing consulting and expert services on construction claims.

June 2007-January 2012:

Project Controls, Project Engineer, Project Manager – David Evans and Associates. Performed scheduling and project management for transit projects.

February 2001-June 2007:

Scheduler – Owner's Representative at Denver International Airport, City and County of Denver. Performed scheduling and estimating for projects at Denver International Airport.

October 2000-February 2001:

Project Controls Engineer–Sargent & Lundy LLC. Created, maintained, and analyzed schedules for power plant design.

September 1993-July 2000:

United States Air Force Engineering Officer. Responsible for leadership of engineering tradesmen and management of Air Force equipment and materials, both domestically and overseas. Held a variety of positions with a range of duties.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

VOLUME OF WORK PREVIOUSLY AWARDED TO WJE BY THE STATE OF WYOMING

State of Wyoming

The following is a list of projects where WJE's client was the State of Wyoming.

DEPARTMENT OF CORRECTIONS

WYOMING STATE PENITENTIARY
Rawlins, WY

- 1983 Investigation of Structural Problems
- 1983 Design of Foundation Stabilization at Building 3MS
- 1985 Foundation Underpinning
- 1985 Investigation of Settlement Problems
- 1987 Security Walls Consultation

DEPARTMENT OF HEALTH

WYOMING STATE HOSPITAL
Evanston, WY

- 1984 Roof Analysis

DEPARTMENT OF EDUCATION

UNIVERSITY OF WYOMING
Laramie, WY

- 1990 Engineering Evaluation and Repair - War Memorial Stadium

LINCOLN ELEMENTARY SCHOOL
Riverton, WY

- 2005 Termite Damage - Glulam Arches

DEPARTMENT OF TRANSPORTATION

Cheyenne, WY

- 1991 AASHTO T277 Chloride Permeability Testing

DEPARTMENT OF STATE PARKS AND CULTURAL RESOURCES - HISTORIC PRESERVATION OFFICE

WYOMING MONUMENTS AND MARKERS
Cheyenne, WY

- 2002 Wyoming Monuments and Markers Stone Conservation

HEART MOUNTAIN RELOCATION CENTER
Park County, WY

- 2011 Foundation Investigation, Vertical Alignment Assessment, Masonry Observations, Masonry Material Studies, Structural Analysis and Stabilization Design and Repair

Private Firms

The following is a list of projects where WJE worked on State of Wyoming facilities, but consulted for other firms.

CAMPBELL COUNTY MEMORIAL HOSPITAL

CAMPBELL COUNTY MEMORIAL HOSPITAL
Gillette, WY

- 1994 Hospital Evaluation
- 1995 Beam Support Investigation
- 1995 Slab Analysis for MRI
- 1995 Review Roof Problem
- 1995 Review for Two Floor Addition

MARTIN/MARTIN CONSULTING ENGINEERS
CENTRAL WYOMING COMMUNITY COLLEGE
Riverton, WY
- 1983 Testing of Roof Truss Members

WESTATES CONSTRUCTION COMPANY
NATRONA JUNIOR HIGH SCHOOL
Casper, WY
- 1984 Fire Damage Investigation

FRED R. DOLLISON
SHERIDAN HIGH SCHOOL
Sheridan, WY
- 1989 Consultation on Wall Leakage and Other Construction Problems

FREMONT COUNTY, WY
DUBOIS ELEMENTARY SCHOOL
DuBois, WY
- 1989 Foundation Settlement Consultation

LARAMIE COUNTY SCHOOL DISTRICT 1
LARAMIE COUNTY COMMUNITY COLLEGE STUDENT HOUSING
Cheyenne, WY
- 1990 Engineering Services

HARRISON & BAY P.C.
POWELL HIGH SCHOOL
Powell, WY
- 1991 Masonry Consultation

SHERIDAN COUNTY SCHOOLS
SHERIDAN HIGH SCHOOL
Sheridan, WY
- 1993 Curtain Wall Leakage Investigation

KLOEFKORN-BALLARD
UNIVERSITY OF WYOMING HERITAGE CENTER
Laramie, WY
- 1994 Consulting on Concrete Masonry Cracking Problem

LARAMIE COUNTY SCHOOL DISTRICT 1
ADMINISTRATION BUILDING
Laramie, WY
- 1996 Structural Engineering Investigation

GORDER/SOUTH GROUP
UNITA COUNTY SCHOOL DISTRICT #6 POOL
Lyman, WY
- 1998 Review Design Drawings Consultation on Moisture Problem

PINE BLUFF JUNION AND SENIOR SCHOOLS
Pine Bluff, WY
- 1999 Water Leakage Investigation

NATRONA COUNTY HIGH SCHOOL STADIUM
Casper, WY
- 2000 Evaluate Stadium
- 2000 Design Repairs

MGT OF AMERICA INC
LANDER VALLEY HIGH SCHOOL
Lander, WY
- 2000 Evaluate Building Stair

SCHOOL FACILITIES COMMISSION
2002 Structural and Seismic Evaluation
- Powell, WY - Powell SHS

2003 Building Evaluations
- Alcova, WY - Alcova ES
- Burns, WY - Burns JHS, Burns SHS, West ES
- Casper, WY - Bar Nunn ES, Centennial JHS, Crest Hill ES, CY JHS, Dean Morgan JHS, Fort Casper Academy, Garfield ES, Grant ES, McKinley ES, Mountain View ES, Natrona County HS, Oregon Trail ES, Paradise Valley ES, Poison Spider MS, Red Creek ES, Sagewood ES, Southridge ES Westwood ES
- Carpenter, WY - Carpenter ES
- Cheyenne, WY - Afflerbach ES, Alta Vista ES, Anderson ES, Arp ES, Baggs ES, Bain ES, Buffalo Ridge ES, Carey JHS, CBOE (Clark Building), Churchill ES, Clawson ES, Cole ES, Corlett ES, Davis ES, Deming ES, Dildine ES, District Administration, East HS, Fairview ES, Gilchrist ES, Goins ES, Hebard ES, Henderson ES, Hobbs ES, Jessup ES, Johnson JHS, Lebhart ES, McCormack MS, Miller ES, Pioneer Park ES, Rossman ES, Triumph HS, Willadsen ES
- Guernsey, WY - Guernsey Sunrise ES, Guernsey Sunrise JHS, Guernsey Sunrise SHS
- Mills, WY - Mills ES
- Kaycee WY - Willow Creek ES
- Pine Bluffs, WY - Albin K-12, District Administration, Pine Bluffs ES, Pine Bluffs JHS, Pine Bluffs SHS
- Powder River WY - Powder River ES

2003 Seismic Evaluations
- Afton, WY - Afton ES
- Etna, WY - Metcalf ES
- Evanston, WY - Clark ES
- Thayne, WY - Holdaway ES

2003 Investigation of Masonry Walls
- Afton, WY - Star Valley HS

STRUCTURAL SOLUTIONS, LLC
UNIVERSITY OF WYOMING STADIUM
Laramie, WY
- 2001 Evaluation of West Stands
- 2002 Initial Survey - East Stands and Lower West Stands
- 2002 Evaluate Stadium
- 2003 Annual Inspection
- 2003 Upper West Stand Replacement - Consult With SS
- 2005 Design Repairs
- 2008 Design Repairs and CMAR Work for East Stands

WESTON COUNTY SCHOOL DISTRICT #1
NEWCASTLE HIGH SCHOOL
Newcastle, WY
- 2002 Evaluation of Cracking in CMU Walls

HOT SPRINGS COUNTY SCHOOL DISTRICT 1
THERMOPOLIS HIGH SCHOOL
Thermopolis, WY
- 2003 Locate Steel in Concrete

PARK COUNTY SCHOOL DISTRICT #1
POWELL HIGH SCHOOL NATATORIUM 1
Powell, WY
- 2003 Wall Reinforcement

WASHAKIE COUNTY SCHOOL DISTRICT #1
WORLAND HIGH SCHOOL SWIMMING POOL BUILDING
Worland, WY
- 2004 Investigation of Pool Building Roof Structure

ROCKY MOUNTAIN PRESTRESS, INC
UNIVERSITY OF WYOMING VISUAL ARTS BUILDING
Laramie, WY
- 2010 Design Review of Selected Precast Details Regarding Moisture Management

PREMIER SPECIALTY CONTRACTORS, INC
WYOMING STATE CAPITAL
Cheyenne, WY
- 2013 Cornice Netting Anchorage Design

HDR, INC
WYOMING STATE CAPITAL
Cheyenne, WY
- 2015 Peer Review Services - Stone Restoration
- 2015 Construction Phase Services

WJE ENGINEERS
ARCHITECTS
MATERIALS SCIENTISTS

PROOF OF INSURANCE

177909

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Sam Barbera	
Wells Fargo Insurance Services USA, Inc.	PHONE (A/C, No, Ext): 847-753-7211	FAX (A/C, No): 847-291-9371
10 S. Wacker, 17th floor	E-MAIL ADDRESS: sbarbera@wje.com	
Chicago, IL 60606	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A: Travelers Property Casualty Co of America	25674
INSURED	INSURER B: Travelers Indemnity Company	25658
Wiss, Janney, Elstner Associates, Inc.	INSURER C: United States Fire Insurance Company	21113
Attn: Sam Barbera	INSURER D:	
330 Pfingsten Rd.	INSURER E:	
Northbrook IL 60062	INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:** See below

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			P-630-6368C258-TIL-17	6/1/2017	6/1/2018	EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 300,000
							MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY			P-810-6368C258-IND-1	06/01/2017	06/01/2018	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
	X Comp/Coll / X $1,000 ded.							$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			408-731294-7	06/01/2017	06/01/2018	X PER STATUTE OTH-ER	
	ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N N/A (Mandatory in NH)						E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

FOR INFORMATIONAL PURPOSES ONLY

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

177909

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Sam Barbera
Wells Fargo Insurance Services USA, Inc. 10 S. Wacker, 17th floor Chicago, IL 60606	PHONE (A/C, No, Ext): 847-753-7211 FAX (A/C, No): 847-291-9371 E-MAIL ADDRESS: sbarbera@wje.com
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : Lloyd's of London
INSURED Wiss, Janney, Elstner Associates, Inc. Attn: Sam Barbera 330 Pfingsten Rd. Northbrook IL 60062	INSURER B : INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:** See below

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$
	☐ CLAIMS-MADE ☐ OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$
	☐ POLICY ☐ PRO-JECT ☐ LOC						PRODUCTS - COMP/OP AGG	$
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO						BODILY INJURY (Per person)	$
	☐ OWNED AUTOS ONLY ☐ SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	☐ HIRED AUTOS ONLY ☐ NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	☐ UMBRELLA LIAB ☐ OCCUR						EACH OCCURRENCE	$
	☐ EXCESS LIAB ☐ CLAIMS-MADE						AGGREGATE	$
	☐ DED ☐ RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						☐ PER STATUTE ☐ OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ Y / N ☐ N / A						E.L. EACH ACCIDENT	$
	(Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	Professional Liability (Claims Made)			W1755E170301	01/01/2017	01/01/2019	$1,000,000 Per Claim $1,000,000 Annual Agg	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

FOR INFORMATIONAL PURPOSES ONLY

$50,000 deductible per claim

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

FORM SF 330 - PARTS I AND II

ARCHITECT - ENGINEER QUALIFICATIONS

PART I - CONTRACT-SPECIFIC QUALIFICATIONS

A. CONTRACT INFORMATION

1. TITLE AND LOCATION *(City and State)*

Wyoming State Penitentiary (WSP) Independent Peer Review Study Statement of Qualifications, Rawlins and Cheyenne, Wyoming

2. PUBLIC NOTICE DATE	3. SOLICITATION OR PROJECT NUMBER
May 6, 2017	0774

B. ARCHITECT-ENGINEER POINT OF CONTACT

4. NAME AND TITLE

Jerry Maly, Principal

5. NAME OF FIRM

Wiss, Janney, Elstner Associates, Inc.

6. TELEPHONE NUMBER	7. FAX NUMBER	8. E-MAIL ADDRESS
303-914-4300	303-914-3000	jmaly@wje.com

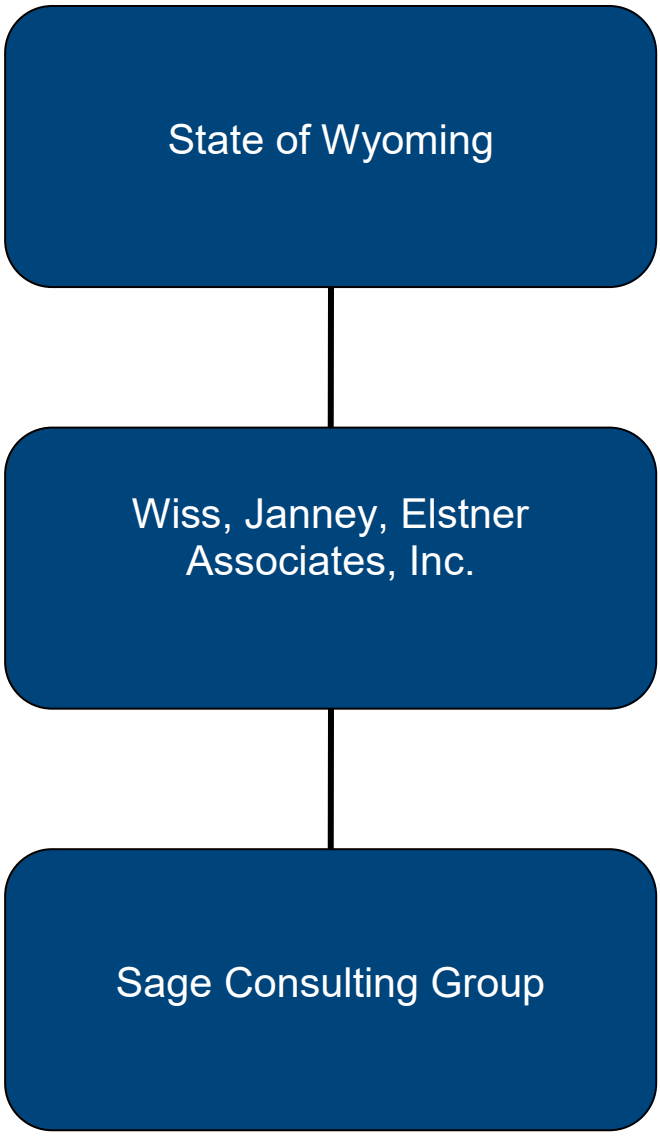
C. PROPOSED TEAM

(Complete this section for the prime contractor and all key subcontractors.)

	(Check) PRIME	(Check) J-V PARTNER	(Check) SUBCON-TRACTOR	9. FIRM NAME	10. ADDRESS	11. ROLE IN THIS CONTRACT
a.	☒	☐	☐	Wiss, Janney, Elstner Associates, Inc. ☒ CHECK IF BRANCH OFFICE	3609 South Wadsworth Boulevard Suite 400 Lakewood, Colorado 80235	Prime Consultant
b.	☐	☐	☒	Sage Consulting Group ☐ CHECK IF BRANCH OFFICE	1623 Blake Street Suite 400 Denver, Colorado 80202	Sub-Consultant
c.	☐	☐	☐	☐ CHECK IF BRANCH OFFICE		
d.	☐	☐	☐	☐ CHECK IF BRANCH OFFICE		
e.	☐	☐	☐	☐ CHECK IF BRANCH OFFICE		
f.	☐	☐	☐	☐ CHECK IF BRANCH OFFICE		

D. ORGANIZATIONAL CHART OF PROPOSED TEAM ☐ *(Attached)*

ORGANIZATIONAL CHART
WYOMING STATE PENITENTIARY INDEPENDENT PEER REVIEW STUDY



ARCHITECT ENGINEER QUALIFICATIONS

1. SOLICITATION NUMBER *(If any)*

PART II - GENERAL QUALIFICATIONS

(If a firm has branch offices, complete for each specific branch office seeking work.)

2a. FIRM *(or Branch Office)* NAME Wiss, Janney, Elstner Associates, Inc.	3. YEAR ESTABLISHED 1979
	4. UNIQUE ENTITY IDENTIFIER 01-883-1417
2b. STREET 3609 S. Wadsworth Boulevard, Suite 400	5. OWNERSHIP
	a. TYPE Corporation
2c. CITY Lakewood	2d. STATE CO
	2e. ZIP CODE 80235
	b. SMALL BUSINESS STATUS No
6a. POINT OF CONTACT NAME AND TITLE Tracy Perry, Unit Manager and Senior Associate	7. NAME OF FIRM *(If Block 2a is a Branch Office)* Wiss, Janney, Elstner Associates, Inc.
6b. TELEPHONE NUMBER (303) 914-4300	6c. E-MAIL ADDRESS tperry@wje.com

8a. FORMER FIRM NAME(S) *(If any)*	8b. YEAR ESTABLISHED	8c. UNIQUE ENTITY IDENTIFIER
Janney and Associates (1956); Wiss and Janney Associates (1957); Wiss, Janney, Elstner & Associates (1961); Wiss, Janney, Elstner and Associates, Inc. (1973); Wiss, Janney, Elstner Associates, Inc. (1983–Present)	1956	06-441-1473

9. EMPLOYEES BY DISCIPLINE

a. Function Code	b. Discipline	c. No. of Employees (1) FIRM	c. No. of Employees (2) BRANCH
02	Administrative	111	2
06	Architect	94	1
08	CAD Technician	11	1
11	Chemist	7	0
40	Materials Engineer	12	0
30	Geologist	6	0
57	Structural Engineer	195	9
58	Technician	28	3
12	Civil Engineer	58	2
	Specialist	26	4
	Architect Engineer	94	5
	Fire Protection Engineer	6	0
	Other Employees	0	
	Total	648	27

10. PROFILE OF FIRM'S EXPERIENCE AND ANNUAL AVERAGE REVENUE FOR LAST 5 YEARS

a. Profile Code	b. Experience	c. Revenue Index Number *(see below)*
A11	Auditoriums & Theaters	1
B02	Bridges	2
C06	Churches; Chapels	1
C10	Commercial Buildings	4
E02	Education. Facilities; Classrooms	4
F02	Field Houses; Gyms; Stadiums	1
G01	Garages; Parking Decks	2
H01	Harbors, Jetties, Piers, Terminals	1
H07	Highways, Streets, Airfields	1
H09	Hospitals & Medical Facilities	3
H10	Hotels; Motels	2
H11	Housing	5
I01	Industrial; Manufacturing	2
J01	Judicial and Courtroom Facilities	1
L04	Libraries, Museums, Galleries	1
O01	Office Buildings; Industrial Parks	3
P12	Power Generation; Transmission	1
R04	Recreational Facilities	1
T05	Towers	1
W01	Warehouses	1
W03	Water Supply; Treatment; Distrib.	1
	Other	1

11. ANNUAL AVERAGE PROFESSIONAL SERVICES REVENUES OF FIRM FOR LAST 3 YEARS

(Insert revenue index number shown at right)

a. Federal Work		5	
b. Non-Federal Work		10	
c. Total Work		10	

PROFESSIONAL SERVICES REVENUE INDEX NUMBER

1. Less than $100,000.
2. $100,000 to less than $250,000
3. $250,000 to less than $500,000
4. $500,000 to less than $1 million
5. $1 million to less than $2 million
6. $2 million to less than $5 million
7. $5 million to less than $10 million
8. $10 million to less than $25 million
9. $25 million to less than $50 million
10. $50 million or greater

12. AUTHORIZED REPRESENTATIVE

The foregoing is a statement of facts.

a. SIGNATURE 	b. DATE 5/2/2017
c. NAME AND TITLE Tracy Perry, Unit Manager and Senior Associate	

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

SOQ: APPENDIX A - COMPLETE LIST OF WJE WORK IN WYOMING SINCE 1982

EXPERIENCE LIST

Wyoming Projects

THE HERSLER BUILDING
SHAND MORAHAN & COMPANY, INC.
Cheyenne, WY
- Collapsed Spandrel Beam Investigation (1982)

CENTRAL WYOMING COMMUNITY COLLEGE
MARTIN / MARTIN CONSULTING ENGINEERS
Riverton, WY
- Testing of Roof Truss Members (1983)

STATE PRISON
STATE OF WYOMING
- Structural Problems (1983)

WYOMING STATE PENETENTIARY
STATE OF WYOMING
- Design of Foundation Stabilization at Building 3MS (1983)

CRACKING OF RESIDENTIAL CONCRETE PAVEMENT
CITY OF GILLETTE
- Cracking of Residential Concrete Pavement; Causes and Corrective Actions (1984)

SNO-KING VILLAGE CONDOMINIUMS
KELLOGG CORPORATION
Jackson Hole, WY
- Design Review (1984)

WYOMING STATE HOSPITAL
STATE OF WYOMING
- Roof Analysis (1984)

SCHOOL SETTLEMENT PROBLEM
VOLK & HARRISON SCHOOL
- Settlement Problem (1984)

NATRONA JUNIOR HIGH SCHOOL
WESTATES CONSTRUCTION COMPANY
Casper, WY
- Fire Damage Investigation (1984)

CRYSTAL DAM PULL-OFF TESTS
AVI ENGINEERS
- Crystal Dam Pull-Off Tests ACI 503, Appendix A (1985)

PETROGRAPHIC STUDIES OF MASONRY
PEABODY CONTINENTIAL HEINE CO
- Petrographic Studies of Masonry from a Chimney (1985)

WYOMING STATE PENITENTIARY
STATE OF WYOMING
Rawlins, WY
- Settlement Problems (1985)

FIRST INTERSTATE BANK
VOLK & HARRISON
Casper, WY
- Parking Garage Investigation (1985)

THERMOPOLIS HARDWARE STORE
VOLK & HARRISON
Thermopolis, WY
- Petrographic Core Testing (1985)

WYOMING STATE PENITENTIARY
WYOMING STATE PENITENTIARY
Rawlins, WY
- Foundation Underpinning (1985)

RE: OFFERDAHL V. OSWOOD, TURNER, AND JELLEM
REEVES & MURDOCK
- Expert Testimony on Scaffold Accident (1986)

LITTLE SNAKE DIVERSION PIPELINE
REIMAN CORPORATION
- Investigation of Leakage and Erosion (1986)

PAVEMENT STUDY
GILBERT CENTRAL CORP.
- Pavement Study (1987)

LEGAL CONSULTATION
MR. HARLAN RASMUSSEN
- Legal Consultation Regarding Strength of Concrete (1987)

ACCELERATED WEATHERING TEST
RESCON TECHNOLOGY CORPORATION
- Accelerated Weathering Test (1987)

CORROSION STUDY
RESCON TECHNOLOGY CORPORATION
- Corrosion Study (1987)

WYOMING STATE PENITENTIARY
SNOWMASS MOUNTAIN CONDO ASSOC.
- Security Walls Consultation (1987)

ASPHALT PLANT
STERLING COMPANIES
- Collapse Investigation (1987)

MOONWALK LITIGATION CONSULTATION
GUY WILLIAMS WHITE
- Litigation Consultation (1988)

SNOW-KING TOWNHOUSES
MR. DON RISKE
- Retaining Walls Repairs (1988)

EXPERIENCE LIST

Wyoming Projects

SS & S BUILDING
SHAND MORAHAN & COMPANY, INC.
- Building Distress Review (1988)

SCHOOL: EXPERT TESTIMONY
BRADLEY & RASMUSSEN, PC
- Expert Testimony (1989)

RUSTED ROOF TRUSSES
CASPER FAMILY YMCA
- Rusted Roof Trusses Consultation (1989)

SHERIDAN HIGH SCHOOL
FRED R. DOLLISON
Sheridan, WY
- Consultation on Wall Leakage and Other Construction Problems (1989)

DUBOIS ELEMENTARY SCHOOL
FREMONT COUNTY
Fremont County, WY
- Foundation Settlement Consultation (1989)

MASONRY WALLS
LARAMIE COUNTY SCHOOL DISTRICT 1
Laramie County, WY
- Cracking Masonry Walls Investigation (1989)

MOONWALK
PICKETT & McKINNEY
- Deposition (1989)

WYOMING MEDICAL CENTER
VINSON M. JOHNSON
- Parking Garage Consultation Evaluation and Report (1989)

61 BALCONIES
GORDER/SOUTH GROUP
- 61 Balcony Consultations (1990)

EVANSTON TELEPHONE BUILDING
HARRISON & BAY P.C.
Evanston, WY
- Concrete Repair Consultation and Site Visit (1990)

JACKSON HOLE, WYOMING RESIDENCE
KEN BYERLY ARCHITECTS
Jackson Hole, WY
- Conceptual Review of Structural System (1990)

LARAMIE COUNTY COMMUNITY COLLEGE STUDENT HOUSING
LARAMIE COUNTY SCHOOL DISTRICT 1
- Engineering Services (1990)

CHILD DEVELOPMENT SERVICES BLDG.
ROGER POTRATZ
Lander, WY
- Litigation Consultation, Structural Evaluation and Report (1990)

RICHARDS-BLONDE BUILDING
TOWN OF THERMOPOLIS
Thermopolis, WY
- Masonry Wall Damage Consultation (1990)

WAR MEMORIAL STADIUM
UNIVERSITY OF WYOMING
- Engineering Evaluation and Repair (1990)

POWELL HIGH SCHOOL
HARRISON & BAY P.C.
- Masonry Consultation (1991)

CONCRETE STUDIES
BORTON INC
- Concrete Studies (1991)

MCKEE CONSTRUCTION COASTAL CHEM. PLANT
McBRIDE-RATLIFF & ASSOCIATES
Cheyenne, WY
- Cooling Tower Concrete Studies Report (1991)

AASHTO T277
WYOMING DEPARTMENT OF TRANSPORTATION
- Aashto T277 - Chloride Permeability Testing (1991)

AMERICAN HERITAGE CENTER
DON REYNOLDS USA, INC.
- Curtain Wall Design Review (1992)

KEY BANK BUILDING
EDWARDS CONSTRUCTION SERVICES
Cheyenne, WY
- Curtain Wall Framing Distress Evaluation (1992)

FIRST INTERSTATE GARAGE
FIRST INTERSTATE BANK
Casper, WY
- Engineering Services(1992)

WYOMING MEDICAL CENTER GARAGE
GORDER/SOUTH GROUP
- Construction Administration Services (1992)

COASTAL CHEMICAL FERTILIZER PLANT
MERRICK & COMPANY
- Concrete Tower Evaluation (1992)

EXPERIENCE LIST

Wyoming Projects

AMERICAN HERITAGE CENTER
POWERS PRODUCTS COMPANY
- Review Shop Drawings for Skylight (1992)

HIRSCH RESIDENCE
AIAC
- Glass Breakage Investigation (1993)

FIRST INTERSTATE BANK OF CASPER
FIRST INTERSTATE BANK
Casper, WY
- Parking Garage Underside Repairs (1993)

PATENT PAIL EXPANSION
KALMAN FLOOR COMPANY
- Patent Pail Expansion Test Application (1993)

LOCATE REINFORCING STEEL
MR. FRED HYNEK
- Locate Reinforcing Steel in Masonry Bearing Walls (1993)

SHERIDAN HIGH SCHOOL
SHERIDAN COUNTY SCHOOL
- Curtain Wall Leakage Investigation (1993)

B. J. SERVICES BUILDING
TURNKEY BUILDERS
- Fire Damage and Building Consultation (1993)

M & S BUILDING
BURKE MOVING & STORAGE
Casper, WY
- Structural Evaluation (1994)

CAMPBELL COUNTY MEMORIAL HOSPITAL
CAMPBELL COUNTY MEMORIAL
- Hospital Evaluation (1994)

UNIVERSITY OF WYOMING HERITAGE CENTER
KLOEFKORN-BALLARD
- Consulting on Concrete Masonry Cracking Problem (1994)

CAMPBELL COUNTY MEMORIAL HOSPITAL
CAMPBELL COUNTY MEMORIAL
- Beam Support Investigation (1995)
- Slab Analysis for MRI (1995)
- Review Roof Problem (1995)
- Review for Two Floor Addition (1995)

LOLLIE PLANK RESIDENCE
SARAH NETTLETON ARCHITECTS
- Consult on Masonry and Roof Leakage (1995)

ADMINISTRATION BUILDING
LARAMIE COUNTY SCHOOL DISTRICT 1
- Structural Engineering Investigation (1996)

STEWART CORP V. NORTHWEST PIPELINE CO.
NORTHWEST PIPELINE COMPANY
- Litigation Consultation (1996)

MUNICIPAL POOL
TSP FIVE INC
DOUGLAS, WY
- Consult on Cracks In New Swimming Pool (1996)

PRE-BLAST AND POST-BLAST
WOODWARD - CLYDE CONSULTANTS
- Visual Inspection (1996)

WILLIAMS RESIDENCE
DANNY WILLIAMS
- Mortar Analysis (1997)

HIRSCH WYOMING RESIDENCE
FIREMAN'S FUND INSURANCE COMPANY
- Glass Breakage Investigation (1997)

BURLINGTON NORTHERN-GLENDIVE
EMCOR GOVERNMENT SERVICES, INC
- Fueling System ASTM C 1260 (1998)

UINTA COUNTY SCHOOL DISTRICT #6 POOL
GORDER/SOUTH GROUP
- Review Design Drawings Consultation on Moisture Problem (1998)

WARREN BUILDING
GORDER/SOUTH GROUP
- Evaluate Leakage Problem in Penthouse Floor, Design Repairs (1998)

TRARN TOWER TOWNHOUSE ASSOCIATION
REBECCA A LEWIS, PC
- Trarn Tower Townhouse Association V. McCollister Et Al-Litigation Svc. (1998)

SYLVAN PASS DEPOSIT/FHWA - YELLOWSTONE
WESTERN COLORADO TESTING INC
- Petrography of Base Coarse Aggregate (1998)

LUND V. HOME PLACE
DAVIS & CANNON
- Litigation Services for Failed Floor Panel; Prepare for and Provide Deposition (1999)

EXPERIENCE LIST

Wyoming Projects

PINE BLUFF JUNIOR & SENIOR SCHOOLS
GORDER/SOUTH GROUP
- Water Leakage Investigation (1999)

3 BUILDINGS - ASSISTED LIVING CENTER
PEH ARCHITECTS
Cheyenne, Laramie, Casper, WY
- Evaluate Structural Problems (1999)

TRIHYDRO
TEXACO
- Cement Content Analysis (1999)
- ASTM C1084 on Composite and Concrete Samples (1999)
- Determine Cement Content on Composite, Soil and Prism (1999)

HMTAP TASK #306
URS CORPORATION
Casper, WY
- ATC-21 Rapid Visual Screening Training (1999)

OLD FAITHFULL HISTORIC LODGE
VERICLAIM, INC.
- Load Bearing Wall Movement Investigation (1999)

WYOMING PRA-YELL 10(8) YELLOWSTONE NATIONAL PARK
WESTERN COLORADO TESTING INC
- Air Measurements (1999)

NATRONA COUNTY HIGH SCHOOL STADIUM
GORDER/SOUTH GROUP
- Evaluate Stadium (2000)
- Design Repairs (2000)

COAL FLAT STORAGE FACILITY
HOLLAND & HART, LLP
- Litigation Support for Settlement and Structural Concerns (2000)

EAGLE BRONZE FOUNDRY
KIM D BASHAM, Ph.D., PE
- Petrographic Examination of Two Concrete Cores (2000)

LANDER VALLEY HIGH SCHOOL
MGT OF AMERICA INC
- Evaluate Building Stair (2000)

WYOMING LAW ENFORCEMENT ACADEMY
GORDER/SOUTH GROUP
Douglas, WY
- Engineering Evaluation (2001)

CHEYENNE AIRPORT
KIM D BASHAM, Ph.D., PE
- Petrographic Studies of One Concrete Core From a Deteriorating Runway (2001)

UNIVERSITY OF WYOMING STADIUM
STRUCTURAL SOLUTIONS, LLC
- Evaluation - West Stands (2001)

W W C C MICROWAVE TOWER
TRAVELERS INSURANCE COMPANY
- Investigation of Tower Collapse File No. B5X5324 (2001)

CENTRAL WYOMING COUNSELING CENTER
CENTRAL WYOMING COUNSELING CENTER
- Evaluate Excessive Sound Transmission from Counseling Rooms (2002)

MARTIN CABIN
CHUBB GROUP OF INSURANCE COMPANIES
Dubois, WY
- Evaluation of Settlement Damage Claim No. 1107149614 (2002)

ST. JOHN'S HOSPITAL ADDITION
DAVIS PARTNERSHIP, PC ARCHITECT
- Roofing Consulting - Send Info on EPDM Exp. Joint detail (2002)

ELK RIDGE APARTMENTS
FIREMAN'S FUND INSURANCE COMPANY
Cheyenne, WY
- Roof Inspection, Claim N0. 170-472-776 (2002)

CITY OF CHEYENNE
K B ENGINEERING, LLC
- Additional Petrographic Studies of Two Concrete Cores (2002)

POWELL HIGH SCHOOL
MGT OF AMERICA INC
- Structural and Seismic Evaluation (2002)

WYOMING MONUMENTS AND MARKERS
STATE OF WYOMING
- Stone Conservation (2002)

UNIVERSITY OF WYOMING STADIUM
STRUCTURAL SOLUTIONS, LLC
- Initial Survey - East Stands and Lower West Stands (2002)

WYOMING MEMORIAL STADIUM
STRUCTURAL SOLUTIONS, LLC
- Evaluate University of Wyoming Stadium (2002)

LARAMIE COUNTY COURTHOUSE
TRAVELERS INSURANCE COMPANY
- Evaluation of Repairs for Curtain Wall Leakage - Travelers Claim No. C6U3638P (2002)

EXPERIENCE LIST

Wyoming Projects

NEWCASTLE HIGH SCHOOL
WESTON COUNTY SCHOOL DISTRICT #1
- Evaluation of Cracking in CMU Walls (2002)

SOBIESKI LOG STRUCTURE
WHITE & STEELE, P.C.
- Review of Seismic Reinforcing Requirements (2002)

LOWES REGIONAL DISTRIBUTION CENTER
WL CONTRACTING INC
- Petrographic Studies of Four Concrete Cores (2002)

FIRE TRAINING COMPLEX
COOK-McCANN CONCRETE INC
- Brief Petrographic Examination (2003)

WY LAW ENFORCEMENT ACADEMY
GSG ARCHITECTURE
- Masonry Consultation (2003)
- Monitoring Program (2003)

THERMOPOLIS HIGH SCHOOL
HOT SPRINGS COUNTY SCHOOL DISTRICT 1
- Locate Steel in Concrete (2003)

WESTERN FORGE WAREHOUSE
OXFORD BUILDING COMPANY LLC
- Inspect Walls (2003)

POWELL HIGH SCHOOL NATATORIUM 1
PARK COUNTY SCHOOL DISTRICT #1
- Wall Reinforcement (2003)

WAR MEMORIAL STADIUM
STRUCTURAL SOLUTIONS, LLC
- Annual Inspection (2003)

UNIVERSITY OF WY STADIUM
STRUCTURAL SOLUTIONS, LLC
- Upper West Stand Replacement - Consult with SS (2003)

STATE OF WYOMING
MGT OF AMERICA INC
- Building Evaluation (2003)

WYOMING SCHOOL FACILITIES COMMISSION
MGT OF AMERICA INC
- Investigation of Masonry Walls (2003)

SEISMIC EVALUATION: 4 ELEMENTARY SCHOOLS
MGT OF AMERICA INC
- Seismic Evaluation (2003)

CHATTERTON HOUSE, FORT FRED STEELE
ABSTRACT MASONRY RESTORATION, INC
- Materials Study of Concrete and Plaster (2004)

FIRST INTERSTATE BANK GARAGE
FIRST INTERSTATE BANK
Gillette, WY
- Evaluate New Topping - Second Opinion (2004)

F. E. WARREN BASE - BUILDING 152
INNOVATIVE TECHNICAL SOLUTIONS INC
- Design Waterproofing (2004)

UNIVERSITY OF WYOMING STADUIM
REIMAN CORPORATION
- Inspection of Overlay (2004)

CHEYENNE FRONTIER DAYS - EXHIBITION HALL
STRUCTURAL SOLUTIONS, LLC
- Condition Evaluation (2004)

WORLAND H.S. SWIMMING POOL BUILDING
WASHAKIE COUNTY SCHOOL DISTRICT No. 1
- Investigation of Pool Building Roof Structure (2004)

WILSON FIRE HALL ROOF CLAIM
WHITE & STEELE, P.C.
Jackson, WY
- Litigation Support Services (2004)

MOVIE THEATER
WILLIAMS & ASSOCIATES ARCHITECTURE INC
- Evaluate Acoustic Gap at Top of Wall (2004)

LABORATORY TESTING OF WINDOW
JELD WEN WINDOWS & DOORS
- Air and Water Testing of Window in Laboratory (2005)

LINCOLN ELEMENTARY
JGA ARCHITECTS
Riverton, WY
- Termite Damage-Glulam Arches (2005)

GRAND TETON NATIONAL PARK
NATIONAL PARK SERVICE
- Structural and Seismic Evaluation of Six Buildings (2005)

WAR MEMORIAL STADIUM
STRUCTURAL SOLUTIONS, LLC
- Design Repairs (2005)

EXPERIENCE LIST

Wyoming Projects

ELK BASIN COMPRESSOR STATION
TEJAS MAINTENANCE INC
Powell, WY
- Petrographic Examination of Compressor Slab Concrete for Composition (2005)

WAL-MART NO. 1485
WAL-MART STORES INC
Gillette, WY
- Assessment of Roof Deck Damaged by High Winds (2005)

JOHNSTON RESIDENCE
WHITE & STEELE, P.C.
Evanston, WY
- Evaluate and Repair Foundation System (2005)

SUNRISE SHOPPING CENTER
CONNOLLY PROPERTIES, INC
Casper, WY
- Roof Inspection (2006)

FRONTIER MALL LIGHTPOLES
FRONTIER MALL
- Evaluating Sample of Existing Parking Lot Lightpoles after a Single Failure that Damaged Property (2006)

FE WARREN AFB - DORM 230
TORIX GENERAL CONTRACTORS
Cheyenne, WY
- Structural Design for Temporary Shoring System (2006)

HOLIDAY INN - CASPER
ENVIRONMENTAL SYSTEMS, LLP
Casper, WY
- Evaluate Condensation (2007)

FIRST INTERSTATE BANK B-2 LEVEL
FIRST INTERSTATE BANK
Casper, WY
- Evaluate Slab (2007)

CENTENNIAL COMPLEX
PAPPAS & PAPPAS ARCHITECTS
- Masonry Walls - Phase II (2007)
- Construction Administration Services (2007)

HOLIDAY INN
T K O
Casper, WY
- Design Services (2007)

5353 YELLOW STONE ROAD
THE RMR GROUP INC. [REIT MANAGEMENT & RESEARCH, LLC]
- Facade and Roof Inspection and Report (2007)

CHEYENNE MDC #7077-00
WAL-MART STORES INC
Cheyenne, WY
- Structural Examination of Mezzanine (2007)

WYOMING MEDICAL CENTER PARKING STRUCTURE
WYOMING MEDICAL CENTER
- Condition Survey (2007)

FOUR SEASONS HOTEL
AKERMAN SENTERFITT, LLP
Jackson Hole, WY
- Structural Evaluation of Roof (2008)

FE WARREN AFB DORMS 220 AND 228
INNOVATIVE TECHNICAL SOLUTIONS INC
- Lateral and Vertical Shoring Design (2008)

WYOMING BEHAVIORAL INSTITUTE ADDITION
LOTT BROTHERS CONSTRUCTION COMPANY
Casper, WY
- Peer Review of Exterior Envelope (2008)

CHEYENNE CIVIC CENTER FLOOD
McLARENS
Cheyenne, WY
- Evaluation of Structural, Mechanical and Electrical Damage Due to Flood (2008)

JACKSON MOUNTAIN RESORT
RESTRUCTION CORPORATION
Jackson Hole, WY
- Evaluate Tram Bollard (2008)

UNION PACIFIC V. ENTERGY
SHOOK HARDY & BACON , LLP
Mile Marker 76, WY
- Litigation Re: Up v. Entergy (Train Detrailment) (2008)

CAKEBREAD RANCH
STEVE & JILL CAKEBREAD
Star Valley, WY
- Waterproofing and Roofing Peer Review Consulting Services (2008)

WAR MEMORIAL STADIUM - EAST STANDS
STRUCTURAL SOLUTIONS, LLC
- Design Repairs CMAR Work (2008)

GREEN RIVER HAMPTON INN
UNIFIED BUILDING SCIENCE INC. (UBSE)
Green River, WY
- Moisture Investigation (2008)

EXPERIENCE LIST

Wyoming Projects

NCHS STADIUM
NATRONA COUNTY SCHOOL DISTRICT
Casper, WY
- Stadium Evaluation (2009)

CASPER HOLIDAY INN EXPRESS
BANGS McCULLEN LAW FIRM
- Litigation Services (2010)

CASPER HOLIDAY INN EXPRESS
BANGS McCULLEN LAW FIRM
- Litigation Services Structural (2010)

CASPER COLLEGE OF BUSINESS
GSG ARCHITECTURE
Casper, WY
- Leakage Investigation and Repair Documents (2010)

WWTP
McLARENS
Sheridan, WY
- Evaluate Clarifier Floor (2010)

CENTRAL WYOMING COUNSELING CENTER
PHILADELPHIA INSURANCE COMPANIES
Casper, WY
- Roof Inspection Claim No. 473412 (2010)

FMC SODA ASH SILOS
RESTRUCTION CORPORATION
Green River, WY
- Phase III- Analysis & Repair Design (2010)

NCAR WYOMING
ROCKY MOUNTAIN PRESTRESS INC
- Design Review of Window / Curtain Wall Details at P/C Openings (2010)

UNIVERSITY OF WYOMING VISUAL ARTS BLDG
ROCKY MOUNTAIN PRESTRESS INC
- Design Review of Selected Precast Details Regarding Moisture Management (2010)

NCAR
SAUNDERS CONSTRUCTION COMPANY
Cheyenne, WY
- NCAR Envelope Review (2010)

WYOMING MEDICAL CENTER PARKING STRUCTURE
WYOMING MEDICAL CENTER
- Parking Structure Evaluation (2010)

JACKSON HOLE SKI BOLLARDS
ZAIST CONSTRUCTION MANAGEMENT
- Evaluate Bollards Concrete and Wood (2010)

CHEYENNE REGIONAL MEDICAL CTR - ADDITION
CHEYENNE REGIONAL MEDICAL CENTER
Cheyenne, WY
- DD and CD Level Design Review, Construction Observation Services (2011)

ROCKY MOUNTAIN HALL - EASTERN SHOHONE TRIBE
CRAWFORD GLOBAL TECHNICAL SERVICES INC
Fort Washakie, WY
- Roof Inspection (2011)

WYOMING MEDICAL CENTER BECX
ENGINEERING ECONOMICS INC
Casper, WY
- Building Envelope Commissioning Services (2011)

WHITE MOUNTAIN MALL
F M GLOBAL
Rock Springs, WY
- Investigation of Fire Sprinkler Water Main Failure Beneath Slab-On-Grade (2011)

FOUR SEASONS RESORT JACKSON HOLE
FS-JH CONDOMINIUM OWNERS ASSOCIATION, INC.
- Roof Evaluation (2011)

ECHOSTA
HENSEL PHELPS CONSTRUCTION COMPANY
- Microscopical and Petrographic Studies of Two Concrete Core Samples (2011)

YELLOWSTONE NATIONAL PARK - LANDSCAPE
LIZ SARGENT HLA
- Cultural Landscape Inventory Editing (2011)

M&N CORPORATE HANGER
M & N AVIATION
- Floor Coating Failure Evaluation (2011)

SNAKE RIVER LODGE & SPA
OZ ARCHITECTURE
- Facade Consulting (2011)

CASPER APARTMENT INVESTORS, LLC
PHILADELPHIA INSURANCE COMPANIES
Casper, WY
- Roof Failure Investigation (2011)

EXPERIENCE LIST

Wyoming Projects

WYOMING INDIAN SCHOOLS
PHILADELPHIA INSURANCE COMPANIES
Ethete, WY
- Roof Failure Investigation Claim No. 529782 (2011)

SINCLAIR REFINERY - FIRE DAMAGE
SINCLAIR WYOMING REFINING COMPANY
- Structural Assessment for 582 Unit (2011)

SINCLAIR REFINERY - DRILLED PIERS
SINCLAIR WYOMING REFINING COMPANY
- Structural Assessment for 582 Unit (2011)

HEART MOUNTAIN RELOCATION CENTER
WYOMING STATE HISTORIC PRESERVATION OFFICE
- Foundation Investigation, Structural Analysis, Stabilization Design and Repair (2011)

BUNZL RESIDENCE
CARNEY LOGAN BURKE ARCHITECTS
Wilson, WY
- Design Review of Roofing and Phase I Services
- Waterproofing Additional Services (2012)

COYNE KOLASKY RESIDENCE
CARNEY LOGAN BURKE ARCHITECTS
Teton County, WY
- Design Review of Roofing
- Phase I Services (2012)

MUELLER RESIDENCE
CODY MUELLER
Jackson, WY
- Initial Site Visit
- Design Phase Services
- Construction Phase Services (2012)

YELLOWSTONE CANYON VILLAGE
JVA, INC
Yellowstone, WY
- Consulting Services (2012)

YELLOWSTONE NATIONAL PARK
LIZ SARGENT HLA
- Cultural Landscape Inventory Editing (2012)

YELLOWSTONE PARK CULTURAL LANDSCAPE
LIZ SARGENT HLA
- Historic District Cultural Landscape Inventory (2012)

MCLARENS YOUNG WY.MED.CENTER
McLARENS
Casper, WY
- Roof Hail Damage Investigation (2012)

THE INN @ JACKSON HOLE
METWEST RERRA HOSPITALITY, LLC
Teton Village, WY
- Roof Evaluation and Recommendations (2012)

FMC CRUSHER
RESTRUCTION CORPORATION
Green River, WY
- Vibration Evaluation (2012)

VILLAGE CENTER
CARNEY LOGAN BURKE ARCHITECTS
Teton, WY
- Construction Phase Services (2013)
- Pre-purchase Survey (2013)

O'CONNOR COMPOUND
CARNEY LOGAN BURKE ARCHITECTS
Teton County, WY
- Design Review of Roofing, Waterproofing and Facade (2013)

MUELLER RESIDENCE
CODY MUELLER
Jackson, WY
- Litigation Support Services (2013)

SHERIDAN MEDICAL BUILDING
LIBERTY MUTUAL INSURANCE COMPANY
Sheridan, WY
- Condensation Investigation (2013)

WARM - LARAMIE, WY - POLICE EVIDENCE GARAGE
McLARENS
Laramie, WY
- Evaluate CMU Walls and Steel Components for Fire Damage (2013)

200 SOUTH COLLEGE DRIVE, CHEYENNE, WY
POWERS PRODUCTS COMPANY
Cheyenne, WY
- Nozzle Testing of Centria Panel System (2013)

WYOMING STATE CAPITAL
PREMIER SPECIALTY CONTRACTORS, INC
Cheyenne, WY
- Cornice Netting Anchorage Design (2013)

2013 EASTSIDE 2ND STREET
TEN HIGH, LLC
Sheridan, WY
- Slab Moisture Investigation (2013)

EXPERIENCE LIST

Wyoming Projects

TROY CONST. VS. RYCKMAN CREEK RESOURCES
GREENBERG TRAURIG, LLP
Evanston, WY
- Litigation Support (2014)

SAGE VIEW CARE CENTER
VENTAS, INC
Rock Springs, WY
- Building Settlement Observations (2014)

WESTON COUNTY EVENT CENTER
WESTON COUNTY
Newcastle, WY
- Review of Design and Remedial Plan (2014)

WESTON COUNTY EVENT CENTER
WESTON COUNTY
Newcastle, WY
- Construction Period Services (2014)

NEW MOUNT CARMEL MONASTERY CHAPEL
A & E ARCHITECTS, PC
Meeteetse, WY
- Peer Review of Building Enclosure (2015)

FOUR SEASONS JACKSON HOLE
FJ_JH RESORT OWNERS' ASSOCIATION INC.
Teton Village, WY
- Balcony Deck Evaluation (2015)

WYOMING STATE CAPITOL
HDR, INC
Cheyenne, WY
- Peer Review Services - Stone Restoration (2015)

WYOMING STATE CAPITOL
HDR, INC
Cheyenne, WY
- Construction Phase Services (2015)

BECKER, ET AL v. MRJ DEVELOPMENT, ET AL;
HOLLAND & HART, LLP
Gillette, WY
- Litigation Support Pertaining to Sixteen Homes Damaged by Foundation Movements Resulting from Expansive and Collapsible Soils (2015)

MUD SILL DESIGN I-90 BRIDGE
S & S BUILDERS
Sundance, WY
- Design Mud Sills for Shoring Posts Relative to Repair to Damaged Girder (2015)

SIERRA TRADING POST
TJX COMPANIES
Cheyenne, WY
- Roof Consulting Services (2015)

CLIFFORD ET AL. V. LANG HOMES, INC. ET AL;
HOLLAND & HART, LLP
Gillette, WY
- Litigation Support Pertaining to Nine Homes Damaged by Foundation Movements Resulting from Both Settlements and Expansive Soils at the Sage Valley Estates (2016)

SOUTHRIDGE ELEMENTARY
NATRONA COUNTY SCHOOL DISTRICT
Casper, WY
- Roof Consulting (2017)

GIRDER ERECTION CLASS - WYOMING
WYOMING CONTRACTORS ASSOCIATION
- Provide Training for Wyoming Contractors Association (2017)

APPENDIX B - DOCUMENTS REVIEWED BY WJE

- Preliminary Geotechnical Engineering Report, 400 Bed Close Security Prison, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by Terracon Consultants Western, Inc. (Terracon), Project No. 24965021, dated October 9, 1996.
- Geotechnical Engineering Report, High Security/Special Need Facility, Wyoming Department of Corrections, Rawlins, Wyoming, prepared by Terracon, Project No. 24965021, dated October 20, 1997.
- High Security and Special Needs Facility Drawing Sets for the South Facility, prepared by Plan One Architects (Plan One) and Rosser International, Inc. (Rosser), and their consultants, originally dated between January and May 1998, some sheets subsequently issued with various and'/or multiple revisions. Drawings sets included Architectural, Civil, Structural, Justice Architecture, Plumbing, Mechanical, and Electrical drawings.
- Project Manual, Specifications Volumes 1 and 2, High Security & Special Needs Facility for Wyoming Department of Corrections, prepared by Plan One/Architects and Rosser International, Inc., dated February 10, 1998.
- Supplemental Instructions/Information, Wyoming Department of Corrections, RFI EH-1, Groathouse serial letter #8, prepared by Plan One/Architects, dated July 22, 1998. Included was a letter dated May 11, 1998 prepared by Groathouse Construction that, among other issues, requested that 'skim slabs' be constructed between the bottom of the foundation grade beams and the void forms; also included was a response by Bay & Lower, PC, dated May 12, 1998.
- Summary of Caisson (Drilled Shaft) Observation, Security Prison-Wyoming State Penitentiary, Rawlins, Wyoming, prepared by Terracon, Project No. 24981029 for Drilled Shafts 810 through 828, dated September 24, 1998.
- Geotechnical Engineering Report, Penitentiary Kitchen and Laundry Facility East of the New Penitentiary, Rawlins, Wyoming, prepared by Terracon, Project No. 24005036, dated July 27, 2000.
- Certificate of Occupancy issued by the City of Rawlins, Department of Building Inspection for the Prison, dated September 28, 2000, and included the following notation: *"Substantial completion on structure. 90 day completion of punch list."*
- High Security and Special Needs Central Production Facility (CPF) Drawing Sets, prepared by Tobin & Associates, P.C. (Tobin) and Associates West, Inc., and their consultants, originally dated February 5, 2001. Drawing sets included Architectural, Civil, Structural, Food Service, Laundry, Mechanical, and Electrical.
- Certificate of Occupancy issued by the City of Rawlins, Department of Building Inspection for Prison - Pod A, dated March 29, 2001, and included the following notation: *"Certificate of Occupancy is for structural and plumbing. Electrical and fire is subject to State Fire Marshall's review."*
- Certificate of Occupancy issued by the State of Wyoming, Department of Fire Prevention and Electrical Safety for Wyoming State Penitentiary - Administration Building and Warehouse Complex, dated May 25, 2001.
- Letters regarding reinforcing steel testing at the Wyoming State Penitentiary, prepared by David LaPlante, dated November 8, 2001 and January 3, 2002.
- Letter regarding metal detection in masonry walls at the Wyoming State Penitentiary, prepared by Atkinson-Noland & Associates, Inc., dated December 11, 2001.
- Project Observation Report regarding Wyoming State Penitentiary Maximum Security Prison, prepared by Robert E. Lower, P.E., Lower & Co., dated January 8, 2002.
- Letter regarding observations made by Bob Lower at the Wyoming State Penitentiary, prepared by David LaPlante, dated January 15, 2002.

- Certificate of Occupancy issued by the State of Wyoming, Department of Fire Prevention and Electrical Safety for Building Address 2301 S. Higley Boulevard, Rawlins, dated July 31, 2002. (It is WJE's understanding that this document was issued for the CPF building.)
- Preliminary Geotechnical Engineering Report, New Prison Facility, Rawlins, Wyoming, Project No. 24045063, prepared by Terracon, dated September 16, 2004.
- Wyoming State Penitentiary - South Facility (K Unit) Drawing Sets, prepared by GSG Architecture together with Reilly Johnson Architecture, and their consultants, originally dated August 9, 2004. Drawing sets included Architectural, Civil, and Structural.
- Various email correspondence between staff of the WSP (e.g. Terry Keys, Charles Moore) and others regarding services by Lower Co., P.C. (Lower), with dates between December 2011 and August 2012, regarding movements in various locations of the South Facility.
- Letter regarding South Facility Structural Observations, Rawlins, Wyoming, prepared by Lower, dated December 23, 2011. This letter specifically addresses movement in the gymnasium walls.
- Letter regarding South Facility Structural Observations, Rawlins, Wyoming, prepared by Lower, dated August 9, 2012. This letter specifically addresses movement in the gymnasium walls and the corridor south of Area C.
- Proposal for Post Construction Geotechnical Engineering Services, Wyoming State Penitentiary South Facility - Gymnasium Area, Rawlins, Wyoming, prepared by Terracon, Project No. 2412G089, dated August 20, 2012.
- Post Construction Geotechnical Engineering Report, Wyoming Penitentiary South Facility, Rawlins, Wyoming, prepared by Terracon, Project No. 24125039, dated January 11, 2013.
- Email correspondence regarding crack in masonry at mechanical mezzanine in K Unit, January through March 2013. Parties involved included representatives of the State of Wyoming and WDOC, the project architect, GSG Architecture, and the Structural Engineer of Record, S.A. Miro.
- Elevation survey monitoring point drawings and data for the South Facility, prepared by Coffey Engineering & Surveying (Coffey), with data collected between August 2013 and March 2015.
- Groundwater Monitoring Study, Wyoming Penitentiary South Facility, Rawlins, Wyoming, prepared by Terracon, Project No. 24125039, dated December 6, 2013
- Drawings of the South Facility, annotated by Mr. Terry Keys and WSP staff in 2014, identifying the below grade sanitary and storm sewers that were inspected via video cameras. Portions of the videos were also reviewed.
- Drawings of the South Facility, annotated by Mr. Terry Keys, identifying courtyards where repairs were completed in 2014, and other courtyards where repairs are pending. These repairs include removal of damaged concrete slabs, installation of new concrete slabs, with drain inlets, below grade drain piping systems, and heat tracing.
- Monitoring Well Survey Drawing, Wyoming Department of Corrections, WSP South Facility, Control Exhibit, Rawlins, Wyoming, prepared by Coffey, including data between June 2014 and April 2016.
- Plan drawing of the CPF and K Unit, annotated by WSP staff, identifying locations of significant building distress, dated August 15, 2014.
- Letter regarding structural repairs near the Gymnasium in the South Facility in Rawlins, Wyoming, addressing structural repairs near the Gymnasium in the South Facility, prepared by Lower Co., P.C., dated December 30, 2014.
- Email correspondence from John Lund with M/M to Bob Kiser and others at the State of Wyoming, regarding elevation surveys by Coffey, dated March 2, 2015.

- Site Visit Observations, Wyoming State Penitentiary South Facility and CPF Building, Rawlins, Wyoming, prepared by Terracon, Project No. 24125039, dated March 17, 2015. Specifically, this letter addresses the structural support for a steel beam over Corridor F127 at the masonry wall between the Gymnasium and the Hobby Craft Room, F117.
- WSP Wall Movement History, dated March 31, 2015. The source of this document is not identified.
- Geotechnical Subgrade Study, Wyoming State Penitentiary, prepared by Terracon, Project No. 24125039, dated April 17, 2015.
- Study of Crack Monitoring Gauges Nos. 1 through 4, prepared by M/M, with dates between August 11, 2015 and December 18, 2015.
- Geotechnical Consultation, Building Movement Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by CTL|Thompson, dated September 9, 2015.
- Executive Summary Geotechnical Consultation, Building Movement Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by CTL|Thompson, dated September 23, 2015.
- Structural Investigation of Foundation Movement Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by M/M, dated September 28, 2015.
- Structural Investigation of Foundation Movement Supplemental Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by M/M, dated September 29, 2015.
- WSP Wall Movement Update, prepared by The State of Wyoming, Department of Corrections, dated October 6, 2015.
- Geotechnical Consultation, Building Movement Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by CTL|Thompson, dated December 18, 2015
- Power Point Presentation, Wyoming State Penitentiary, Rawlins, Wyoming, Structural Engineering Investigation, Report of Findings, prepared/presented by M/M, dated June 3, 2016.
- Structural Engineering Reconnaissance Study and Conceptual Cost Estimate Report, Wyoming State Penitentiary, Rawlins, Wyoming, prepared by M/M, dated September 14, 2016.
- Supplemental Civil Engineering Report regarding the Wyoming State Penitentiary, Rawlins, Wyoming, prepared by M/M, dated January 6, 2017.
- Plans for the South Facility, CPF, and K Unit that identify windows, doors, and courtyards throughout the facility that reportedly have operational or serviceability issues. These drawings were reportedly prepared for a meeting on May 26, 2017 between WSP staff and Representative Nicholas.
- A Summary of information and a timeline of events regarding the South Facility at the Wyoming State Penitentiary, prepared by the State of Wyoming, Department of Administration and Information, Construction Management Division, dated approximately June 2017.
- Letter regarding Nondestructive Testing Investigation of 3 drilled pier shafts and masonry wall reinforcing at various locations in the Wyoming State Penitentiary, Rawlins, Wyoming, prepared by Olson Engineering, Job No. 5767A, dated June 20, 2017.
- Summary of Information and Timeline of Events related to construction of the South Facility at the WSP, prepared by State of Wyoming, Department of Administration and Information, Construction Management Division, not dated.

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

APPENDIX C - TERRACON SITE VISIT OBSERVATIONS, DRAFT REPORT, DATED MARCH 17, 2015

March 17, 2015

State of Wyoming, Department of Corrections
Unicover Building, Suite 100
1934 Wyott Drive
Cheyenne, Wyoming 82007-3427

Attn: Mr. Terry Keys

Re: Site Visit Observations
Wyoming State Penitentiary South Facility and CPF Building
Rawlins, Wyoming
Terracon Project No. 24125039

Dear Mr. Keys:

In this letter, Terracon summarizes the observations made during our March 9, 2015 visit to the referenced facilities. Brent Wilkins, PE and Bill Attwooll, PE visited the facilities in company with Terry Keys and Jeffrey Heller of the Wyoming Department of Corrections.

The purpose of the site visit was to observe the current conditions in the facilities and to compare the current conditions with those observed during an October 22, 2012 site visit in which Mr. Attwooll participated.

Background Information

We understand that the Wyoming State Penitentiary South Facility was constructed in 1998 and 1999. The South Facility structure is supported on drilled pier foundations with slab-on-grade floors.

The CPF facility was initially constructed in (*Brent Wilkins to expand).* The CPF facility has shallow spread footing foundations with slab-on-grade floors. *(Brent Wilkins to provide more geotechnical historical perspective here).*

In the South Facility, there has been relative movement occurring in the floors and masonry walls. Indications of movement were observed during the 2012 site visit, and included cracks in masonry walls, displacements at construction (expansion) joints, and binding and/or racked doors. The movement is most pronounced at the north side of the gymnasium, but there has also been significant movement in Area A and along the Northwest Hall, as well as indications of movement elsewhere in the facility.

Terracon performed a post-construction subsurface exploration titled Post Construction Geotechnical Engineering Report, dated January 11, 2013. Field work was performed in late 2012. A boring was drilled in the open patio area north of the gymnasium, and anther boring was drilled in a locker room (mechanical area) near the northwest corner of the gymnasium. The results of laboratory testing on the retrieved soil samples indicated that the moisture content of the subsurface materials had increased compared to pre-construction conditions, especially in the upper portions of the underlying claystone/sandstone bedrock materials.

At the time of the 2012 site visit, relative movement in the Gymnasium area was reported to be about 1 3/8", with approximately 1 3/4" relative elevation difference at the intersection of the northwest and east-west halls by the west end of the outdoor patio.

Baseline and On-Going Survey Data

A baseline survey of elevations in the South Facility was performed in August 2013. The survey has been repeated about quarterly through October 2014. Coffey surveyors were on site performing another of these surveys during our March 9 site visit.

Our review of the survey data through October 2014 indicates that the surveyed elevation results have been somewhat erratic. However, the trends in the data suggest that relative vertical movements of up to 1/2" may have occurred over the survey period, with the greatest relative movements being in the Gymnasium area.

Recent Construction at South Facility

In our January 11, 2013 Report, Terracon recommended that the exterior areas surrounding the corridors and gymnasium be re-graded with positive slopes and that they be hard-scaped with concrete. It was our opinion that these open areas adjacent and within the building were significant locations for the infiltration of water into the subsurface that has produced the heave in the underlying swell-potential bedrock materials.

We were pleased to observe that the outdoor patio and the area immediately adjacent to the east side of the Gymnasium were hard-scaped in 2014. We understand that outdoor areas adjacent to Area A are scheduled to be hard-scaped this year. This hard-scaping program should appreciably reduce moisture infiltration into the subsurface near the portions of the facility that have had the greatest distress.

We understand that underfloor utilities have been inspected for leakage and were found to be in good condition.

Terracon constructed piezometers in a follow-up geotechnical investigation titled Groundwater Monitoring Study dated December 6, 2013. More piezometers have since

been installed by others, and Terracon understands that standing water has been observed in some of the piezometers. We understand that the Coffey survey personnel were to measure the piezometer water levels as part of the current survey. We will be pleased to review the water level data as it becomes available.

Site Visit Observations

South Facility

As observed during our March 9, 2015 site visit and as compared to our October 2012 observations, there is ongoing relative displacement and distress within the facility. In 2012, the most significant distress was in the Gymnasium Area, along the east-west wall that runs north of the Gymnasium, in the northwest hall, and in the A Unit.

For the most part, the nature and general location of the ongoing distress is a continuation of the distress observed in 2012, except that with over two years of additional relative movement, it has become more pronounced. There are more cracks and greater displacements that at some locations have resulted in spalling of the concrete masonry unit (CMU) interior walls.

Gymnasium Area

In the Gymnasium, in 2012 there was noticeable distress at the northeast corner, at the center of the north wall, at the Hobby Room and Office at the northwest end of the Gymnasium, and in the mechanical room west of the Hobby Room. There were less significant cracks elsewhere, primarily at construction joints.

The same pattern continues at the present time, but is more pronounced at the center of the north wall and at the northeast corner where CMU spalling has occurred on the outside of the wall. Some of the cracks elsewhere in the gymnasium walls have widened and displacements over the cracks increased, such as on the upper portion of the east wall.

Some of the greatest ongoing displacements were observed in the mechanical room immediately to the west of the gymnasium where a large piece of CMU has broken off an interior wall. Of note at this location is that the top of the north wall appears to be displacing towards the north. This displacement has moved the north-south oriented ceiling joists to the north pulling the ceiling fireproofing about one-quarter of an inch away from the south wall. Because of this ongoing movement and displacement, a shoring column has been placed in the adjacent east-west hallway to provide added support at this location.

Area A and West End of Northwest Hall

Relative movement and distress similar to that observed in Terracon's 2012 site visit continues in Area A and the west end of the northwest hall.

The continuing relative movement has created substantial, very noticeable cracking in the window jamb at the northwest corner of the office that is immediately east of the Area A entrance hall. The cracking at this location was not as pronounced during Terracon's 2012 site visit.

Another location in Area A with noticeably increased cracking and displacement is in the small closet off the southwest corner of the Area A multi-purpose room where the east end of the south wall has pulled away from the adjacent wall by about a half inch. The same crack was also observed on the other side of the wall on the south side of an interior office.

Other Locations

There is distress at other locations in the north portion of the South Facility. The most consistent type of distress is displacement of CMU walls at the expansion joints in the northwest hall and in the long east-west hall that passes by the north end of the gymnasium. At several of the expansion joints the displacement affects the overlying ceiling tiles.

There are also some horizontal cracks in hallway walls CMU blocks. Mr. Heller told us that one of these was recent, and that it opened abruptly with a rifle-like report.

In the housing area at the east end of the east-west hall, we were shown vertical cracks in the west and north walls. We did not observe this location during our site visit in 2012, but Mr. Heller informed us that these cracks have opened since then.

CPF Facility

There has been some relative movement and distress within the CPF Facility. As this was the first time we have observed this facility, we cannot make comparisons of continuing movement.

The north end of the building appears to be on a dock-height fill.

In general, the distress is of a somewhat different nature and not as great as in the South Facility. The distress in this facility consists of cracking of concrete floor slabs, distress in joints in CMU walls, and some diagonal cracking across CMU blocks.

The most significant distress is in an upper level mechanical room where a horizontal crack of about one-half inch width carries completely through a CMU block that is laid adjacent to a cast-in-place concrete wall. The crack continues horizontally over the cast-in-place wall giving the appearance that the cast-in-place concrete has settled about one-half inch relative to the adjacent CMU. A portion of a CMU block above this crack near the ceiling has spalled.

Some of the interior halls are tiled. There are cracks in the floor tiles on either side of some door openings. At an exterior door at the end of a hallway of the east end of the building, it appears that the floor on the right side of the interior of the door has settled somewhat compared to the floor at the left side of the door. A crack stair-steps through the floor tile joints and the door jamb appears go be racked at this location.

Comments on Site Visit Observations

South Facility

In general the relative displacement and distress that we observed during this site visit were of a similar nature to what we observed in our site visit during 2012, but the distress has increased due to continuing relative movements. At several locations the displacements have become more dramatic due to spalling of CMU blocks, and the opening of large and very visible cracks. As a result of the additional and on-going movement, a shoring column has been placed in the east-west hall just outside the mechanical room that is immediately west of the gymnasium.

We understand the concern of Wyoming Department of Corrections personnel with respect to these on-going movements and the resultant distress. Keys and Heller expressed concerns about health and safety issues that could result such as from distressed piping and conduits.

With respect to structural issues, as we expressed in our January 11, 2013 Post Construction Geotechnical Engineering Report, the structural engineer of record should be copied on all pertinent data so that the continued stability of the walls and roofs can be assessed. We recommend that the appropriate members of the project team should also be informed so that the condition of the piping, conduits and mechanical equipment can be assessed relative to health and safety issues.

We understand that the surveyor, Coffey Engineers, is aware of the erratic elevation data in the previous surveys. We understand that they were making special efforts to assure that the elevations on the current survey will be internally consistent. If, after these efforts, it the elevation data continue to be erratic, it may be because the benchmarks are not stable but are also subject to relative movement. If that is the case, we recommend that stable benchmarks be established at locations not immediately

adjacent to the Facility. Stable benchmarks are typically established by drilling a boring to about forty foot depth, placing a continuous reinforcing bar within the boring, and backfilling with concrete grout. We can provide details for stable benchmarks if needed and requested.

With respect to ongoing surveys, we have noted above that at several locations within the facility that in addition to relative vertical displacements, there appear to be relative horizontal displacements. We recommend that horizontal survey measurements be performed at these locations to evaluate the rate of ongoing horizontal movements. Specific locations would be in the north-south direction within the mechanical room west of the gymnasium and within the gymnasium itself. Other locations for horizontal measurements would include the closet at the southeast corner of the Area A multi-purpose room.

It is probable that the newly constructed and planned hard-scaping will minimize surface water infiltration so that over time the amount and rate of relative movement will decrease. With respect to how long the on-going movements will continue, we note that the claystone materials on which the facility is supported are very tight. That is, water moves through these materials very slowly. This is indicated by the fact that movements that are still continuing fourteen years after facility construction. As it has taken many years for the continuing distress to occur, it could be a number of years before the facility finally stabilizes.

As we expressed in our January 11, 2013 Report, if it is determined that the continued movements render walls or roofs unstable or spaces un-useable, then underpinning would likely be required. Based on our experience with remedial construction in similar facilities impacted by heave of swell potential subsurface materials, it is often cost effective to address specific portions of the structure where the data and observations indicate such repairs are needed. At this time, it is our opinion that if elements need to be underpinned, the underpinning should be planned for the affected locations only rather than for the facility as a whole.

During a telephone conversation between our Mr. Attwooll and Mr. Bob Kiser of the State of Wyoming Department of Administration and Information at the conclusion of our March 9, 2015 site visit, Mr. Kiser asked if it were possible that the subsurface water could be coming from native areas uphill of the site and from other natural drainages.

Mr. Attwooll expressed his opinion that it was more likely that the subsurface moisture is infiltrating within the area of the greater overall facility footprint. The construction of the overall facility creates many loosened and gravel covered surfaces which allow more of the typical nine inches of annual precipitation that occurs at the site to infiltrate than occurs on nearby native surfaces. The greater transpiration and evaporation from the native surfaces minimizes deep penetration of water into the subsurface compared to the modified surfaces within the overall facility.

CPF Facility

Based on our site visit observations, the causes of the distress observed at the CPF Facility are different than at the South Facility. Rather than being the result of heave of the swell potential subsurface materials, the distress appears to be primarily the result of settlement in the fill materials that underlie the facility.

Based on our observations, the main floor level at the north end of the facility is constructed over a dock height fill. It appears that the floor slabs have locally settled about one-half inch and possibly up to about one inch relative to the footing supported walls and structural elements. The differential floor slab settlements are indicated by the cracks in flooring tile at doorways and the extensions added to the flue ceiling plenums of floor slab supported equipment in the laundry area. The floor slab cracks are a response to the differential settlement between the floors and walls and across the floor themselves. The wall separations at the elevated guard area are likely the result of floor slab settlement under the elevated guard area.

There also appears to be some localized differential settlement under the footing supported structural elements. The displacements observed across CMU wall joints and the cracking through some of the CMU blocks appear to be the result of the response of the relatively rigid structure to the differential settlement. This is also indicated by the racking of some door frames, and the distress in the upper level mechanical room.

We recommend that a survey program be established in this facility similar to what has been established in the South Facility to evaluate the rate of ongoing movement. The survey data will assist in evaluating appropriate responses to the ongoing distress.

If you have any questions or need additional information, please contact us at your convenience.

Sincerely,

William J. Attwooll, P.E.
Senior Geotechnical Engineer

Brent F. Wilkins, P.E.
Geotechnical Department Manager

Reviewed by:
Douglas J. Jobe, P.E.
Senior Principal

Attachments photos from March 9 site visit

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

APPENDIX D - LOWER DOCUMENTATION OF AREA F MOVEMENTS AND REPAIR RECOMMENDATIONS

December 23, 2011

Mr. Chuck Moore
Wyoming Dept. of Corrections
P.O. Box 400
Rawlins, WY 82301

REF: South Facility Structural Observations,
Rawlins, Wyoming.

Dear Chuck:

At your request I observed the Gymnasium area of the above referenced facility on December 19, 2011. Some movement of floor slabs and masonry walls is evident. The following is a report of our observations and recommendations for repair / preventive maintenance.

Facility Construction:
The facility was constructed in 1998 / 1999. The buildings structural systems are described as follows:
Foundations: Drilled Piers to Claystone Bedrock, Concrete Grade Beams spanning over Piers.
Walls: Reinforced Concrete Masonry Bearing Walls.
Roofs: Steel Framed.
Floors: Concrete Slab on Grade.

The deep foundation system was used because of the potential for heaving of the Claystone subgrade soils. Slabs on grade were separated from expansive soils by a minimum of three feet of compacted engineered fill. A copy of the foundation plan and typical section of the Gym walls is attached. Also attached is the Geotechnical Report from October 1997, Pier drilling logs and project observation report from June 1998, and concrete compressive strength test results from June 1998.

Observations:
Gymnasium: See attached partial sheet S7. It is apparent that the grade beams supporting the east and west Gym walls have settled. Diagonal cracking and door/window frame distortion indicates that the walls have displaced downward toward the center of the Gym wall relative to the north and south ends of the Gym. I measured vertical displacements of the walls and floor slabs of a maximum of 1 ½" at the west wall and 1" at the east wall. Staff members that have been at the facility since it's construction stated that this movement has been slowly progressing since the building was completed.

1607 Cy Avenue, Suite 201 Casper, Wyoming 82604 307/234-6984 Fax 307/234-6985
lowerpc@trib.com

The east and west walls of the Gym are structural load bearing walls that support the roof. They are supported by grade beams and drilled piers. The drilled piers are drilled into claystone bedrock. The drilling logs indicate that bedrock was encountered at approximately 14 feet below grade. The piers were drilled to a minimum of 21 feet overall length, which gives a minimum of 11 feet of bedrock penetration (design minimum was 6 feet / 8 feet). When the drilling took place, conditions were ideal and the work progressed per plans and specifications under the constant observation of the Geotechnical Engineers. I observed the drilling in this area and was pleased with the work as stated in the attached observation report.

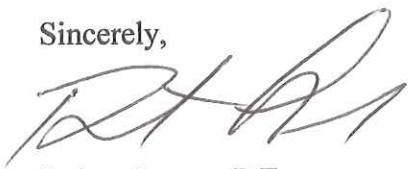
I have designed drilled pier foundations of this type for 27 years now, and my predecessors in the firm designed them since 1955. In this time, this is the first instance where we have seen settlement of such a foundation. The fact that the floor slab has also settled, which is not supported by the grade beam, but by the subgrade soils, indicates that the settlement is taking place in a soil layer that is located below the bedrock that the piers are drilled into. This would seem to be very unlikely. If the piers were failing bearing in the bedrock (punching through the bedrock), then we would see a relative downward displacement of the wall / grade beam versus the floor slab. We do not see such displacement. It appears that there is settlement of the soils located below the bottom of the piers.

Recommendations:
At this time the settlement is not enough to cause instability of the walls or roof. There is no need to discontinue use of the space. It is of course a nuisance and an eyesore to have such cracking and distortion taking place. I do not recommend that any remedial action take place yet however. Repairs to cracks may continue to move and require further repair. I recommend that we monitor the walls on a quarterly basis for further movement. If the movement continues to a point that will cause instability of the walls, then underpinning will be required. If the movement is noted to have ceased, then we can repair the damage and refinish the surfaces. It would be wise at this time to drill a soil boring on the outside of the building off of the south west corner of Area-F to identify the soil profile and check moisture contents of the bedrock.

Underpinning of these walls will be challenging, since it is apparent that we will have to drill new piers into a layer of bedrock that is deeper than reached during construction. Drilling would take place inside of the Gym with special equipment. I estimate that the Gym would be out of service for several months.

If you have any questions or comments, please give me a call.

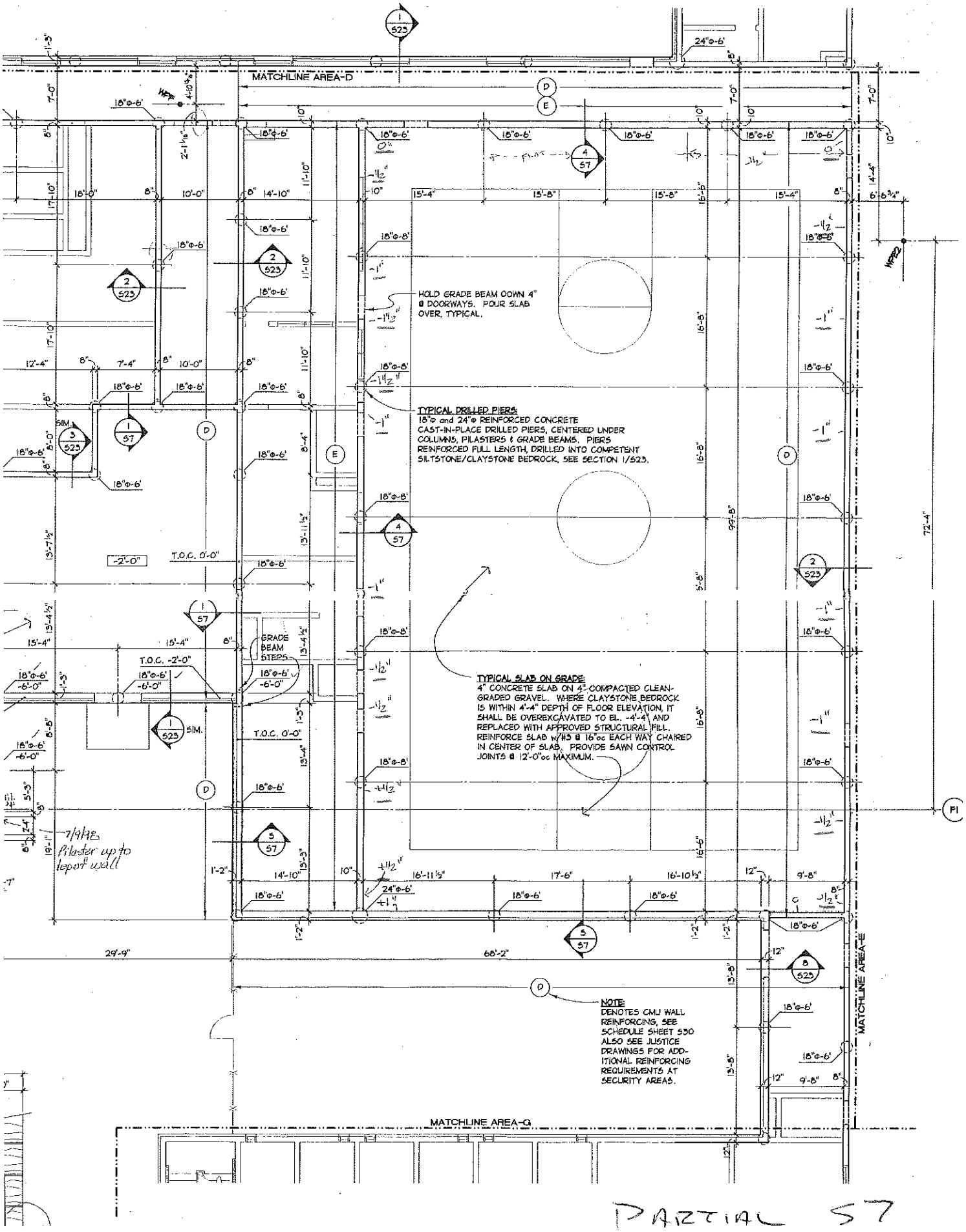
Sincerely,



Robert Lower, P.E.

11-087

1607 Cy Avenue, Suite 201 Casper, Wyoming 82604 307/234-6984 Fax 307/234-6985
lowerpc@trib.com


MATCHLINE AREA-D
MATCHLINE AREA-E
MATCHLINE AREA-G
HOLD GRADE BEAM DOWN 4" @ DOORWAYS. POUR SLAB OVER, TYPICAL.
TYPICAL DRILLED PIERS:
18"ø and 24"ø REINFORCED CONCRETE CAST-IN-PLACE DRILLED PIERS, CENTERED UNDER COLUMNS, PILASTERS & GRADE BEAMS. PIERS REINFORCED FULL LENGTH, DRILLED INTO COMPETENT SILTSTONE/CLAYSTONE BEDROCK, SEE SECTION 1/523.
TYPICAL SLAB ON GRADE:
4" CONCRETE SLAB ON 4" COMPACTED CLEAN-GRADED GRAVEL. WHERE CLAYSTONE BEDROCK IS WITHIN 4'-4" DEPTH OF FLOOR ELEVATION, IT SHALL BE OVEREXCAVATED TO EL. -4'-4" AND REPLACED WITH APPROVED STRUCTURAL FILL. REINFORCE SLAB w/#5 @ 16"oc EACH WAY CHAIRED IN CENTER OF SLAB. PROVIDE SAWN CONTROL JOINTS @ 12'-0"oc MAXIMUM.
NOTE:
DENOTES CMU WALL REINFORCING, SEE SCHEDULE SHEET S30 ALSO SEE JUSTICE DRAWINGS FOR ADDITIONAL REINFORCING REQUIREMENTS AT SECURITY AREAS.
GRADE BEAM STEPS
T.O.C. -2'-0"
T.O.C. 0'-0"
-2'-0"
7/9/12
Pilaster up to taper wall
PARTIAL S7

August 9, 2012

Mr. Chuck Moore
Wyoming Dept. of Corrections
P.O. Box 400
Rawlins, WY 82301

REF: South Facility Structural Observations,
Rawlins, Wyoming.

Dear Chuck:

At your request I observed the Gymnasium area of the above referenced facility on July 31, 2012. This visit was a follow-up to my visit of December 19, 2011. The following is a report of our observations and recommendations for repair / preventive maintenance.

Observations:
Gymnasium: See attached partial sheet S7. It is apparent that a central portion of the grade beams supporting the west Gym wall has settled further since December 2011. The magnitude of the additional displacement is approximately 3/8" downward. Measurements of the east, north and south walls of the Gym indicate that they have not displaced since December 2011. There is still no need to discontinue use of the Gym, the building is safe to occupy and use. The amount of movement is not enough to cause any instability of the structural walls or roofs.

Corridor South of C-Unit: A window in the south wall of room C164 fractured and was removed. I took measurements of the walls of this corridor and found that the floor slab and grade beam have apparently displaced upward. (see attached partial sheet S7) It is not unusual to find some heaving of floor slabs in the building, we noticed some of this activity in 2008 in the administration wing. These floors are slabs on grade and are subject to movement if the subgrade soils swell. But the corridor wall is a structural wall supported on a grade beam and deep, drilled piers. This location is in the vicinity of Boring #10 of the Geotechnical report, which shows bedrock at approximately 11' below floor elevation. The drilled piers supporting the 4' deep grade beam were a minimum of 21' in length, and would have had approximately 14' of bedrock penetration. This is normally more than adequate bedrock penetration to resist potential uplift of expansive soils.

Because the floor slab and grade beam have heaved similarly, it indicates that the expansion may have taken place in bedrock that is located deeper than the bedrock that is supporting the piers. It is also possible that the expansion has taken place in shallower bedrock and has uplifted the piers. In either case it is apparent that a significant quantity of water has gotten to the bedrock and caused expansion. All of the exploratory borings under the building showed no groundwater contact when they were completed in 1997. Any water that is accumulating under the building would be the result of leaking sewer piping or roof drain piping.

1607 Cy Avenue, Suite 201 Casper, Wyoming 82604 307/234-6984 Fax 307/234-6985
lowerpc@trib.com

Recommendations:
At this time the settlement/heaving is not enough to cause instability of the walls or roofs. There is no need to discontinue use of the spaces. I do not recommend that any remedial action take place yet however. Repairs to cracks may continue to move and require further repair. I recommend that we monitor the walls on a quarterly basis for further movement. I also recommend that we enlist the aid of Mr. Doug Jobe, P.E., of Terracon Engineers in Cheyenne. Doug is very familiar with the facility and with this type of foundation/floor system. He may suggest that we conduct an investigation of the subgrade soils to determine moisture levels.

It would also be advisable to conduct a study of the buildings underground piping to determine if waste or storm sewer lines are leaking. If you have any questions or comments, please give me a call.

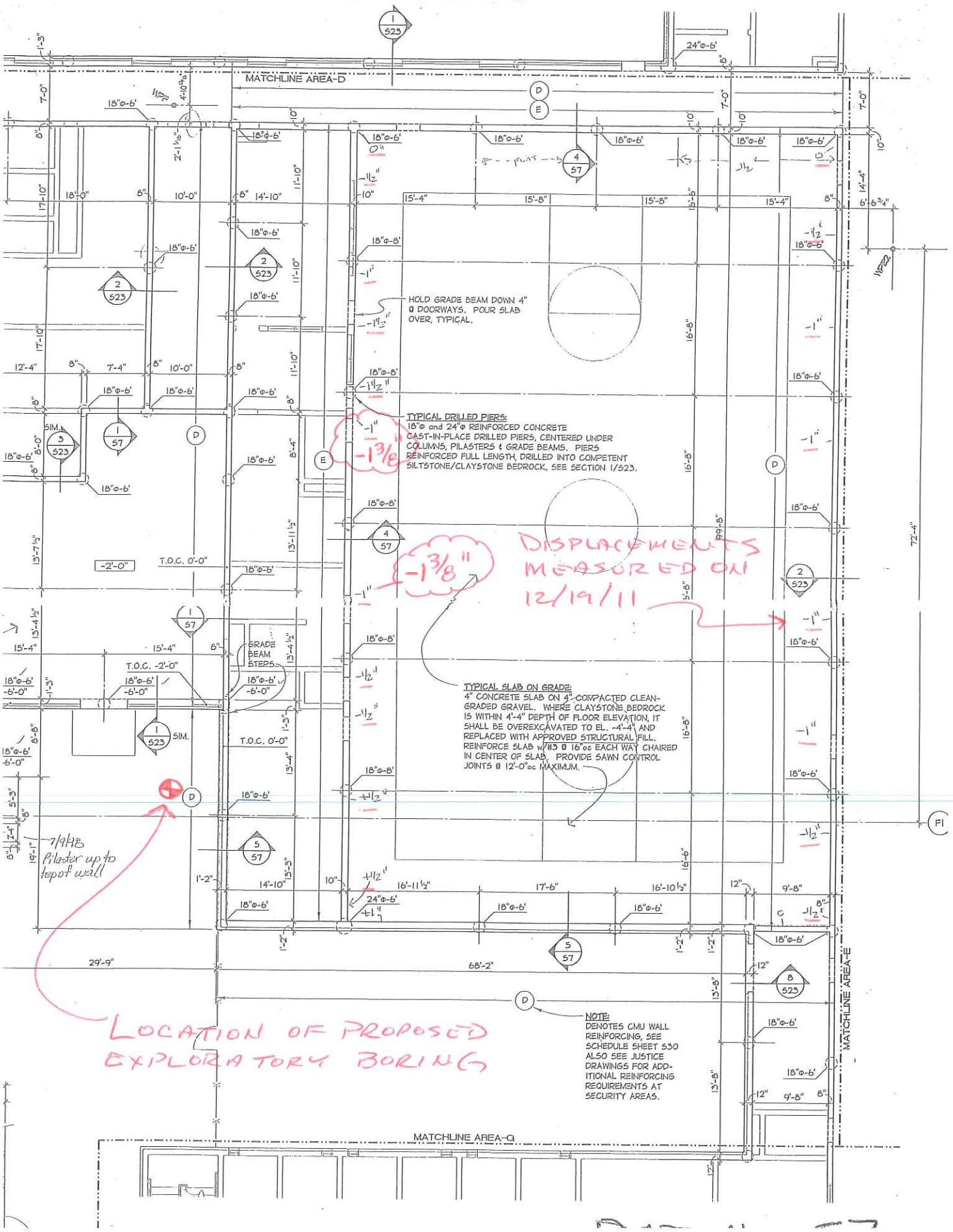
Sincerely,

Robert Lower, P.E.

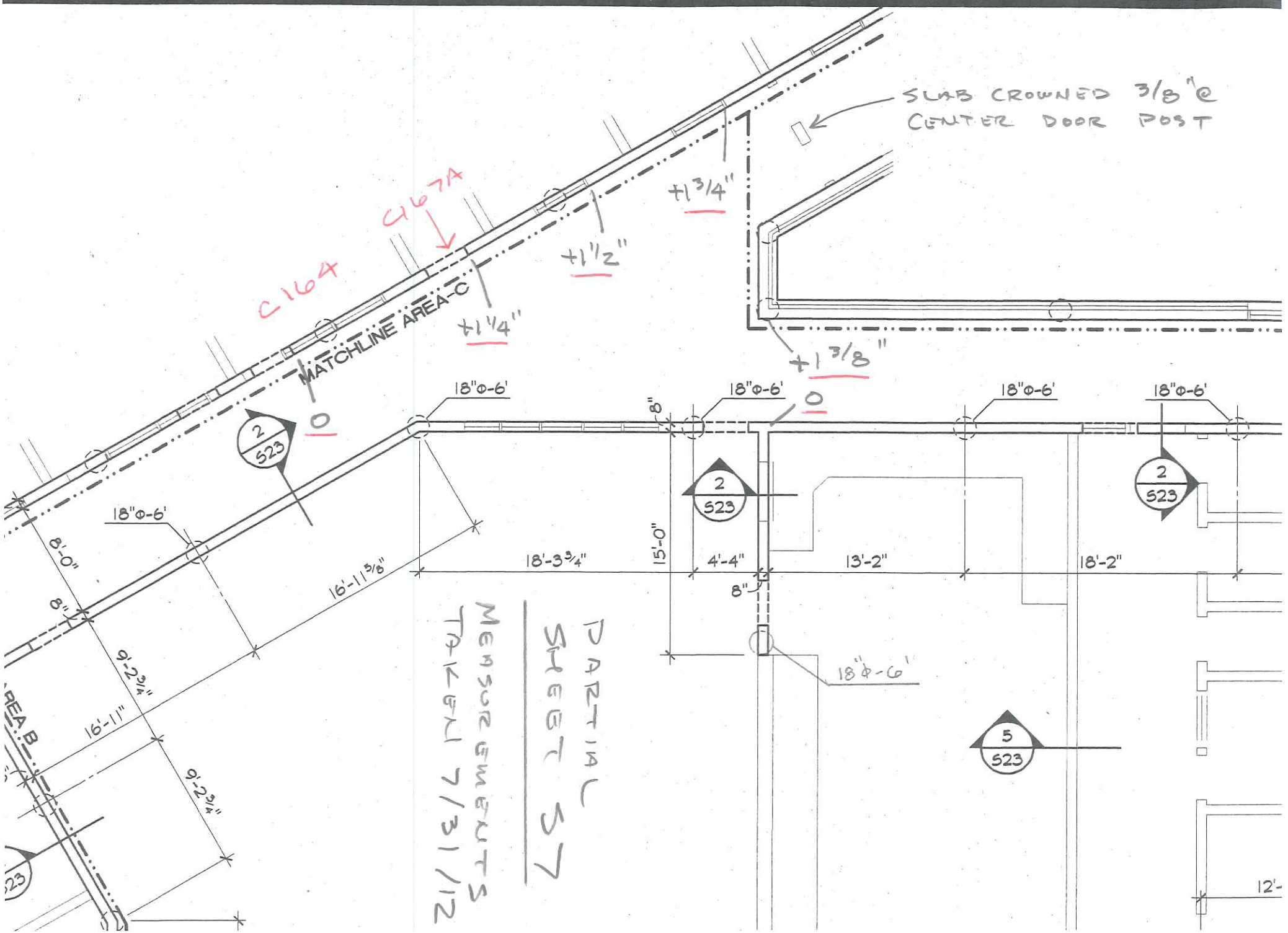
11-087

1607 Cy Avenue, Suite 201 Casper, Wyoming 82604 307/234-6984 Fax 307/234-6985
lowerpc@trib.com

CLOUDED AREAS SHOW FURTHER MOVEMENT MEASURED 7/31/12 (NOTED MOVEMENT MEASURED 12/19/11.)



plan
Jackson, cody, W
STAMP
Ross
Architects
Atlanta, S
524 West
Atlanta, C
(404) 876
STAMP



PARTIAL SHEET S7

MEASUREMENTS TAKEN 7/31/12

December 30, 2014

Mr. Terry Keys
Facilities manager
Wyoming Dept. of Corrections
1934 Wyott Drive, Suite 100
Cheyenne, WY 82002

REF: WYDOC South Facility,
Rawlins, Wyoming.

Dear Terry:
The letter is written in reference to the Gymnasium at the South Facility. At your request I have detailed necessary repairs to the damaged lintel bearing at the north-west corner of the Gymnasium, and to the damaged roof joist bearing bond beam at the south end of the adjacent electrical room. These repairs will provide for the stability of the lintel and the joist bearings, and should be carried out as soon as is practical.

I estimate the cost of the Lintel Repair to be $4,500.00 and the cost of the Bond Beam Repair to be $4,000.00. I believe that these repairs could be performed during normal daily operations provided that adequate safety measures and traffic control procedures were observed.

On our December 18 visit we also observed damage to the east wall of the Gym at the north end of the wall that indicates that the grade beam supporting the wall has been moved upward more, binding up the exit door. Damage to the masonry near the top of the east wall has also occurred at two masonry control joints. This damage is not under a joist bearing, so it does not compromise the integrity of the roof. Both of these conditions should be monitored for further movement.

We observed some separation of non-structural masonry from cast in place concrete columns in Sallyport A158. The masonry adjacent to these columns is supported on the floor slab while the column is on a drilled pier, so even a small amount of movement of the floor will show up as a displacement relative to the column. This condition does not present a problem. Further movement of the non-structural masonry in storage closet A180 was observed, such that the ceiling tiles are coming off of the edge angles. This condition was also observed in Counselor offices A174 and A177. Again these masonry walls are supported by the slab on grade, so their movement does not cause any structural damage, but the ceiling tiles and grid must be modified to provide for its stability. We anticipate that the drainage improvements that are under way at the facility will prevent most of the water infiltration that is causing the native soils to swell and produce these movements.

1607 Cy Avenue, Suite 201 Casper, Wyoming 82604 307/234-6984 Fax 307/234-6985 lowerco@lowerco.com

Terry

We observed an area of concern in the CPF at the Mechanical Room. The masonry column surround that covers a steel column in the wall has separated from the wall masonry. This surround should have been provided with a caulked control joint where it meets the wall, but the joint was mortared instead. The CMU soaps that extend above the top of the column into the web of the W24 steel beam that is supported by the column are loose and should be removed. It is not necessary to replace these CMU soaps. The mortar that is damaged and cracked at the surround / wall joint should be removed and replaced with backer rod and paintable caulking.

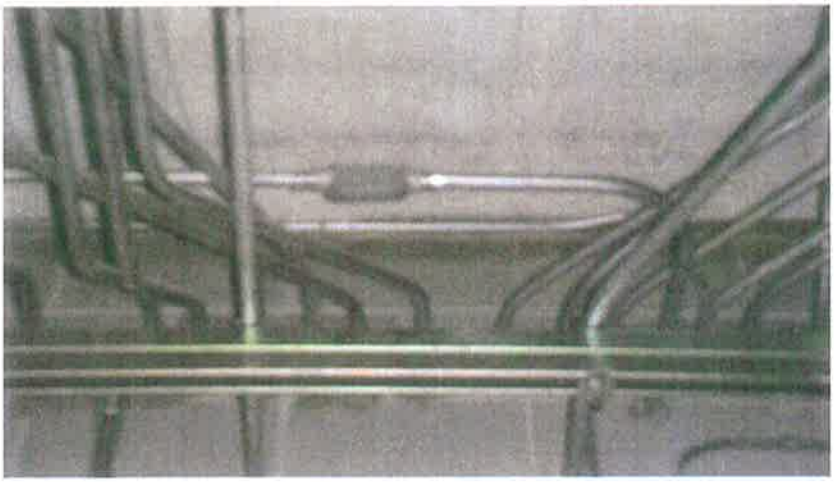
If you have any questions or comments please contact me.

Sincerely,

Robert Lower, P.E.

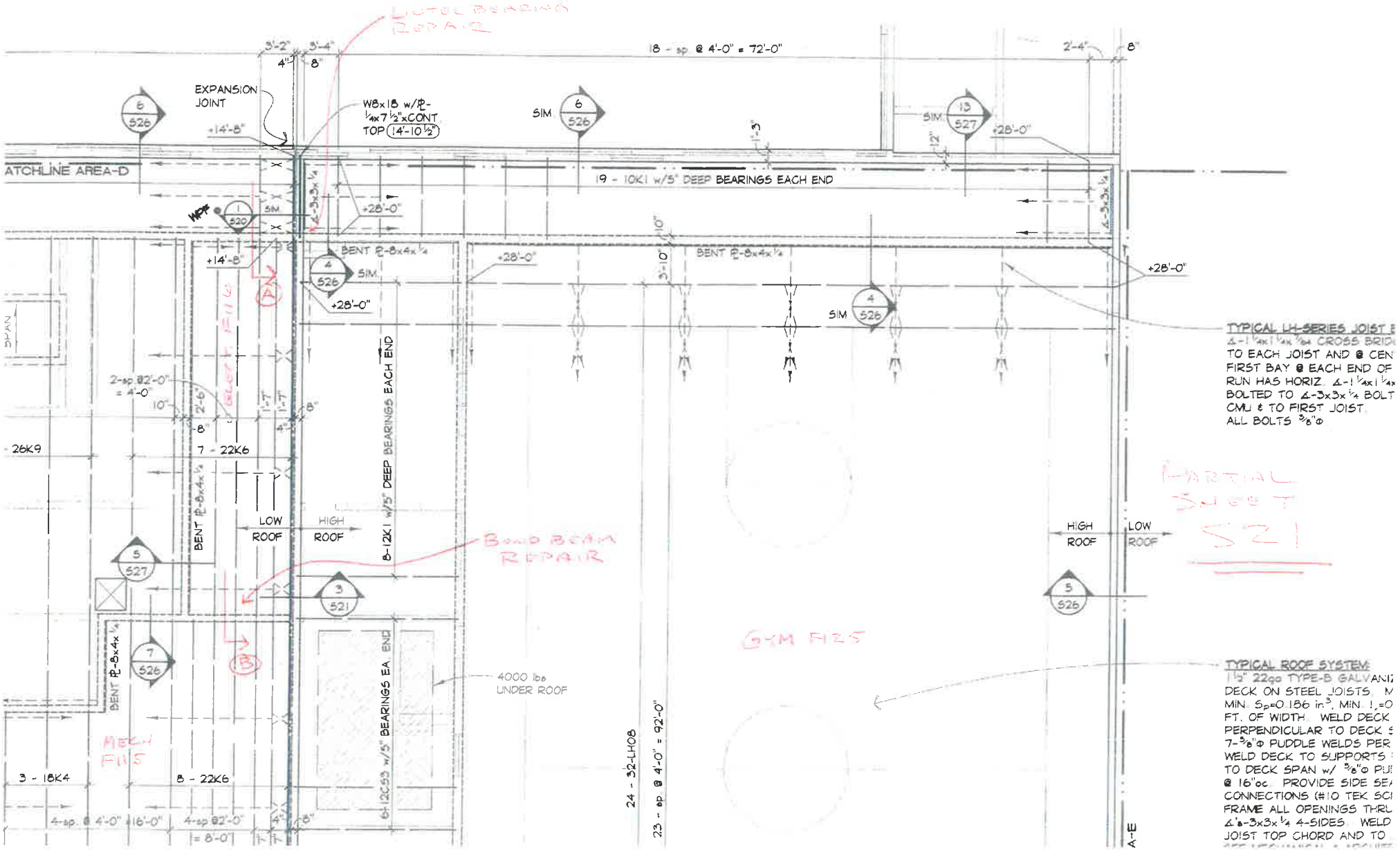
13-074

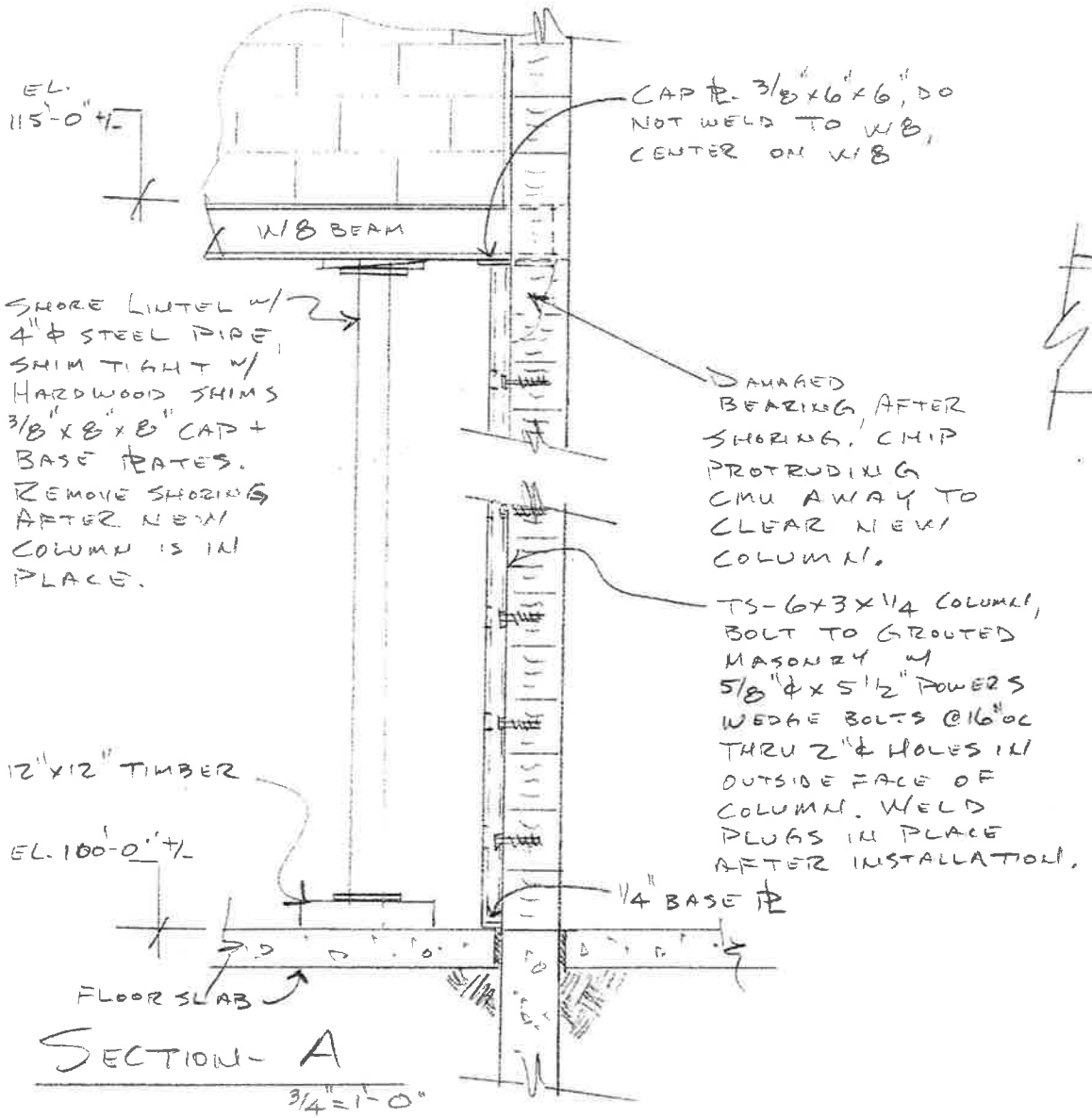
PHOTOS



Damaged Bond Beam in Electrical F116

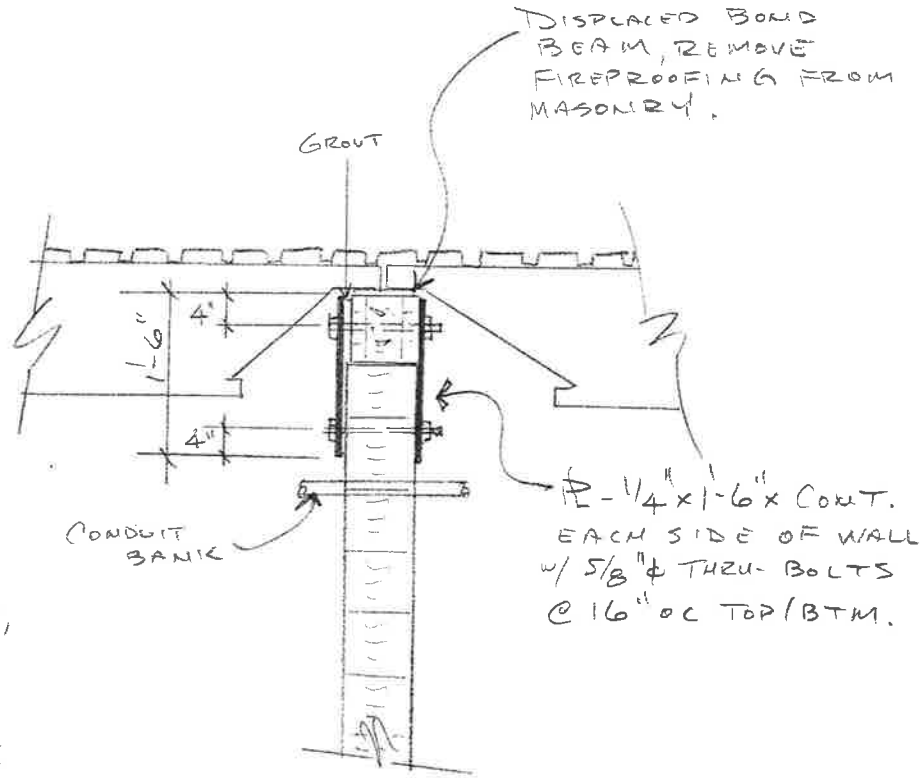
Damaged Column Surround


JOIST BEARING REPAIR
18 - sp @ 4'-0" = 72'-0"
EXPANSION JOINT
W8x18 w/ PL-1/4x7 1/2"xCONT TOP (14'-10 1/2")
19 - 10K1 w/5" DEEP BEARINGS EACH END
BENT PL-8x4x1/4
8-12K1 w/5" DEEP BEARINGS EACH END
BOND BEAM REPAIR
PARTIAL SHEET S21
GYM FLR
MECH FLR
4000 lbs UNDER ROOF
6-12G53 w/5" BEARINGS EA END
24 - 32LH08
23 - sp @ 4'-0" = 92'-0"
3 - 18K4
8 - 22K6
7 - 22K6
26K9
LOW ROOF
HIGH ROOF
TYPICAL LH-SERIES JOIST
TYPICAL ROOF SYSTEM:
A-E



SECTION - A

3/4"=1'-0"



SECTION - B

3/4"=1'-0"

Terry Keys <terry.keys@wyo.gov>

South Facility Repairs:

Bob Lower <rlower@lowerco.com> Wed, Dec 31, 2014 at 8:29 AM
To: Terry Keys <terry.keys@wyo.gov>

Terry:
Please see responses below:
Thanks and Happy New Year.

From: Terry Keys
Sent: Wednesday, December 31, 2014 5:28 AM
To: Bob Lower
Subject: Re: South Facility Repairs:

Bob,

Please review the details for the repairs in the Electrical Room. As I recall the Section "B" repairs indicate a dimishing load bearing wall supporting joists@ detail [7/S26]. Yes that is the detail with joists coming from both directions sharing a bearing plate on top of the wall.

The proposed bolted steel plate, is this to be continuous the entire length inside this Electrical Room? Are there any concerns regarding the drilling for these thru bolted connections, with a standard Roto hammer which vibrates/hammers, or should this performed by a regular non-vibratory drilling method, of the masonry blowouts if these lintel/bond beams are not properly grouted? The plate wants to run the entire length of this wall (9'-4" will give us 4" each end for erection clearance). It may be necessary to cut the plate at least once on the electrical room side in order to get it in place due to the large number of conduits below the joists. The bond beam will be grouted solid, the course below will be grouted at 32" oc. We do not need to drill thru grouted cells at the lower line of bolts. With a hammer drill It is likely that a small cone of CMU face shell will break out of the far side of the wall when drilling, that is unavoidable and not a problem.

As I recall the joists runs are in the opposite direction and a (I-Beam) rest on this wall. Yes the joists span north / south and they bear on an embedded plate cast in the bond beam.

In the areas where the fireproofing is to be removed for repairs, does it need to be reinstalled once the repairs are completed? No sir the fireproofing that is on the masonry bond beam is overspray and does not need to be replaced.

At the binded gym door, what is the recommended repairs for reusing this door? I think it would be best to leave the existing frame in place rather than removing it. It is filled with grout and very difficult to remove. I think we need to remove and cut the top of the existing door to fit the opening. The cut edge will require a new heavy gage metal edge be welded in place (14 gage minimum).

The proposed repairs at the high roof above this door, are these joists chords the only ones for repairs, are all the entire length of the gym? I think it is only necessary to observe the cracked masonry at the two control joints for any broken pieces that may fall. At the joist whose weld to the bearing plate is broken we should place a steel shim under the lifted side of the bearing and weld the shim to the plate, and the shim to the joist bearing. I suspect that there is only one such location.

At the CPF Building, if the current Masonry soaps are removed at the W24 beam, will any of the above beam CMU, that currently overhangs the beam support be compromised? No sir the structure above the W24 beam is heavy gage structural steel studs and gypsum sheathing. The column surround does not continue above the W24 beam because the column stops at the bottom of the beam (Approx 14' above floor).

Bob, these are concerns I need addressed before I seek repairs and how long areas my require being unoccupied to discuss with the Warden.

Thank you sir for this information provided.

Best regards,

Terry Keys

On Dec 30, 2014 11:23 PM, "Bob Lower" <rlower@lowerco.com> wrote:

> Terry:
> Please find attached repair directives for the damaged lintel bearing and joist bearing in Area-F.
>
> Thanks
>
> -----Original Message----- From: copier@lower.com
> Sent: Tuesday, December 30, 2014 9:13 PM
> To: bob
>
> This E-mail was sent from "RNPEAC85D" (Aficio MP C2550).
>
> Scan Date: 12.30.2014 23:13:20 (-0500)
> Queries to: copier@lower.com

WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

APPENDIX G - SUBSURFACE INFORMATION AND STUDIES

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Approximate Surface Elevation (ft)	Boring Depth (ft)	Depth to Bedrock (ft)	Sample Depth (ft)	Blow Count	Applied Stress at Inundation (psf)	Swell Pressure (psf)	Swell (%)	Soil Suction (pF)
TH-1	CTL	06/15/15	na	35	22.5	2	6/12	500	na	0	3.75
TH-1	CTL	06/15/15	na	35	22.5	4	6/12	500	na	na	3.91
TH-1	CTL	06/15/15	na	35	22.5	6	5/12	na	na	na	na
TH-1	CTL	06/15/15	na	35	22.5	8	15/12	na	na	na	na
TH-1	CTL	06/15/15	na	35	22.5	10	15/12	na	na	na	na
TH-1	CTL	06/15/15	na	35	22.5	12	21/12	1,000	na	na	3.02
TH-1	CTL	06/15/15	na	35	22.5	14	10/12	1,500	na	0	3.11
TH-1	CTL	06/15/15	na	35	22.5	16	19/12	1,500	na	na	2.96
TH-1	CTL	06/15/15	na	35	22.5	18	20/12	1,500	na	na	2.88
TH-1	CTL	06/15/15	na	35	22.5	20	23/12	2,000	na	na	3.18
TH-1	CTL	06/15/15	na	35	22.5	24	47/12	2,000	6000	1.2	4.21
TH-1	CTL	06/15/15	na	35	22.5	29	50/8	2,000	14000	5.6	4.34
TH-1	CTL	06/15/15	na	35	22.5	34	50/5	na	na	na	na
TH-2	CTL	06/15/15	na	35	19.5	2	10/12	500	na	0	3.18
TH-2	CTL	06/15/15	na	35	19.5	4	6/12	500	na	na	3.52
TH-2	CTL	06/15/15	na	35	19.5	6	11/12	500	na	na	3.38
TH-2	CTL	06/15/15	na	35	19.5	8	11/12	na	na	na	na
TH-2	CTL	06/15/15	na	35	19.5	10	10/12	na	na	na	na
TH-2	CTL	06/15/15	na	35	19.5	12	17/12	na	na	na	na
TH-2	CTL	06/15/15	na	35	19.5	14	19/12	na	na	na	na
TH-2	CTL	06/15/15	na	35	19.5	16	16/12	1,500	na	na	3.85
TH-2	CTL	06/15/15	na	35	19.5	18	23/12	1,500	2,500	1.2	4.07
TH-2	CTL	06/15/15	na	35	19.5	20	24/12	2,000	6,200	1.7	3.89
TH-2	CTL	06/15/15	na	35	19.5	24	37/12	2,000	7,100	1.8	4.17
TH-2	CTL	06/15/15	na	35	19.5	29	50/6	2,000	19,000	5.9	4.46
TH-2	CTL	06/15/15	na	35	19.5	34	50/4	na	na	na	na
TH-3	CTL	06/15/15	na	35	15.5	2	15/12	500	750	0.1	3.45
TH-3	CTL	06/15/15	na	35	15.5	4	27/12	500	na	0	3.35
TH-3	CTL	06/15/15	na	35	15.5	6	27/12	500	na	0	3.34
TH-3	CTL	06/15/15	na	35	15.5	8	9/12	1,000	na	na	2.98
TH-3	CTL	06/15/15	na	35	15.5	10	15/12	1,000	2500	0.8	3.57
TH-3	CTL	06/15/15	na	35	15.5	12	24/12	1,000	na	na	3.95
TH-3	CTL	06/15/15	na	35	15.5	14	23/12	1,500	3800	0.9	4.36
TH-3	CTL	06/15/15	na	35	15.5	16	44/12	1,500	na	na	4.59
TH-3	CTL	06/15/15	na	35	15.5	18	40/12	1,500	2200	0.6	4.60
TH-3	CTL	06/15/15	na	35	15.5	20	29/12	2,000	na	na	4.44
TH-3	CTL	06/15/15	na	35	15.5	24	19/12	2,000	na	na	4.01
TH-3	CTL	06/15/15	na	35	15.5	29	22/12	na	na	na	na
TH-3	CTL	06/15/15	na	35	15.5	34	50/6	na	na	na	na
TH-4	CTL	06/15/15	na	35	23	2	11/12	500	na	na	2.17
TH-4	CTL	06/15/15	na	35	23	4	7/12	500	na	na	1.02
TH-4	CTL	06/15/15	na	35	23	6	31/12	500	na	0	3.27
TH-4	CTL	06/15/15	na	35	23	8	14/12	1,000	na	-0.9	3.23

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Soluble Sulfate Content (%)	Moisture Content (%)	Saturation (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200 Sieve/ Fines (%)	Material Type
TH-1	CTL	06/15/15	na	9.9	59.08	116	na	na	na	na	2
TH-1	CTL	06/15/15	na	9.1	45.03	109	na	na	na	na	2
TH-1	CTL	06/15/15	na	9.9	59.08	116	na	na	na	40	2
TH-1	CTL	06/15/15	na	9.6	48.76	110	na	na	na	55	5
TH-1	CTL	06/15/15	na	11.7	59.42	110	na	na	na	35	5
TH-1	CTL	06/15/15	na	7.0	38.49	113	na	na	na	na	3
TH-1	CTL	06/15/15	na	19.9	95.95	108	na	na	na	na	3
TH-1	CTL	06/15/15	na	12.1	88.36	123	na	na	na	na	4
TH-1	CTL	06/15/15	na	5.7	45.65	126	na	na	na	na	4
TH-1	CTL	06/15/15	na	9.1	72.88	126	na	na	na	na	3
TH-1	CTL	06/15/15	na	11.7	88.07	124	na	na	na	na	13
TH-1	CTL	06/15/15	na	11.5	81.50	122	na	na	na	na	13
TH-1	CTL	06/15/15	na	na	na	na	na	na	na	na	13
TH-2	CTL	06/15/15	na	13.9	70.59	110	na	na	na	na	2
TH-2	CTL	06/15/15	na	10.7	60.45	114	na	na	na	na	2
TH-2	CTL	06/15/15	na	9.0	60.15	120	na	na	na	na	2
TH-2	CTL	06/15/15	na	6.3	32.85	111	na	na	na	24	5
TH-2	CTL	06/15/15	na	10.7	73.62	121	na	na	na	51	4
TH-2	CTL	06/15/15	na	8.8	55.54	118	na	na	na	42	4
TH-2	CTL	06/15/15	na	9.7	54.80	114	na	na	na	41	5
TH-2	CTL	06/15/15	na	11.5	63.24	113	na	na	na	na	3
TH-2	CTL	06/15/15	na	15.3	86.44	114	na	na	na	na	3
TH-2	CTL	06/15/15	na	15.1	110.26	123	na	na	na	na	10
TH-2	CTL	06/15/15	na	14.3	98.40	121	na	na	na	na	13
TH-2	CTL	06/15/15	na	11.9	92.37	125	na	na	na	na	13
TH-2	CTL	06/15/15	na	na	na	na	na	na	na	na	13
TH-3	CTL	06/15/15	na	10.5	60.96	115	na	na	na	na	2
TH-3	CTL	06/15/15	na	10.6	68.83	119	na	na	na	na	2
TH-3	CTL	06/15/15	na	10.1	69.50	121	na	na	na	na	2
TH-3	CTL	06/15/15	na	13.1	68.30	111	na	na	na	na	3
TH-3	CTL	06/15/15	na	12.3	84.63	121	na	na	na	na	3
TH-3	CTL	06/15/15	na	5.5	26.52	108	na	na	na	na	4
TH-3	CTL	06/15/15	na	15.0	87.09	115	na	na	na	na	3
TH-3	CTL	06/15/15	na	8.1	33.56	102	na	na	na	na	14
TH-3	CTL	06/15/15	na	9.7	56.32	115	na	na	na	na	14
TH-3	CTL	06/15/15	na	9.1	52.83	115	na	na	na	na	14
TH-3	CTL	06/15/15	na	10.8	61.02	114	na	na	na	na	14
TH-3	CTL	06/15/15	na	na	na	na	na	na	na	na	14
TH-3	CTL	06/15/15	na	na	na	na	na	na	na	na	14
TH-4	CTL	06/15/15	na	10.4	71.56	121	na	na	na	na	2
TH-4	CTL	06/15/15	na	13.2	83.31	118	na	na	na	na	2
TH-4	CTL	06/15/15	na	8.6	52.77	117	na	na	na	na	2
TH-4	CTL	06/15/15	na	9.5	45.80	108	na	na	na	na	4

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Approximate Surface Elevation (ft)	Boring Depth (ft)	Depth to Bedrock (ft)	Sample Depth (ft)	Blow Count	Applied Stress at Inundation (psf)	Swell Pressure (psf)	Swell (%)	Soil Suction (pF)
TH-4	CTL	06/15/15	na	35	23	14	22/12	1,500	na	-0.2	na
TH-4	CTL	06/15/15	na	35	23	19	19/12	2,000	na	-0.5	3.27
TH-4	CTL	06/15/15	na	35	23	24	21/12	2,000	9,000	3.1	3.94
TH-4	CTL	06/15/15	na	35	23	29	50/11	2,000	13,000	4.3	4.21
TH-4	CTL	06/15/15	na	35	23	34	50/6	na	na	na	na
TH-5	CTL	06/15/15	na	35	3	4	50/9	500	16,000	9	4.36
TH-5	CTL	06/15/15	na	35	3	9	50/8	1,000	12,000	9.2	4.37
TH-5	CTL	06/15/15	na	35	3	14	50/6	1,500	12,000	3.4	4.26
TH-5	CTL	06/15/15	na	35	3	19	50/5	2,000	7,000	1.6	4.47
TH-6	CTL	09/29/15	na	31.5	13	2.5	29/12	500	na	0.8	4.09
TH-6	CTL	09/29/15	na	31.5	13	5.5	20/12	500	na	0.7	3.87
TH-6	CTL	09/29/15	na	31.5	13	8.5	32/12	na	na	na	na
TH-6	CTL	09/29/15	na	31.5	13	11.5	50/12	1,000	na	-4.3	4.42
TH-6	CTL	09/29/15	na	31.5	13	14.5	50/12	1,500	na	5.5	4.63
TH-6	CTL	09/29/15	na	31.5	13	17.5	36/12	1,500	na	4	4.63
TH-6	CTL	09/29/15	na	31.5	13	20.5	52/12	2,000	na	4.8	4.89
TH-6	CTL	09/29/15	na	31.5	13	25.5	50/6	2,000	na	8.9	4.75
TH-6	CTL	09/29/15	na	31.5	13	30.5	50/6	na	na	na	na
TH-7	CTL	09/29/15	na	25.5	5	2.5	20/12	500	na	0.5	3.91
TH-7	CTL	09/29/15	na	25.5	5	5.5	50/12	500	na	3.7	4.41
TH-7	CTL	09/29/15	na	25.5	5	8.5	44/12	1,000	na	2.9	4.53
TH-7	CTL	09/29/15	na	25.5	5	11.5	50/12	1,000	na	3.3	4.72
TH-7	CTL	09/29/15	na	25.5	5	14.5	50/11	1,500	na	1.2	4.47
TH-7	CTL	09/29/15	na	25.5	5	19.5	50/7	2,000	na	1.6	4.60
TH-7	CTL	09/29/15	na	25.5	5	24.5	50/5	500	na	11.3	4.85
TH-8	CTL	09/29/15	na	35	23	3	2/12	na	na	na	na
TH-8	CTL	09/29/15	na	35	23	6	20/12	1,500	na	-1.1	na
TH-8	CTL	09/29/15	na	35	23	9	15/12	1,500	na	-0.8	na
TH-8	CTL	09/29/15	na	35	23	12	16/12	1,500	na	-1.4	na
TH-8	CTL	09/29/15	na	35	23	15	14/12	1,500	na	-0.1	na
TH-8	CTL	09/29/15	na	35	23	18	11/12	1,500	na	1	3.16
TH-8	CTL	09/29/15	na	35	23	21	12/12	2,000	na	0	na
TH-8	CTL	09/29/15	na	35	23	24	21/12	2,000	na	3.1	3.99
TH-8	CTL	09/29/15	na	35	23	29	50/10	2,000	na	7.3	4.59
TH-8	CTL	09/29/15	na	35	23	34	50/5	na	na	na	na
TH-9	CTL	09/29/15	na	35	27.5	3	6/12	na	na	na	na
TH-9	CTL	09/29/15	na	35	27.5	6	32/12	na	na	na	na
TH-9	CTL	09/29/15	na	35	27.5	9	18/12	1,500	na	-1.1	na
TH-9	CTL	09/29/15	na	35	27.5	12	17/12	1,500	na	-0.5	na
TH-9	CTL	09/29/15	na	35	27.5	15	42/12	1,500	na	-0.7	na
TH-9	CTL	09/29/15	na	35	27.5	18	26/12	1,500	na	-0.3	3.57
TH-9	CTL	09/29/15	na	35	27.5	21	14/12	2,000	na	-0.6	2.84
TH-9	CTL	09/29/15	na	35	27.5	24	16/12	2,000	na	-0.2	na

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Soluble Sulfate Content (%)	Moisture Content (%)	Saturation (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200 Sieve/ Fines (%)	Material Type
TH-4	CTL	06/15/15	na	11.3	62.14	113	na	na	na	na	5
TH-4	CTL	06/15/15	na	10.4	83.29	126	na	na	na	na	7
TH-4	CTL	06/15/15	na	18.7	100.12	112	na	na	na	na	10
TH-4	CTL	06/15/15	na	13.4	92.20	121	na	na	na	na	13
TH-4	CTL	06/15/15	na	na	na	na	na	na	na	na	13
TH-5	CTL	06/15/15	na	10.8	78.86	123	na	na	na	na	13
TH-5	CTL	06/15/15	na	11.2	65.03	115	na	na	na	na	13
TH-5	CTL	06/15/15	na	11.0	82.80	124	na	na	na	na	13
TH-5	CTL	06/15/15	na	10.0	73.02	123	na	na	na	na	13
TH-6	CTL	09/29/15	na	7.7	56.23	123	na	na	na	na	2
TH-6	CTL	09/29/15	na	11.6	69.23	116	na	na	na	na	2
TH-6	CTL	09/29/15	na	5.6	32.51	115	na	na	na	37	5
TH-6	CTL	09/29/15	na	4.4	20.15	106	na	na	na	na	4
TH-6	CTL	09/29/15	na	11.1	83.55	124	na	na	na	na	13
TH-6	CTL	09/29/15	na	11.3	75.52	120	na	na	na	na	13
TH-6	CTL	09/29/15	na	9.8	81.01	127	na	na	na	na	13
TH-6	CTL	09/29/15	na	10.9	84.61	125	na	na	na	na	13
TH-6	CTL	09/29/15	na	na	na	na	na	na	na	na	13
TH-7	CTL	09/29/15	na	11.5	74.68	119	na	na	na	na	2
TH-7	CTL	09/29/15	na	10.7	83.06	125	na	na	na	na	13
TH-7	CTL	09/29/15	na	10.1	65.58	119	na	na	na	na	13
TH-7	CTL	09/29/15	na	8.9	64.99	123	na	na	na	na	13
TH-7	CTL	09/29/15	na	10.1	71.58	122	na	na	na	98	13
TH-7	CTL	09/29/15	na	9.6	79.36	127	na	na	na	na	13
TH-7	CTL	09/29/15	na	9.5	61.69	119	na	na	na	na	13
TH-8	CTL	09/29/15	na	10.4	34.60	93	na	na	na	31	2
TH-8	CTL	09/29/15	na	9.9	50.28	110	na	na	na	na	2
TH-8	CTL	09/29/15	na	10.0	44.66	105	na	na	na	47	4
TH-8	CTL	09/29/15	na	11.3	55.91	109	na	na	na	62	4
TH-8	CTL	09/29/15	na	15.1	76.69	110	na	na	na	na	4
TH-8	CTL	09/29/15	na	15.1	92.66	117	na	na	na	na	4
TH-8	CTL	09/29/15	na	11.6	79.82	121	na	na	na	na	4
TH-8	CTL	09/29/15	na	18.4	98.52	112	na	na	na	na	10
TH-8	CTL	09/29/15	na	12.5	74.60	116	na	na	na	na	13
TH-8	CTL	09/29/15	na	na	na	na	na	na	na	na	13
TH-9	CTL	09/29/15	na	9.2	58.06	118	na	na	na	29	2
TH-9	CTL	09/29/15	na	na	na	na	na	na	na	50	2
TH-9	CTL	09/29/15	na	13.4	61.38	106	na	na	na	na	3
TH-9	CTL	09/29/15	na	11.4	66.19	115	na	na	na	39	4
TH-9	CTL	09/29/15	na	5.9	21.10	96	na	na	na	48	4
TH-9	CTL	09/29/15	na	9.2	53.41	115	na	na	na	na	4
TH-9	CTL	09/29/15	na	13.0	64.32	109	na	na	na	na	4
TH-9	CTL	09/29/15	na	17.6	82.70	107	na	na	na	na	4

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Approximate Surface Elevation (ft)	Boring Depth (ft)	Depth to Bedrock (ft)	Sample Depth (ft)	Blow Count	Applied Stress at Inundation (psf)	Swell Pressure (psf)	Swell (%)	Soil Suction (pF)
TH-9	CTL	09/29/15	na	35	27.5	29	50/9	2,000	na	9.4	4.53
TH-9	CTL	09/29/15	na	35	27.5	34	50/6	2,000	na	3.8	4.70
6	Terracon	09/30/97	6751.6	24.5	7	0.5	11	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	3	na	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	4	17	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	7	na	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	8	35	na	807	na	na
6	Terracon	09/30/97	6751.6	24.5	7	14	58	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	19	50/0.6	na	na	na	na
6	Terracon	09/30/97	6751.6	24.5	7	24	65/0.5	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	4	12	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	8	na	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	9	44	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	14	37	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	19	70/0.5	na	na	na	na
7	Terracon	09/30/97	6752.6	24.3	14.4	24	100/0.5	na	na	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	4	18	na	na	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	8	na	na	na	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	9	31	na	52	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	14	31	na	na	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	19	50/0.5	na	na	na	na
8	Terracon	09/30/97	6752.7	24.5	4.5	24	50/0.5	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	0.5	33	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	3	na	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	4	43	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	8	34	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	14	34	na	na	na	na
9	Terracon	09/30/97	6746.2	19.7	2.5	19	50/0.8	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	0.5	47	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	3	na	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	4	80	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	8	35	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	14	51	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	19	50/0.6	na	na	na	na
10	Terracon	09/30/97	6742.3	24.5	7	24	50/0.5	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	0.5	17	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	3	na	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	4	31	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	7	na	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	8	44	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	14	30	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	19	30	na	na	na	na
11	Terracon	09/30/97	6742.3	24.8	15	24	50/0.8	na	na	na	na

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Soluble Sulfate Content (%)	Moisture Content (%)	Saturation (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200 Sieve/ Fines (%)	Material Type
TH-9	CTL	09/29/15	na	11.7	78.19	120	na	na	na	na	13
TH-9	CTL	09/29/15	na	11.3	53.10	107	na	na	na	na	13
6	Terracon	09/30/97	na	9	na	na	na	na	na	na	6
6	Terracon	09/30/97	na	2	na	na	na	na	na	na	6
6	Terracon	09/30/97	na	5	na	na	na	na	na	na	6
6	Terracon	09/30/97	na	na	na	na	na	na	na	na	8
6	Terracon	09/30/97	na	9	43.39	108	na	na	na	na	8
6	Terracon	09/30/97	na	9	na	na	na	na	na	na	11
6	Terracon	09/30/97	na	9	na	na	na	na	na	na	11
6	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
7	Terracon	09/30/97	na	3	na	na	na	na	na	na	5
7	Terracon	09/30/97	na	2	na	na	na	na	na	na	5
7	Terracon	09/30/97	na	3	na	na	na	na	na	na	5
7	Terracon	09/30/97	na	6	na	na	na	na	na	na	5
7	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
7	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	13	na	na	na	na	na	na	5
8	Terracon	09/30/97	na	8	45.20	114	na	na	na	na	11
8	Terracon	09/30/97	0.0065	8	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	9	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	8	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	8	na	na	na	na	na	na	11
8	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
9	Terracon	09/30/97	na	8	na	na	na	na	na	na	5
9	Terracon	09/30/97	na	5	32.47	119	na	na	na	na	11
9	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
9	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
9	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
9	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
10	Terracon	09/30/97	na	6	na	na	na	na	na	na	6
10	Terracon	09/30/97	na	1	na	na	na	na	na	na	6
10	Terracon	09/30/97	na	3	na	na	na	na	na	na	6
10	Terracon	09/30/97	na	8	na	na	na	na	na	na	8
10	Terracon	09/30/97	na	6	na	na	na	na	na	na	11
10	Terracon	09/30/97	na	8	na	na	na	na	na	na	11
10	Terracon	09/30/97	na	7	na	na	na	na	na	na	11
11	Terracon	09/30/97	na	9	na	na	na	na	na	na	6
11	Terracon	09/30/97	na	5	na	na	na	na	na	na	6
11	Terracon	09/30/97	na	6	na	na	na	na	na	na	6
11	Terracon	09/30/97	na	3	na	108	na	na	na	na	6
11	Terracon	09/30/97	na	4	na	na	na	na	na	na	6
11	Terracon	09/30/97	na	10	na	na	na	na	na	na	8
11	Terracon	09/30/97	na	9	na	na	na	na	na	na	11
11	Terracon	09/30/97	na	7	na	na	na	na	na	na	11

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Approximate Surface Elevation (ft)	Boring Depth (ft)	Depth to Bedrock (ft)	Sample Depth (ft)	Blow Count	Applied Stress at Inundation (psf)	Swell Pressure (psf)	Swell (%)	Soil Suction (pF)
12	Terracon	09/30/97	6737.9	24.5	4	0.5	23	na	na	na	na
12	Terracon	09/30/97	6737.9	24.5	4	3	na	na	na	na	na
12	Terracon	09/30/97	6737.9	24.5	4	4	75/0.8	na	na	na	na
12	Terracon	09/30/97	6737.9	24.5	4	8	39	na	na	na	na
12	Terracon	09/30/97	6737.9	24.5	4	14	32	na	1706	na	na
12	Terracon	09/30/97	6737.9	24.5	4	19	65	na	na	na	na
12	Terracon	09/30/97	6737.9	24.5	4	24	50/0.5	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	0.5	17	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	3	na	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	4	18	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	7	na	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	8	18	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	14	60	na	na	na	na
13	Terracon	09/30/97	6741.1	20	12	19	48	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	0.5	23	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	3	na	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	4	25	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	7	na	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	8	40	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	14	50	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	19	50/0.8	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	24	50/0.5	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	19	50/0.8	na	na	na	na
14	Terracon	09/30/97	6745.5	24.5	9.5	24	50/0.5	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	0.5	23	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	3	na	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	4	28	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	8	41	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	14	46	na	na	na	na
15	Terracon	09/30/97	6740.5	20	15	19	70	na	na	na	na

Table G-1: Summary of Geotechnical Information – Wyoming State Penitentiary
South Facility and CPF and K Unit/Support Buildings

Boring	Engineer	Date Drilled	Soluble Sulfate Content (%)	Moisture Content (%)	Saturation (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Passing No. 200 Sieve/ Fines (%)	Material Type
12	Terracon	09/30/97	na	7	na	na	na	na	na	na	6
12	Terracon	09/30/97	na	4	na	na	na	na	na	na	6
12	Terracon	09/30/97	na	4	na	na	na	na	na	na	14
12	Terracon	09/30/97	na	3	na	na	na	na	na	na	14
12	Terracon	09/30/97	na	4	23.22	115	na	na	na	na	11
12	Terracon	09/30/97	na	6	na	na	na	na	na	na	11
12	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
13	Terracon	09/30/97	na	15	na	na	na	na	na	na	5
13	Terracon	09/30/97	na	4	15.39	99	na	na	na	na	5
13	Terracon	09/30/97	0.004	na	na	na	na	na	na	na	5
13	Terracon	09/30/97	na	5	29.03	115	na	na	na	na	5
13	Terracon	09/30/97	na	5	na	na	na	na	na	na	5
13	Terracon	09/30/97	na	5	na	na	na	na	na	na	14
13	Terracon	09/30/97	na	6	na	na	na	na	na	na	11
14	Terracon	09/30/97	na	16	na	na	na	na	na	na	4
14	Terracon	09/30/97	na	6	na	na	na	na	na	na	4
14	Terracon	09/30/97	na	8	na	na	na	na	na	na	4
14	Terracon	09/30/97	na	3	na	na	na	na	na	na	4
14	Terracon	09/30/97	na	3	na	na	na	na	na	na	4
14	Terracon	09/30/97	na	6	na	na	na	na	na	na	11
14	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
14	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
14	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
14	Terracon	09/30/97	na	5	na	na	na	na	na	na	11
15	Terracon	09/30/97	na	9	na	na	na	na	na	na	5
15	Terracon	09/30/97	na	3	20.05	120	na	na	na	na	5
15	Terracon	09/30/97	na	3	na	na	na	na	na	na	5
15	Terracon	09/30/97	na	13	na	na	na	na	na	na	6
15	Terracon	09/30/97	na	4	na	na	na	na	na	na	6
15	Terracon	09/30/97	na	4	na	na	na	na	na	na	11

TABLE G-2
CHECK OF CTL ESTIMATES OF REMAINING HEAVE/SETTLEMENT
CTL/THOMPSON JUNE & SEPTEMBER 2015 SITE CHARACTERIZATION
SOUTH FACILITY

TH-1				
Material	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Swell +, Compression - (%)	Heave in Layer (in)
Fill/Clay	0.0	7.5	-0.1	-0.1
Sand, Silty	7.5	11.5	-0.2	-0.1
Clay, Sandy	11.5	15.0	-0.1	0.0
Sand, Clayey	15.0	19.0	-0.1	0.0
Clay, Sandy	19.0	20.0	-0.2	0.0
		Total Estimated Heave		-0.3

TH-2				
Fill/Clay	0.0	7.5	-0.1	-0.1
Sand, Silty	7.5	10.0	-0.2	-0.1
Sand, Clayey	10.0	13.0	-0.1	0.0
Sand, Silty	13.0	15.5	-0.2	-0.1
Clay, Sandy	15.5	19.0	0.2	0.0
Sand, Silty	19.0	19.5	-0.2	0.0
Wea. Claystone	19.5	20.0	1.7	0.1
		Total Estimated Heave		-0.1

TH-5				
Sand, Clayey	0.0	3.0	-0.7	-0.3
Claystone	3.0	7.0	9.0	3.0
Claystone	7.0	12.0	9.2	3.9
Claystone	12.0	17.0	3.4	1.4
Claystone	17.0	20.0	1.6	0.4
		Total Estimated Heave		8.5

TH-6				
Material	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Swell +, Compression - (%)	Heave in Layer (in)
Fill/Clay	0.0	6.5	0.8	0.4
Sand, Silty	6.5	10.0	-0.2	-0.1
Sand, Clayey	10.0	13.0	-4.3	-1.5
Claystone	13.0	16.5	5.5	1.6
Claystone	16.5	20.0	4.0	1.2
		Total Estimated Heave		1.6

TH-7				
Fill/Clay	0.0	5.0	0.5	0.2
Claystone	5.0	8.5	3.7	1.1
Claystone	8.5	10.5	2.9	0.5
Claystone	10.5	13.5	3.3	0.8
Claystone	13.5	17.5	1.2	0.4
Claystone	17.5	20.0	1.6	0.3
		Total Estimated Heave		3.4

Notes:

1. Swell/compression value taken from test of sample within that layer used where available, average value used where values are close.
2. Average of swell/compression values for similar material used where no test available with that layer.
3. Value taken from silty Sand from TH-4, only test available for this material.
4. Depth of wetting assumed to be 20 feet.
5. Heave calculated using correction factor of 0.7 (Thompson, 1997).

TABLE G-3
CHECK OF CTL ESTIMATES OF REMAINING HEAVE/SETTLEMENT
CTL/THOMPSON JUNE & SEPTEMBER 2015 SITE CHARACTERIZATION
CPF AND K UNIT

TH-3				
Material	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Swell +, Compression - (%)	Heave in Layer (in)
Fill/Clay	0.0	7.5	0.0	0.0
Clay, Sandy	7.5	12.0	0.3	0.1
Sand, Clayey	12.0	13.5	-1.6	-0.3
Clay, Sandy	13.5	15.5	0.9	0.2
Sandstone	15.5	17.5	-0.1	0.0
Sandstone	17.5	20.0	0.6	0.1
		Total Estimated Heave		0.1

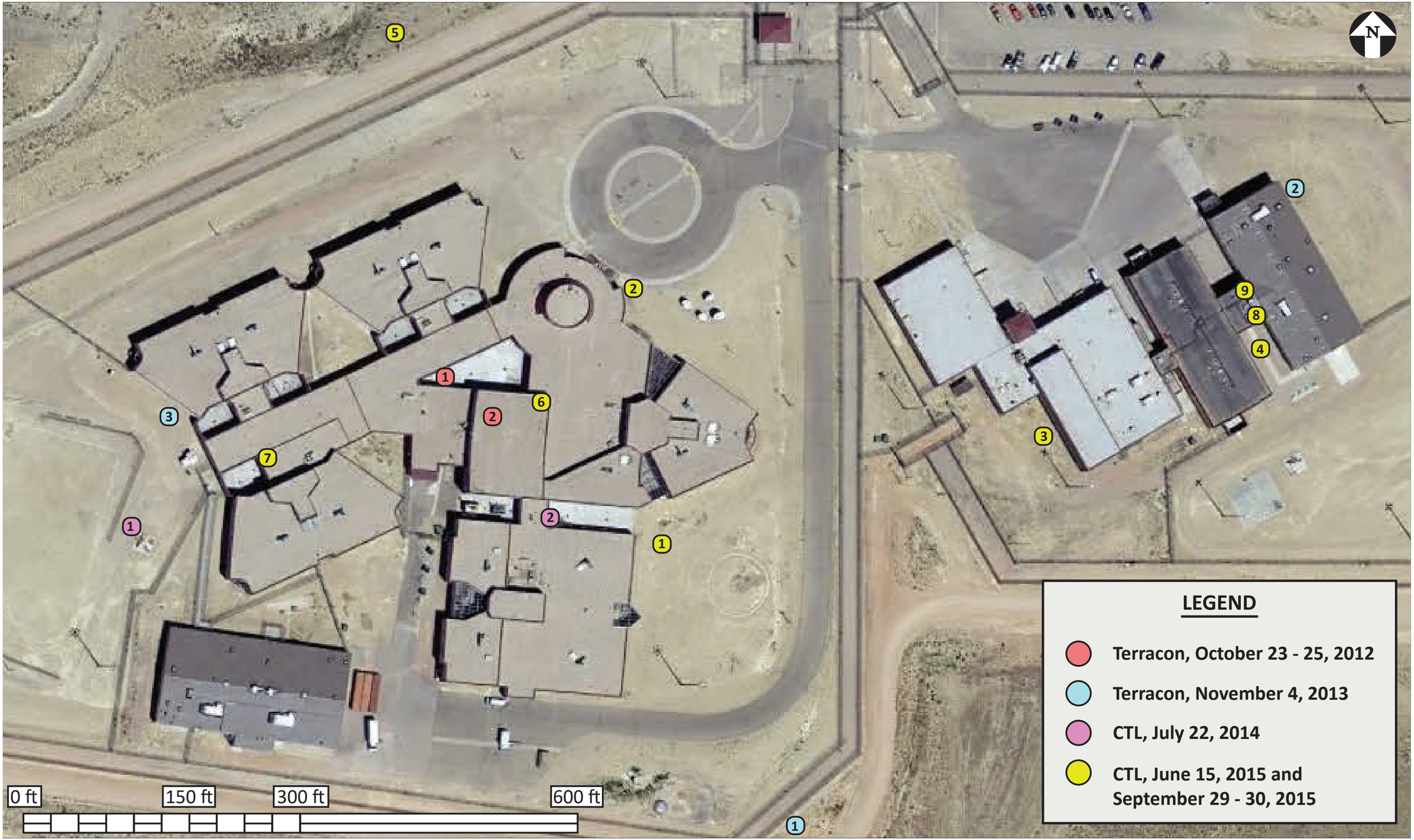
TH-4				
Fill/Clay	0.0	7.0	-0.1	-0.1
Sand, Clayey	7.0	10.5	-0.9	-0.4
Sand, Silty	10.5	16.0	-0.2	-0.1
Inter. Sand/Clay	16.0	20.0	-0.5	-0.2
		Total Estimated Heave		-0.8

TH-8				
Material	Depth to Top of Layer (ft)	Depth to Bottom of Layer (ft)	Swell +, Compression - (%)	Heave in Layer (in)
Fill/Clay	0.0	8.0	0.0	0.0
Sand, Clayey	8.0	11.0	-0.8	-0.3
Sand, Clayey	11.0	14.0	-1.4	-0.5
Sand, Clayey	14.0	17.0	-0.1	0.0
Sand, Clayey	17.0	20.0	1.0	0.3
		Total Estimated Heave		-0.6

TH-9				
Fill/Clay	0.0	8.0	0.0	0.0
Clay, Sandy	8.0	11.0	-1.1	-0.4
Sand, Clayey	11.0	14.0	-0.5	-0.2
Sand, Clayey	14.0	17.0	-0.7	-0.3
Sand, Clayey	17.0	20.0	-0.3	-0.1
		Total Estimated Heave		-0.9

Notes:

1. Swell/compression value taken from test of sample within that layer used where available, average value used where values are close.
2. Average of swell/compression values for similar material used where no test available with that layer.
3. Depth of wetting assumed to be 20 feet.
4. Heave calculated using correction factor of 0.7 (Thompson, 1997).
5. Sandstone compression test result for TH-3 at 16 feet depth was not used, sample appears to be disturbed.
6. Swell/Compression value for TH-8 at 0 to 8 feet depth taken as average of all fill test results. Test result for TH-8 at 6 feet depth appears to be anomalous.



WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS
Wiss, Janney, Elstner Associates, Inc.

Exhibit: Post Construction Investigation Boreholes *Project: Wyoming State Penitentiary* *Location: Rawlins, Wyoming*	*BY: ELB*	*DATE: 07-10-17*
	PROJ. #: 2017.3123.0	*EXHIBIT G-1*

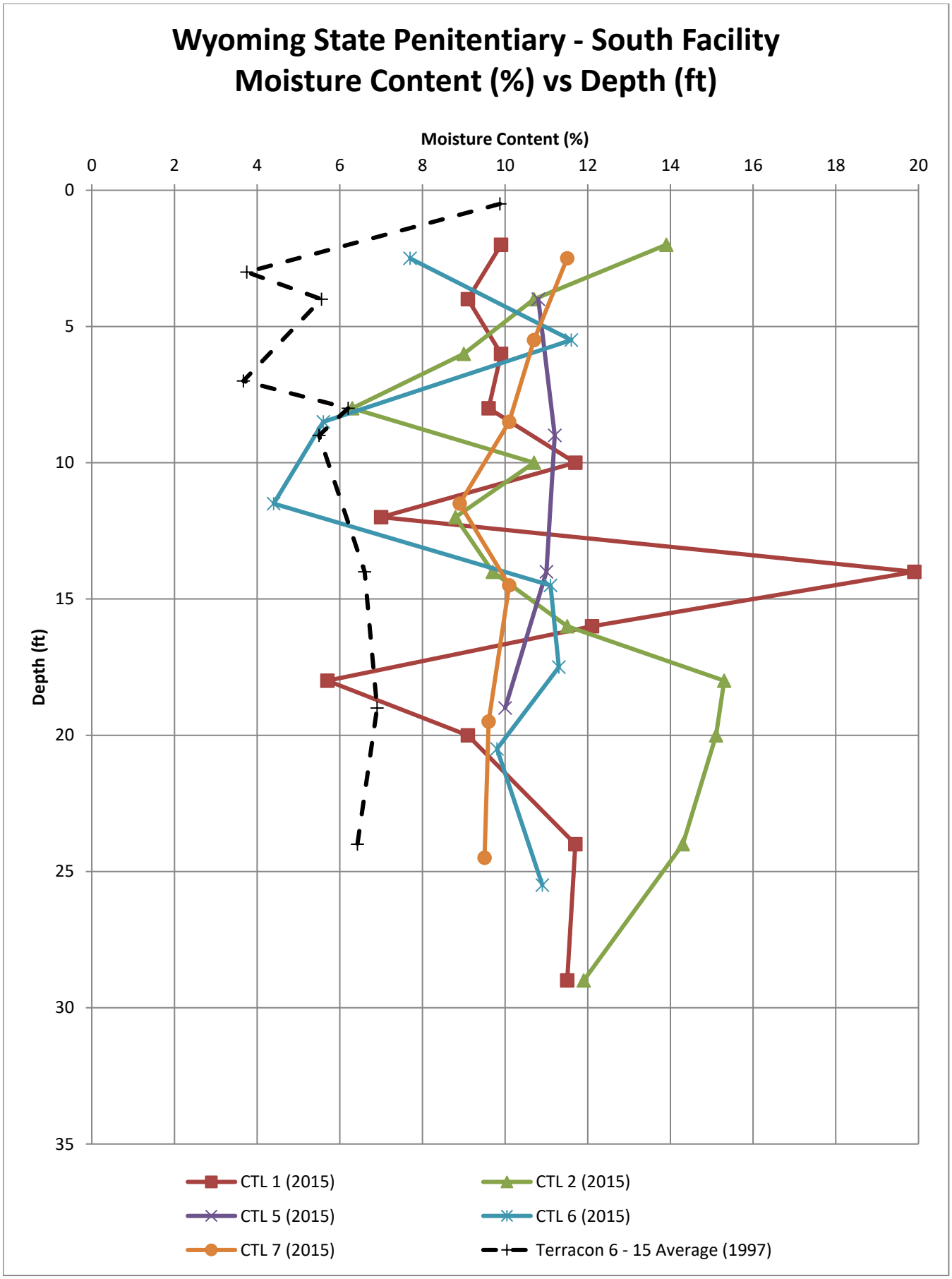

Wyoming State Penitentiary - South Facility
Moisture Content (%) vs Depth (ft)
Moisture Content (%)
0
2
4
6
8
10
12
14
16
18
20
Depth (ft)
0
5
10
15
20
25
30
35
CTL 1 (2015)
CTL 2 (2015)
CTL 5 (2015)
CTL 6 (2015)
CTL 7 (2015)
Terracon 6 - 15 Average (1997)

EXHIBIT G-2

Wyoming State Penitentiary - CPF and K Units
Moisture Content (%) vs Depth (ft)

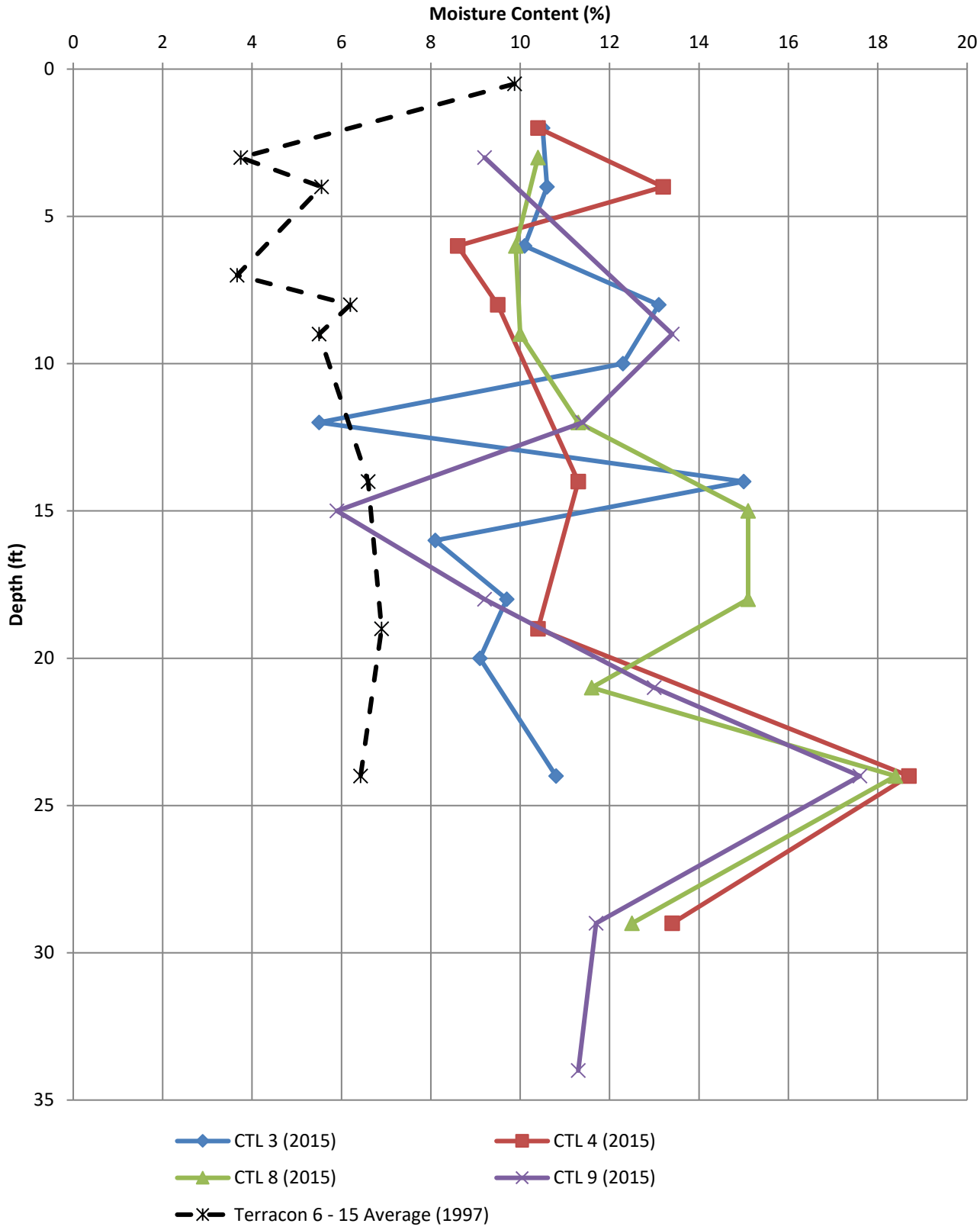


EXHIBIT G-3

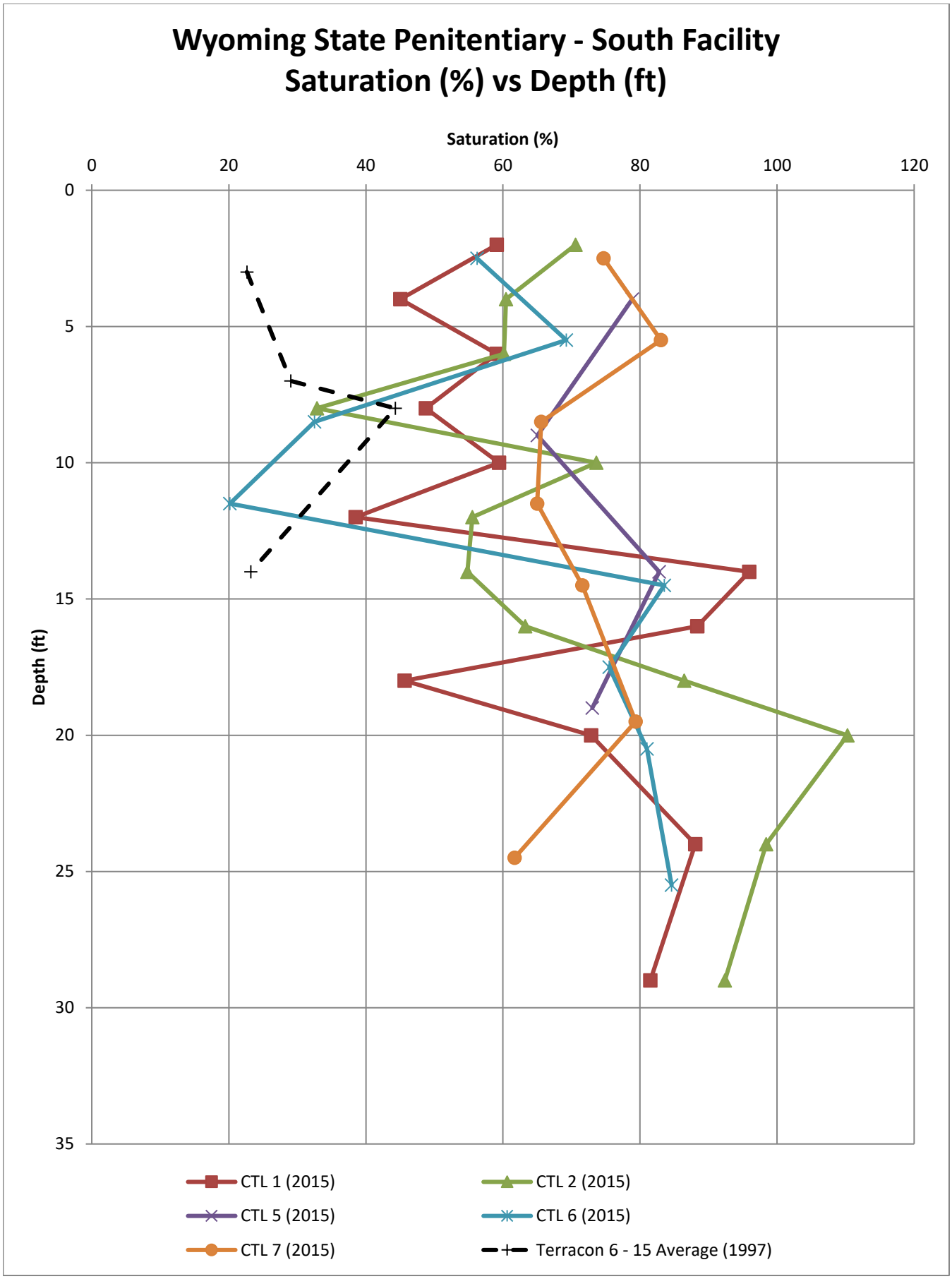

Wyoming State Penitentiary - South Facility
Saturation (%) vs Depth (ft)
Saturation (%)
0
20
40
60
80
100
120
Depth (ft)
0
5
10
15
20
25
30
35
CTL 1 (2015)
CTL 2 (2015)
CTL 5 (2015)
CTL 6 (2015)
CTL 7 (2015)
Terracon 6 - 15 Average (1997)

EXHIBIT G-4

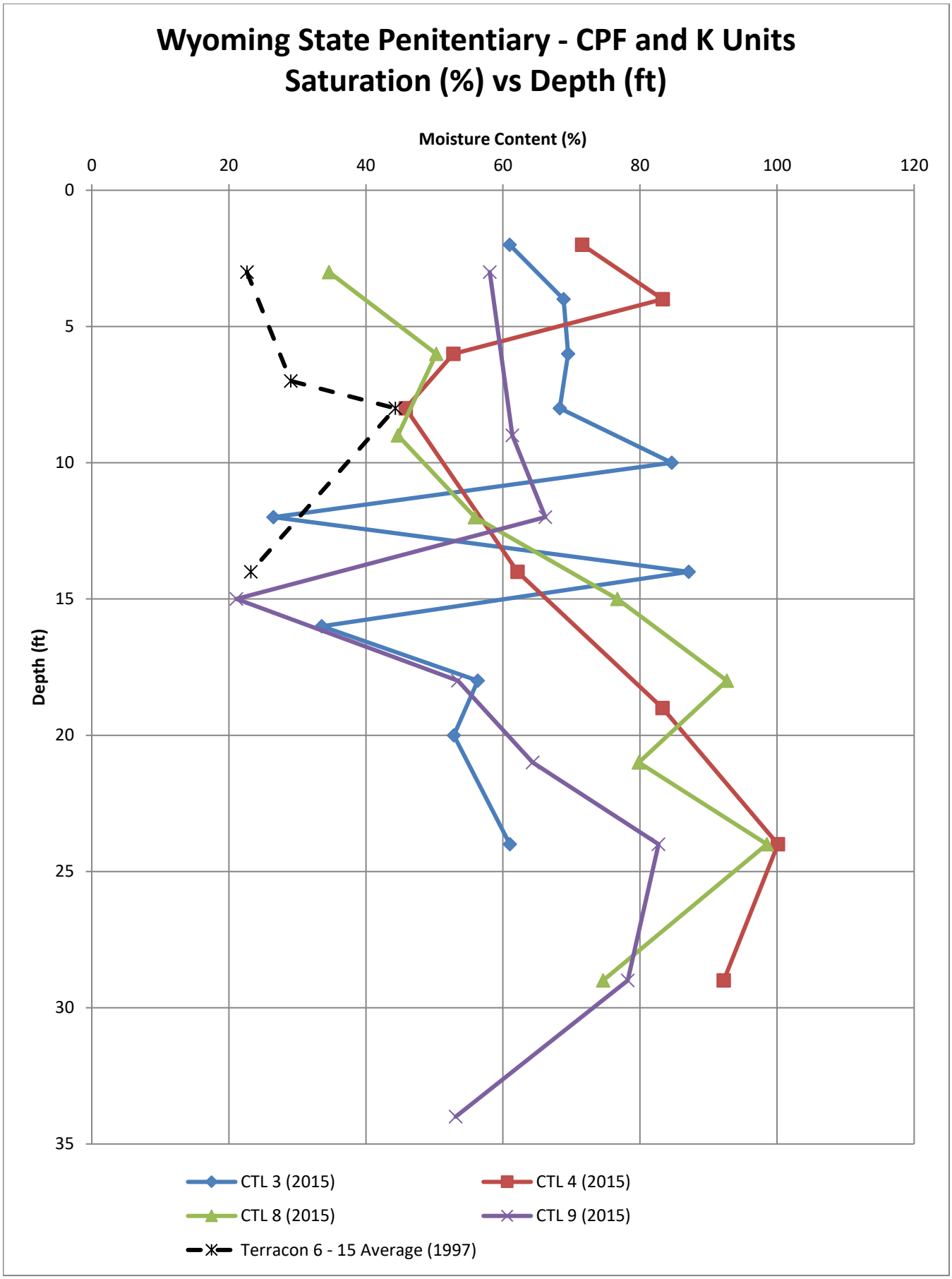

Wyoming State Penitentiary - CPF and K Units
Saturation (%) vs Depth (ft)
Moisture Content (%)
0
20
40
60
80
100
120
Depth (ft)
0
5
10
15
20
25
30
35
CTL 3 (2015)
CTL 4 (2015)
CTL 8 (2015)
CTL 9 (2015)
Terracon 6 - 15 Average (1997)

EXHIBIT G-5

APPENDIX H - PIEZOMETER (MONITORING WELL) LOCATIONS

WYOMING DEPARTMENT OF CORRECTIONS
WSP SOUTH FACILITY
CONTROL EXHIBIT
RAWLINS, WY.

CONTROL

CONTROL POINT NO.	MONUMENT TYPE	LOCATION	METHOD OF MEASUREMENT	
			HORIZONTAL	VERTICAL
1	#5 REBAR	WEST ENTRY PARKING LOT	GPS STATIC-OPUS SOLUTION	
2	#5 REBAR	WEST OF RCREATION YARD	GPS	DIFFERENTIAL LEVEL
3	PUNCHMARK	SOUTHEAST BOLT OF LIGHT POLE BASE, NORTH SIDE OF REC YARD, INSIDE FACITLITY	GPS	DIFFERENTIAL LEVEL
14	SCRIBED "X"	NORTHEAST CORNER, SECURITY CAMERA POLE, CONCRETE BASE, SOUTH SIDE REC YARD	GPS	DIFFERENTIAL LEVEL
5	1" X 3/8" SCREW	FRONT OF CELL BLOCK, ENTRY DOOR OF REC YARD	GPS	DIFFERENTIAL LEVEL
20	SCRIBED "X"	CORRIDOR INTERSECTION, CONCRETE FLOOR	TRIMBLE TOTAL STATION	DIFFERENTIAL LEVEL
21	SCRIBED "X"	IN FLOOR AT GYM DOOR	TRIMBLE TOTAL STATION	DIFFERENTIAL LEVEL
23	SCRIBED "X"	IN FLOOR AT BLOCK "E" DOOR	TRIMBLE TOTAL STATION	DIFFERENTIAL LEVEL
22	MARKER "X"	CENTER OF GYM FLOOR	TRIMBLE TOTAL STATION	DIFFERENTIAL LEVEL

BUILDING MONITOR SURVEY

METHOD OF MEASUREMENT

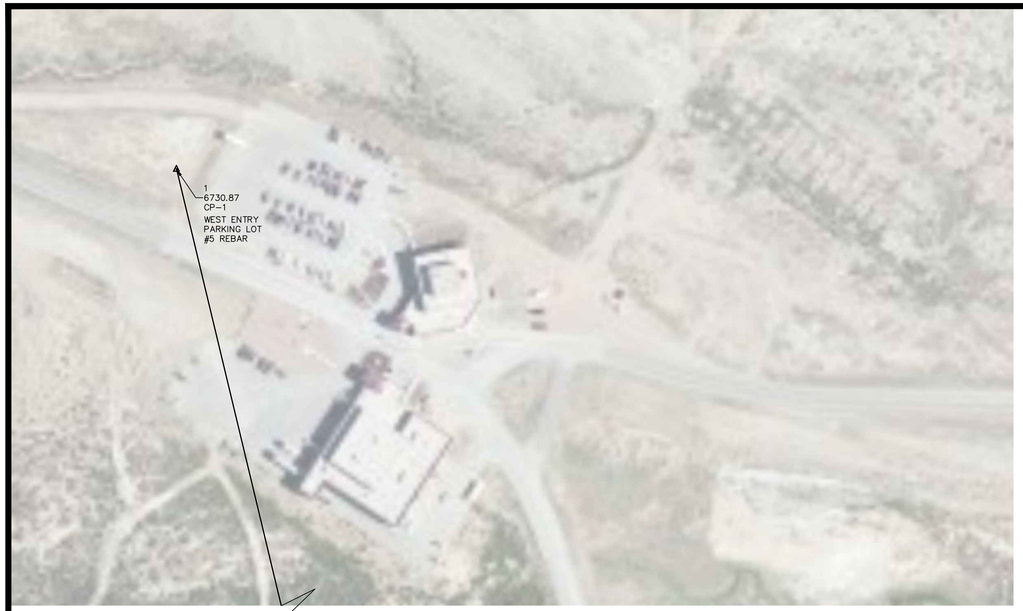
HORIZONTAL	VERTICAL
TRIMBLE TOTAL STATION	TRIMBLE TOTAL STATION
REPEATABLE LOCATIONS	DIFFERENTIAL LEVEL

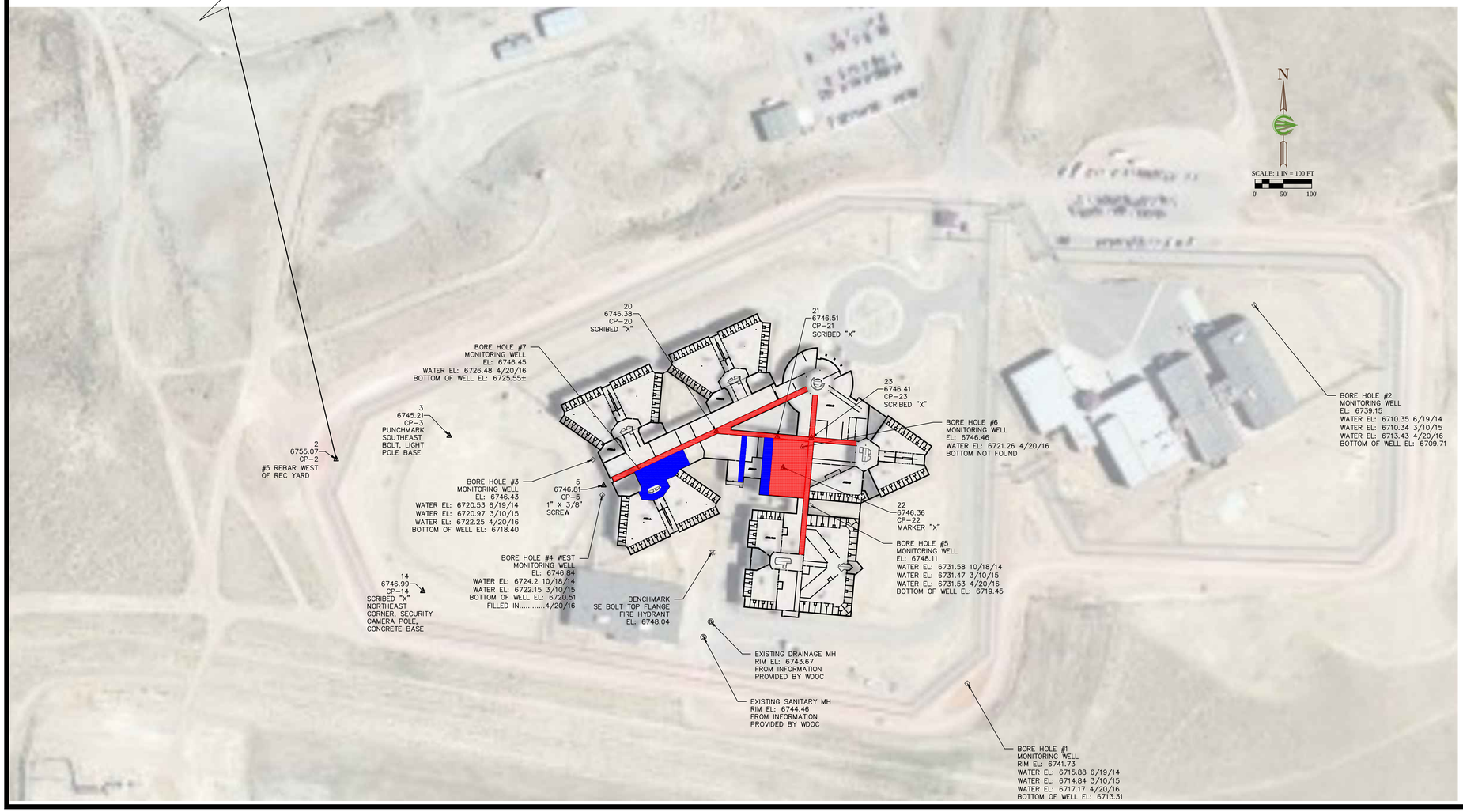
NOTE:
CURRENT CONTROL ELEVATIONS AS SHOWN ARE DERIVED FROM SURVEY PRIOR 3-9-2015

CURRENT ELEVATION DATA WAS GATHERED 3-9-2015 AND HAS YET TO BE PROCESSED.

MONITORING WELL SURVEY

WELL NUMBER	GROUND ELEVATION	WATER EL: 6/19/14	WATER EL: 10/18/14	WATER EL: 3/10/15	WATER EL: 4/20/16	BOTTOM OF WELL EL:
1	6741.73	6715.88	NO MEASUREMENT	6714.84	6717.17	6713.31
2	6739.15	6710.35	NO MEASUREMENT	6710.34	6713.43	6709.71
3	6746.43	6720.53	NO MEASUREMENT	6720.97	6722.25	6718.40
4	6746.84	NO MEASUREMENT	6724.20	6722.15	FILLED IN	6720.51
5	6748.11	NO MEASUREMENT	6731.58	6731.47	6731.53	6719.45
6	6746.46	NO MEASUREMENT	NO MEASUREMENT	NO MEASUREMENT	6721.26	BOTTOM NOT FOUND
7	6746.45	NO MEASUREMENT	NO MEASUREMENT	NO MEASUREMENT	6726.48	6725.55+/-





SURVEY NOTES:

- THE TRIMBLE VX SERIES ROBOTIC TOTAL STATION WAS USED FOR THIS SURVEY.
- A DIFFERENTIAL LEVEL CIRCUIT WAS MEASURED FROM A SANITARY SEWER MANHOLE IN THE GRAVEL SOUTH OF THE CELL BLOCK. A NEW BENCHMARK WAS ESTABLISHED ON TOP OF A BOLT ON THE TOP FLANGE OF A FIRE HYDRANT IN THE VICINITY OF THE SANITARY MANHOLE. OTHER INFORMATION IDENTIFIED TWO ADDITIONAL STORM MANHOLES IN THE PAVED ROADWAY AND A STORM INLET NEAR THE FIRE HYDRANT. THE DIFFERENTIAL ELEVATIONS SHOWED THAT THE INLET HAD BEEN MODIFIED AND THE STATED ELEVATION DID NOT MATCH. THE ELEVATIONS OF THE TWO STORM MANHOLES WAS DETERMINED ACCURATE RELATIVE TO THE SANITARY MANHOLE. THESE THREE MANHOLES IN AGREEMENT WITH PROVIDED ELEVATIONS WERE USED TO DETERMINE THE VERTICAL DATUM. A DIFFERENTIAL LEVEL CIRCUIT WAS THEN RUN FROM THE MANHOLES WEST AND NORTH THROUGH THE RECREATION YARD AND INTO THE CELL BLOCK TO THE ESTABLISHED SCRIBE MARKS ON THE FLOOR. MEASURED ELEVATIONS FOR THE CONTROL SCRIBE MARKS WERE ADJUSTED VERTICALLY TO PROVIDE ELEVATIONS RELATIVE TO THE ESTABLISHED DATUM.
- MARKER TICK MARKS WERE SET ALONG BOTH SIDES OF THE CORRIDOR WALL EVERY 10 FEET AT THE BOTTOM OF THE SECOND GROUT JOINT. (A MARKER TICK MARK BEING SET WAS DECIDED VIA MEETINGS WITH PRISON PERSONNEL AS LIKELY THE MOST DURABLE AND REPEATABLE MEASUREMENT LOCATION). A LOCATION AND ELEVATION OBSERVATION WAS TAKEN AT EACH WALL MARK AS PRESCRIBED BY THE MEETINGS TO DETERMINE WHERE THE MEASUREMENTS WOULD BE TAKEN.
- IN THE GYM, NINE (9) PERMANENT STICKY PAPER TARGETS ARE SET (FOUR ON THE WEST WALL AND FIVE ON THE EAST WALL) AT AN ELEVATED POSITION ON THE GYM WALLS. MEASUREMENTS WERE THEN TAKEN IN REFLECTORLESS MODE AT THESE LOCATIONS TO MONITOR THE MOVEMENT ALONG THE TOP OF THE WALL. A TEN-FEET GRID WAS ESTABLISHED AND PRISM MEASUREMENTS TAKEN AT EACH 10-FOOT INTERVAL.
- THE HOBBY ROOM IS MONITORED USING A DIFFERENTIAL LEVEL CIRCUIT, WITH REPEATABLE LOCATIONS DETERMINED ACCORDING TO FLOOR TILES AND FIXTURES IN THE ROOM.
- THE KITCHEN HALL IS MONITORED BY THE SAME METHOD AS THE HOBBY ROOM USING A DIFFERENTIAL LEVEL CIRCUIT. THE LEVEL IS THEN RUN THRU THE KITCHEN HALL AND POINTS LOCATED BY TAPED MEASUREMENTS ALONG THE WALLS AND AT LOCATIONS IMMEDIATELY ADJACENT TO THE CHAIR RAIL.
- "A" POD IS MONITORED WITH A DIFFERENTIAL LEVEL CIRCUIT USING ESTABLISHED ELEVATIONS ON CORRIDOR CONTROL SCRIBE MARKS. BACK SIGHT WAS TAKEN TO POINT 20 AND HARD POINTS WERE LOCATED IN "A" POD (WALL CORNERS, DOOR OPENINGS, BOLLARDS) THE LEVEL IS THE TRAVERSE THRU "A" POD. THIS IS NOT A CLOSED TRAVERSE LEVEL CIRCUIT; IT ENDED AT FINAL WALL CORNER IN THE BACK OFFICE HALL IN "A" POD.
- MONITORING LOCATIONS WERE DETERMINED DURING A MEETING AT THE PRISON PRIOR TO THE MONITORING EVENT WITH PRISON STAFF BOB LOWER ANBD DOUG JOB.

REVISED			
DATE	REQUEST BY		CHECK

REVISED			
DATE	REQUEST BY		CHECK
2/2015	MONITORING WELL ELEV.		DRC
4/2016	MONITORING WELL ELEV.		

Project: 1892.02
Drawing: CONTROL
Drafted By: CGT
Date: 02/27/15
Rev. Date:
Check By: DRC

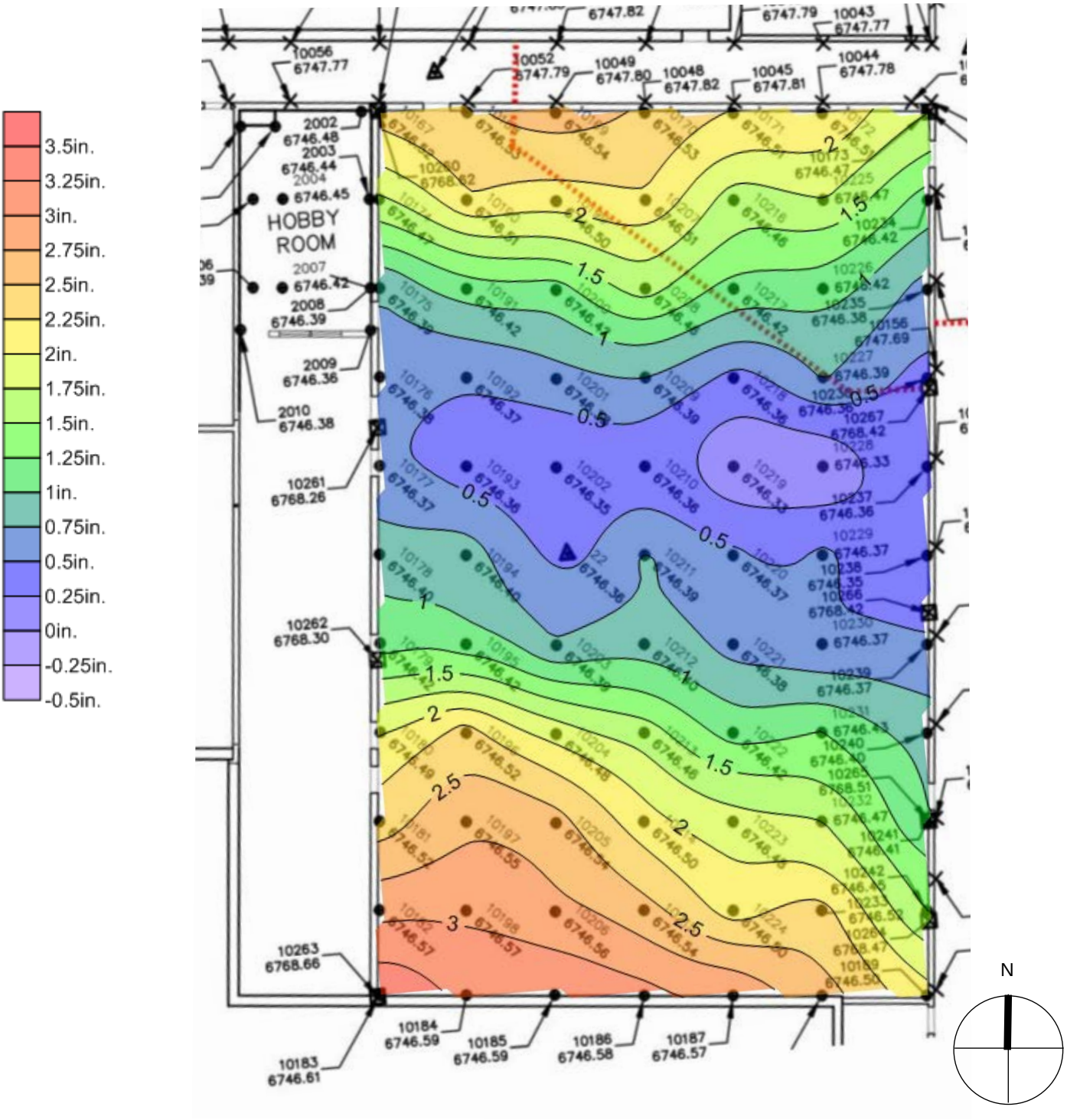
WYOMING DEPARTMENT OF CORRECTIONS
WSP SOUTH FACILITY
CONTROL EXHIBIT
RAWLINS, WY.

COFFEY
ENGINEERING & SURVEYING
902 S. 3rd St., Laramie, WY 82070
(P) 307-742-7455 (F) 307-742-7483

Sheet: 1 / 1

WJE | ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

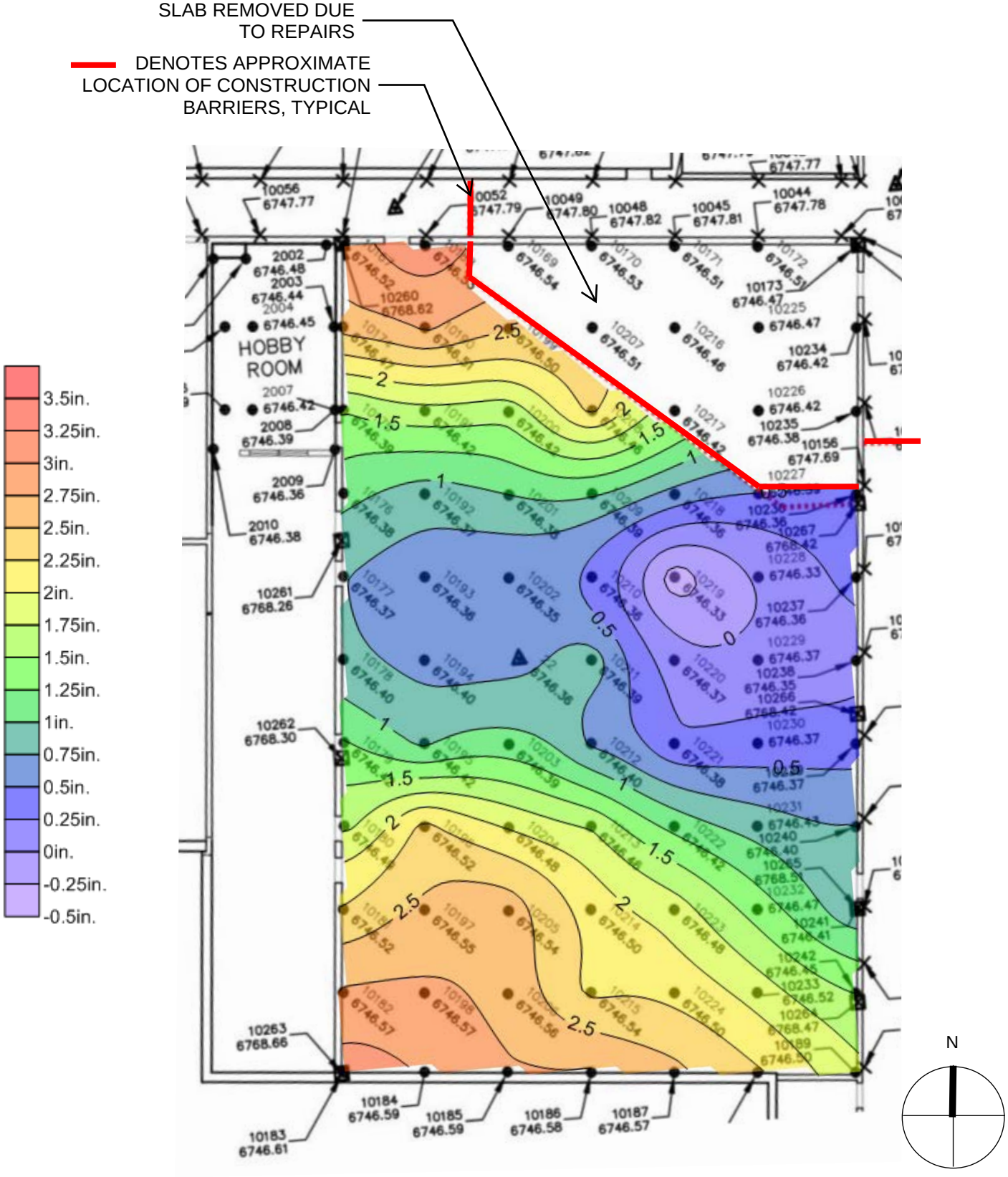
APPENDIX I - WJE INTERIOR ELEVATION SURVEY EXHIBITS



WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax
www.wje.com

Project	WYOMING STATE PENITENTIARY INDEPENDENT PEER REVIEW STUDY
Sheet Title	SOUTH FACILITY GYMNASIUM COFFEY AUGUST 2013 TOPOGRAPGIC RESULTS
Proj. No.	2017.3123
Date	07/13/2017
Drawn	JJV
Checked	
Scale	NTS

EXHIBIT
I-1
Sheet No.



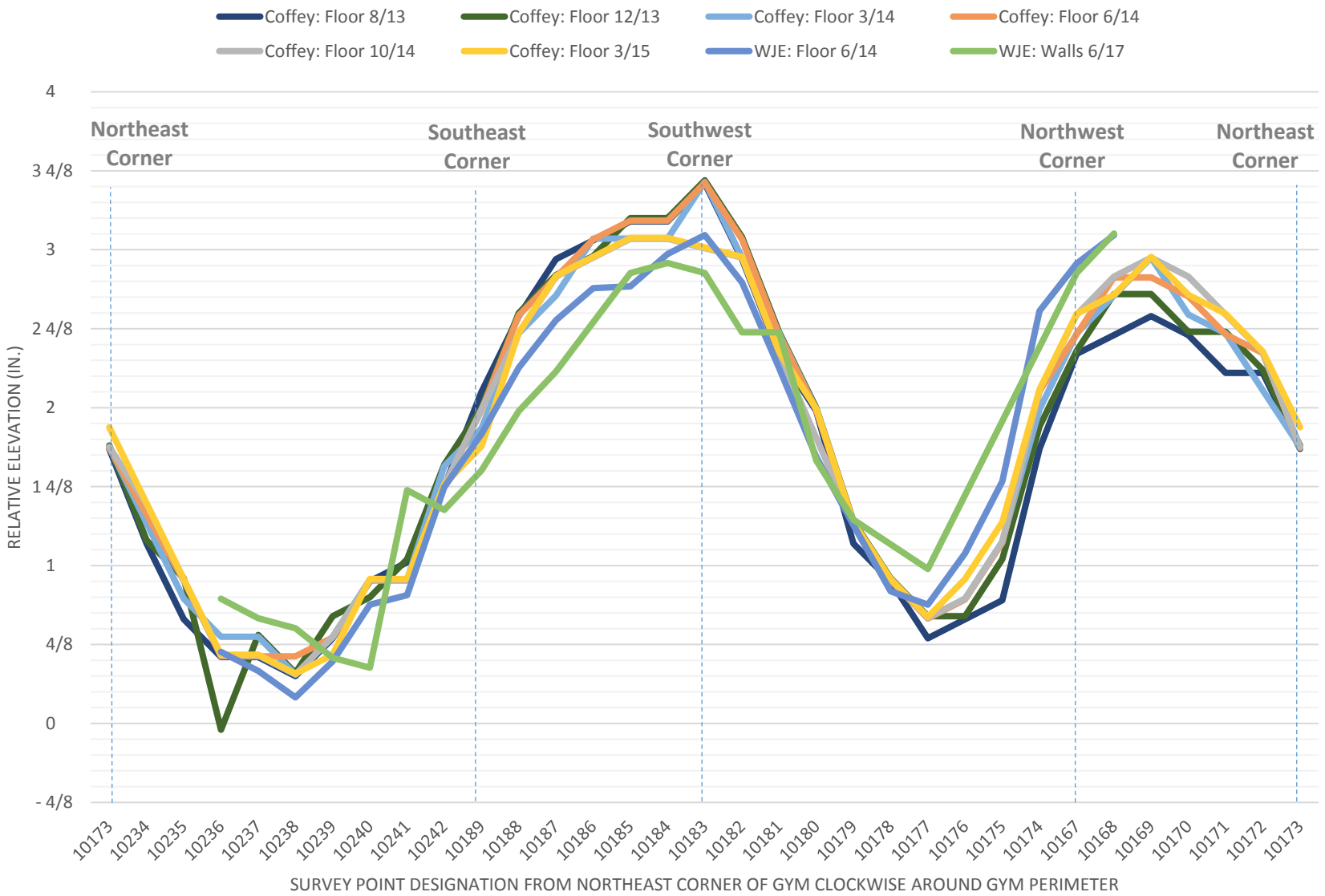
WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax
www.wje.com

Project	WYOMING STATE PENITENTIARY INDEPENDENT PEER REVIEW STUDY
Sheet Title	SOUTH FACILITY GYMNASIUM WJE JUNE 2017 TOPOGRAPHIC RESULTS
Proj. No.	2017.3123
Date	07/13/2017
Drawn	JJV
Checked	
Scale	NTS

EXHIBIT
I-2
Sheet No.

WJE | ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

Exhibit I-3: Comparison of Relative Elevations Around Perimeter of Gymnasium in the South Facility



WJE ENGINEERS ARCHITECTS MATERIALS SCIENTISTS

APPENDIX J - SAGE COST ESTIMATES

Sage Consulting Group
1623 Blake Street, Suite 400
Denver, CO 80202-1337

Telephone: (303)571-0237
Facsimile: (303)893-2849
Mailbox@SageConsulting.com

July 13, 2017 *Email:* jmaly@wje.com

Jerry E. Maly, PE
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Blvd., Suite 400
Lakewood, Colorado 80235

RE: Wyoming State Penitentiary
Sage #: 3587-17

Dear Mr. Maly:

Sage reviewed the project documentation, specifically M/M's September 14, 2016 report including the estimated cost of repairs prepared by JMB Consulting Group and the project plans. Sage also participated in a site inspection conducted on June 23, 2017.

M/M presented four options for repair and JMB estimated the cost of repair for each of those options to address the damage observed at the facility as previously identified. Sage's analysis was limited to review of the JMB estimated cost for Option 1. Option 1 essentially removes all the floor slabs in the South Facility and installs a matrix of micropiles while the CPF and K-Unit's entire slab area is proposed to have compaction grouting performed.

JMB actually prepared three separate estimates for each option, one for the South Facility, one for K-Unit and one for the Central Processing Facility or CPF. These three estimates for Option 1 are summarized as follows:

South Facility	$83,013,256
K-Unit	$ 2,186,884
CPF	$ 2,032,314
Total	$87,232,454

The detailed JMB estimate supporting these amounts has been re-created in the attached spreadsheets, Exhibit 1A, 1B and 1C. Generally the unit costs utilized by JMB are very conservative; in other words, very high. There is no doubt the work could be completed for the proposed amounts.

While there is not a definitive set of construction documents that would allow for preparation of a detailed estimate, review of the JMB estimate indicates some excessive and ultimately unrealistic unit costs were utilized.

For example, JMB uses $285 per linear foot for excavation of grade beams, stockpiling the excavated material for reuse, installing new void forms under the grade beams and then backfilling and compacting the previously excavated material. JMB also indicates that this unit cost includes demolition of the "rat" slabs. This appears to be a reference to the mud slabs, documented by M/M, that were originally installed beneath the grade beams at the South Facility and CPF. About two thirds of this work would be performed within the individual cells and will have to be performed by hand due to the space restraints. The remaining quantity can be performed with equipment.

Using a conservative production amount of 2 cubic yards per day per laborer at $25 per hour yields about $22 per linear foot for excavation. Typically, compacted backfill performed by hand costs somewhat less than excavation. Allowing for soil moisturizing and handling, a conservative unit cost would be about $25 per linear foot of trench or foundation wall. This yields $47 per lineal foot for excavation and backfill. Using $50 per linear foot and doubling the amount to allow for demolition of the mud slabs yields $100 per linear foot. Re-establishing the void should typically require no more than one hour per linear foot or about $25 per linear foot. Allowing two hours yields a total cost of $150 per linear foot versus the $285 per linear foot used by JMB.

JMB uses a unit cost of $49.50 per square foot for installation of a new 10-inch thick concrete slab with number five rebar 14 inches on center each way top and bottom over 6-inch void form. A typical unit cost for a 10-inch concrete slab in place would be about $7.00 per square foot. Adding costs for reinforcing steel, forms, void, concrete pump and vapor barrier results in a total direct cost of about $20 per square foot. Adding 25 percent for inefficiencies of work in a confined environment yields about $25 per square foot, far less than the $49.50 per square foot assumed by JMB.

JMB uses a unit cost of $710 per linear foot to relocate MEP or mechanical, electrical and plumbing in corridors and $178 per linear foot to relocate MEP attached to walls in non-corridor areas. There is no indication as to why there is a significant difference in unit cost for the same work performed in two different areas. Typically, ductwork and plumbing mains are not attached to walls but hung from the ceiling or roof structure, meaning this work would not be necessary. In any event, allowing $85 per hour for a mechanical, electrical or plumbing technician would result in approximately three laborers for 3-1/2 years at the unit cost used by JMB. This is unrealistic. Furthermore, there is no reason for the difference in cost between $710 per linear foot for corridors and $178 per linear foot for non-corridor areas. It is virtually the same work.

JMB uses a unit cost of $4,970 to replace each door, frame and hardware. This is for the hollow metal doors in the non-security areas, in other words, the administrative areas. These doors appear to be standard hollow metal doors and, as such, the cost should be no more than about $2,000 for each door. Allowing for heavy-duty doors, security glass and hardware yields about $3,500 per door in lieu of the nearly $5,000 per door used by JMB.

JMB shows a unit cost of $30.10 per square foot to install a new EPDM roof membrane. This equates to over $3,000 per square. Typical EPDM roof membrane costs are about $250 per square. Including insulation and parapet flashing yields no more than about $1,000 per square or about $10 per square foot.

Although the estimated costs include a total direct cost of $6,865,198 to replace the roof membrane, ballast, and parapet cap flashing for the South Facility Building, this is not work associated with damage caused by movement of the building components. Also included are costs for "Jet roof drain system" and "roof drainage piping and heat trace" for each of the three buildings along with replacement of AHU's and associated testing and balancing in the South Facility. This is not damage related work. These non-damage related amounts are summarized as follows:

South Facility	$820,456
K-Unit	$ 41,141
CPF	$ 37,558
Total	$899,155

These costs are not associated with damage caused by movement of building components.

This is routine maintenance. Removing these direct costs reduces the JMB total estimated repair amount to the following when the other fees and contingency amounts are included:

South Facility	$71,105,484
K-Unit	$ 2,123,142
CPF	$ 1,974,123
Total	$75,202,749

This is a $12,029,705 reduction in the amount related to damage and preventative measures proposed by M/M as a result of soil movement.

JMB also included a direct cost of $2,500,000 for "New-PLC Platforms HMI Control Stations." This appears to be a cost for a new security control system. While replacing the Security Control System may be desirable, it is not necessary as a result of the building movement. Removing this cost further reduces the total amounts necessary for repairs resulting from the building movement. The total repair costs associated with building movement are summarized as follows:

South Facility	$67,691,633
K-Unit	$ 2,123,142
CPF	$ 1,974,123
Total	$71,788,898

JMB calculates the total direct cost and then adds 5 percent for "site logistics." This surcharge appears to be for supervision and coordination and, if so, is a reasonable allowance factor. JMB then added 2.75 percent for a contractor's fee and 7.5 percent for general conditions. These are reasonable amounts for a parametric estimate considering the magnitude of the project. Under competitive bid situations these amounts would typically be discreetly estimated and would be, in all probability, less.

JMB includes a cost to regrade the entire perimeter of the facility along with installation of a concrete slab on grade around the perimeter. While this is necessary work JMB did not include an amount to address the security fencing that must be adjusted to accommodate the revised grading and slopes around the buildings.

In their estimates, JMB applies contingency factors as shown below:

Design + Estimating	15 percent
Escalation	15.9 percent
Construction	2 percent
Markups	13.4 percent

JMB applies the percentage factors for the design, escalation and construction contingency categories to the total cost of the construction prior to general conditions or fee. Typically contingencies are calculated on the total contract amount, which would include the fee and general conditions amounts. JMB also includes a contingency amount identified as markups. This was determined to be a fee on the contingency amounts for design, escalation and construction. This is not a typical contingency factor included in construction estimating, particularly when the contingencies are calculated on the total cost of construction.

JMB uses 15 percent for design and estimating contingency. Typical design fees would be expected to include architectural, structural, mechanical and electrical and should not exceed about 12 percent of the project cost at most. Given the very conservative unit costs utilized throughout the estimate, an additional contingency amount for estimating does not appear warranted. However, if utilized, a 12 percent contingency factor would be appropriate.

JMB shows an escalation factor of 15.9 percent for an assumed construction start in March 2019. Construction costs nationally over the last five years have averaged less than 4.5 percent per year. An escalation factor of 9 percent for the next two years would be appropriate. Review of construction costs in the Rawlins Wyoming area indicate they have risen at a slightly lower rate than nationally.

Utilizing more reasonable escalation factor and the adjusted JMB estimates for each area results in the following amounts:

South Facility	$56,386,931
K-Unit	$ 1,799,642
CPF	$ 1,876,451
Total	$60,063,024

The detail for these amounts is shown in the attached spreadsheets, Exhibits 2A, 2B and 2C. This represents the reasonably expected amount that would be expended to perform the repair work proposed by M/M under Option 1. If the roofing, roof drain work, replacement AHU work and replacement PLC Platform work is not included, the total amount becomes $50,364,359.

The estimate amounts do not include costs that will be incurred by WDOC for housing offenders that are displaced while the work is being performed on the various Pods. According to WDOC's analysis, this amount could be approximately $3,500,000, over a 12-month construction period to over $5 million for an 18-month construction period. Assuming the work will be performed on a pod by pod basis, these durations generally appear reasonable for the work in each pod as proposed by M/M. The amounts for disrupted offenders will need to be considered by WDOC when considering the overall costs incurred to remediate the damage to the facilities.

WJE has developed a scope of work for an alternative repair approach. The estimated cost for the alternative repair approach as proposed by WJE is summarized below.

South Facility	$4,425,723
K-Unit	$1,080,645
CPF	$ 344,651
Total	$5,851,019

The detail for these amounts are shown in the attached spreadsheet, Exhibit 3A, 3B and 3C. The allowance for future maintenance and/or repairs over the next five years for the scope of work determined by WJE is summarized below. These amounts represent one half the costs for the doors/windows and joint sealant and allows 1,000 square feet per year for concrete slab on grade removal and replacement.

Doors/Windows	$ 850,000
Joint Sealant	$ 75,000
Slab on Grade	$ 188,750
Total	$1,113,750

To perform elevation surveys at 6-month intervals an additional amount of $50,000 per survey should be budgeted for a total over 5 years of $500,000. The total amount that should be budgeted over the next 5 years is at least $7,464,769 to perform the scope of work proposed by WJE.

By not removing and replacing the slab on grade which required removal of most of the CMU walls along with attendant finishes significant savings are realized. Approximately $40,000,000 in direct cost savings can be realized over the initially proposed M/M scope of work or approximately $30,000,000 over the adjusted M/M scope of work. Including the various markups and contingencies results in total savings of about $46,000,000 to about $61,500,000 based on the scope of only for the Main South Facility alone. Also significant savings could be realized in the housing of displaced offenders using the WJE proposed scope of work, as such there is little demolition to be performed.

Sincerely,

SAGE CONSULTING GROUP

Donald Harrington
DH/kac

Exhibit 1A
State of Wyoming Penitentiary
JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
South Facility					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Pile Foundations				
00001	5" Dia micro piles, 38' avg length including 25' rock embedment, 11' o.c. avg spacing	1,097	ea	2,900.00	3,181,300
	Grade Beams + UG Plbg/Elec				
00001	GB: Excavate and stockpile for re-use, mini excavator except cells by hand + demo rat slabs and void forms, install new void forms, moisture conditions and compact soils.	15,456	lf	285.00	4,404,960
00001	UG Plbg/Elec: Install new void forms (assume excavation/backfill accomplished via grade beam work)	5,345	lf	16.00	85,520
00001	UG Plbg/Elec: Excavate and stockpile for re-use, mini excavator except cells by hand, install new void forms, moisture conditions and compact soils.	2,858	lf	265.00	757,370
00001	Damproofing touch-up/repairs, 10% of perimeter grade beams	1,706	sf	12.80	21,837
00001	Insulation at perimeter	25,596	sf	2.90	74,228
A1030 Slabs on Grade					
	Structural Slab on Grade				
00001	Abate Mercury Containing Gym Floor	6,200	sf	16.50	102,300
00001	Demolish & remove slab on grade including excavate to subgrade	152,368	sf	12.75	1,942,692
00001	Slab on grade: 10" w/ #5 @ 14" o.c.e.w. T&B mild steel reinforcing over 6" void form, including vapor barrier and control joints.	152,368	sf	49.50	7,542,216
A20	**Basement Construction**				
	Subtotal Foundations				18,112,423
B10 - Shell					
B10	**Superstructure**				
B1010 Floor Construction					
00001	Demolish & remove 5% of load bearing CMU walls including temp shoring	773	lf	324.00	250,452
00001	Replace load bearing CMU walls	773	lf	1,215.00	939,195
00001	Relocate MEP mains in corridors attached to removed walls and enable access to work, 75% of walls to be removed	580	lf	710.00	411,800
00001	Relocate MEP mains in non-corridors attached to removed walls and enable access to work, 25% of walls to be removed	193	lf	178.00	34,354
00001	Replace in-wall electrical devices, allow 1 per 5lf	773	lf	107.00	82,711
00001	Built-up floor/ramps	1,674	sf	64.00	107,136
00001	Misc metals	1	ls	25,000.00	25,000
00001	Housekeeping pads	1	ls	15,000.00	15,000
B1020 Roof construction					
00001	Sprayed cementitious fireproofing patching	1	ls	50,000.00	50,000
B20	**Exterior Enclosure**				
B2010 Exterior Walls					
	Exterior Wall Construction				
00001	EIFS, 3% of EIFS	2,830	sf	80.00	226,400
00001	Replace int & ext caulking + expansion joint cover	3,773	lf	60.00	226,380
00001	Exterior masonry repair, 3% of veneer masonry	473	sf	45.00	21,285
	Parapets				
00001	Repair/patch backside of parapet	1	ls	25,000.00	25,000
B2020 Exterior Windows		EXCLUDED			
B2030 Exterior Doors		EXCLUDED			
B30	**Roofing**				
B3010 Roof Coverings					
00002	Tear-off roofing	158,152	sf	6.50	1,027,988
00002	Remove/reinstall lightning protection grounding cable	Included			
00002	New EPDM membrane system including R30 avg insulation + vapor barrier and parapet cap	158,152	sf	30.10	4,760,375
00002	Precast paver ballast	158,152	sf	6.40	1,012,173
00002	Roof carpentry repairs	158,152	sf	0.20	32,331
00002	Sheetmetal repairs	158,152	sf	0.20	32,331
	Subtotal Superstructure				9,279,911
C - Interiors					
C10	**Interior Construction**				
C1010 Partitions					
	Fixed partitions				
00001	Relocate MEP mains in corridors attached to removed walls and enable access to work, 25% of walls to be removed	1,516	lf	710.00	1,076,360
00001	Relocate MEP mains in non-corridors attached to removed walls and enable access to work, 75% of walls to be removed	4,547	lf	178.00	809,366
00001	Replace in-wall electrical devices, allow 1 per 5lf	6,063	lf	107.00	648,741
00001	Demolish non-load bearing CMU	86,088	sf	12.00	1,033,056

Exhibit 1A
State of Wyoming Penitentiary
JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	CMU, non-load bearing	86,088	sf	30.00	2,582,640
00001	Replace interior security glazing in removed walls (approx 50% of total security glazing)	3,860	sf	192.00	741,120
00001	Interior railings	1	ls	20,000.00	20,000
C1020 Interior Doors					
	Interior doors, frames & hardware				
00001	At removed partitions, replace doors+frames+hardware, per leaf; allow 1 per 25lf of partition	274	ea	4,970.00	1,361,780
C1030 Fittings specialties					
	Fabricated toilet partitions				
00001	Toilet partitions	1	ls	15,000.00	15,000
	Protective guards, barriers & bumpers				
00001	Wall & corner protection	1	ls	15,000.00	15,000
	Identifying devices				
00001	Allow for signage+graphics, limited to areas of wall/partition replacement	152,368	sf	0.37	56,376
	Amenities and convenience items				
00001	Toilet & bath accessories	1	ls	30,000.00	30,000
00001	Storage room shelving	EXCLUDED			
00001	Office shelving	EXCLUDED			
00001	Lockers, per frame	93	ea	500.00	46,500
C20	**Stairs**				
C2010 Stair Construction					
00001	Remove+install new stick built exit stairs	4	flt	40,000.00	160,000
00001	Remove+reinstall mezzanine stair	22	ea	10,000.00	220,000
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Paint CMU, anti microbial coating	15,030	sf	9.00	135,270
00001	Paint new CMU	213,918	sf	2.20	470,620
00001	Touch-up paint existing walls that remain	1	ls	100,000.00	100,000
C3020	Floor Finishes				
	Flooring				
00001	Concrete sealer	135,521	sf	2.20	298,146
00001	Epoxy qtz	3,896	sf	10.00	38,960
00001	Carpet/VCT/SV	12,951	sf	5.00	64,755
00001	Moisture mitigation @ Epoxy/VCT/SV	5,764	sf	6.39	36,832
00001	Bases	1	ls	15,000.00	15,000
00001	Caulking of slab edges	31,000	lf	8.00	248,000
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Remove/replace ceilings to enable access for wall/partition/MEP work	50,789	sf	8.60	436,785
	Subtotal Interior Construction				10,660,307
D - Services					
D10	**Conveying Systems**				
D1010 Elevators and Lifts		EXCLUDED			
D20	**Plumbing**				
	Sanitary fixtures and connection piping				
00001	Remove/reset cell fixtures, per cell	215	ea	2,400.00	516,000
00001	New penal showers	63	ea	2,350.00	148,050
00001	New plumbing fixtures including WC, lavs, sinks, showers, mop sinks, floor drains	197,728	sf	4.25	840,344
	Sanitary waste, vent and service piping				
00001	Relocate MEP for wall/partition construction	Covered in wall/partition allowance			
00001	Repair/replace UG distribution piping for displaced services	197,728	sf	1.00	197,728
	Water treatment, storage and circulation				
00001	New water heaters/recirc pumps/expansion tanks/air separators/flues	197,728	sf	2.85	563,525
	Laboratory & industrial process services				
00001	New dental vacuum pump system	1	ea	30,000.00	30,000
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	50,000.00	50,000
00004	Jet roof drain system	197,728	sf	0.50	98,864
	Testing				
00001	Testing+sterilization	197,728	sf	0.65	128,523
	Special				
00001	Create new space for displaced systems, all trades	Not required			
D30	**Heating, Ventilation and Air Conditioning (HVAC)**				
	Heat generation and chilling (boilers/chillers)	EXCLUDED			
	Thermal storage and circulation pumps				
00001	Expansion tanks	3	ea	5,700.00	17,100
00001	Air separators	2	ea	9,300.00	18,600
00001	Pumps, primary and secondary	4	ea	13,200.00	52,800

Exhibit 1A
State of Wyoming Penitentiary
JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	Variable frequency drives	4	ea	3,600.00	14,400
00001	Pump bases	4	ea	2,400.00	9,600
	Piping, fittings, valves and insulation				
00001	Heating hot water piping, fittings, valves and insulation to relocated pumps	1	ls	25,000.00	25,000
00001	Chilled water piping, fittings, valves and insulation to relocated pumps	1	ls	25,000.00	25,000
	Perimeter heating				
00001	Unit heaters	1	ls	20,000.00	20,000
	Air handling equipment				
	Air handling units				
00001	New AHU's to replace B138 and F115	3	ea	125,000.00	375,000
	Air distribution and return				
	Galvanized steel ductwork and fittings				
00001	Modify duct in Rms B138 and F115 to accept new AHU's	3	ea	10,000.00	30,000
00001	Ductwork ancillaries (flexible ductwork, volume dampers, fire/smoke dampers, etc.)	Covered in wall/partition allowance			
	Diffusers and return air grilles				
00001	Grilles, registers and diffusers - adjust at removed ceilings	50,789	sf	0.85	43,171
	Controls, instrumentation and balancing				
00001	DDC control system for Rms B138 and F115	3	ea	15,000.00	45,000
00001	Testing, adjusting and balancing	197,728	sf	1.50	296,592
	Special				
00001	Create new space for displaced systems, all trades, for CHP and HWP	300	sf	500.00	150,000
D40	**Fire Protection Systems**				
D4010	Fire protection sprinkler systems				
	Fire protection sprinkler systems - complete				
00001	Wet pipe sprinkler systems - adjust at replaced ceilings	50,789	sf	2.50	126,973
D50	**Electrical**				
D5010	Electrical service and distribution				
	Main service and distribution etc.				
00001	New switchboards/panelboards/transformers	197,728	sf	3.90	771,139
00001	New feeders	197,728	sf	4.20	830,458
	Emergency or uninterrupted power				
00001	Generator	EXISTING			
00001	New UPS	197,728	sf	1.10	217,501
00001	New ATS	197,728	sf	0.80	158,182
00001	New switchboards/panelboards/transformers	197,728	sf	2.85	563,525
00001	New feeders	197,728	sf	2.60	514,093
	Machine and equipment power				
	Connections and switches including conduit and wire				
00001	Plumbing and HVAC equipment, new equipment only	1	ls	25,000.00	25,000
	Testing				
00001	Testing	197,728	sf	2.00	395,456
	Special				
00001	Create new space for displaced systems, all trades, for switchboards, etc.	200	sf	500.00	100,000
D5020	Lighting and branch wiring				
	Lighting				
00001	Adjust lighting @ removed ceiling areas	50,789	sf	2.00	101,578
D5030	Communications and security systems				
	Telephone and communications systems				
	Telephone and communications systems				
00001	MDF rough-in	1	ls	5,000.00	5,000
00001	Telephone/data passive equipment (racks, patch panels, termination blocks, etc)	1	ls	50,000.00	50,000
00001	Telephone/data/WAP backbone cabling system	Covered in wall/partition allowance			
00001	Clock system	Covered in wall/partition allowance			
00001	AV systems, rough-in only	Covered in wall/partition allowance			
00001	CATV	Covered in wall/partition allowance			
00001	Distributed Antenna system	EXCLUDED			
	Alarm and security systems				
00001	Fire alarm system	Covered in wall/partition allowance			
	Security systems				
	Access control system/intercom				
00001	New electronics cabinets, primary	1	ea	250,000.00	250,000
00001	New electronics cabinets, secondary	7	ea	50,000.00	350,000
00001	New PLC platform and HMI control stations (includes CPF and K-unit)	1	ls	2,500,000.00	2,500,000
	CCTV system	BY DOC			
	Special				
00001	Create new space for displaced systems, all trades, for MDF, master control and CCTV	705	sf	500.00	352,500
	Subtotal Services				11,006,701

E - Equipment and Furnishings
E10 Equipment
E1010 Commercial equipment

Exhibit 1A
State of Wyoming Penitentiary
JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	Remove/reset laundry equipment	1	ls	5,000.00	5,000
E1020 Institutional equipment					
	AV equipment	EXCLUDED			
	Detention furniture				
00001	New bunk, steel	225	ea	1,250.00	281,250
00001	New desk	215	ea	600.00	129,000
00001	Remove/reset Day Room podium	11	ea	1,000.00	11,000
00001	Remove/reset Day Room telephone table	6	ea	2,000.00	12,000
	Dental/medical equipment	EXCLUDED			
E1090 Other equipment					
00001	Remove/reset Servery equipment	1	ls	50,000.00	50,000
E20	**Furnishings**				
E2010 Fixed furnishings					
00001	New casework	197,728	sf	4.50	889,776
	Subtotal Equipment and Furnishings				1,378,026
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2030 Pedestrian Paving					
00001	Structural slab @ main entrance, courtyards and outdoor rec areas, same as interior	23,273	sf	86.25	2,007,225
00001	Structural slab at entrance stoop	17	ea	10,000.00	170,000
G2040 Site development					
00004	Additional grading and drainage	1	ls	100,000.00	100,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	2,162	lf	400.00	864,800
G30	Site Civil/Mechanical utilities	EXCLUDED			
G40	Site electrical utilities	EXCLUDED			
	Subtotal Building Sitework				3,142,025
	Total South Facility Direct Cost				53,579,393
	Site Logistics	5.00%			2,678,970
	Maximum Allowable Construction Cost				56,258,363
	Fee	2.75%			1,547,105
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			216,000
	Fixed Amount for Specified General Conditions	7.50%			4,219,377
	Total Estimated Construction Cost				62,240,845
	Contingencies				
	Design+Estimating Contingency	15.00%	0.15		8,353,804
	Escalation	15.90%	0.16		8,846,065
	GMP Construction Contingency	2.00%	0.02		1,113,916
	Mark-ups (on contingencies)	13.40%	0.13		2,458,626
	Total Estimated Construction Cost Including Contingencies				83,013,256

Exhibit 1B
State of Wyoming Penitentiary
JMB Estimate Option 1
Central Production Facility

CSI	Description	Quantity	Unit	Rate	Total
Central Production Facility					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Soil Stabilization				
00001	Compaction Grouting	33,560	sf	18.00	604,080
	Subtotal Foundations				604,080
B10 - Shell					
B10	**Superstructure**				
B1010 Floor Construction					
00001	Repairs to masonry	1	ls	30,000.00	30,000
	Subtotal Superstructure				30,000
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Touch-up paint/finishes	1	ls	25,000.00	25,000
C3020	Floor Finishes				
	Flooring				
00001	Concrete sealer, Re-seal floor	33,560	sf	2.20	73,832
00001	Repair walk-in refrig/coolers/freezer floors	493	ea	250.00	123,250
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Repair ceilings in select areas	1	ls	25,000.00	25,000
	Subtotal Interior Construction				247,082
D - Services					
D20	**Plumbing**				
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	20,000.00	20,000
00004	Jet roof drain system	35,116	sf	0.50	17,558
	Subtotal Services				37,558
E - Equipment and Furnishings					
E10	**Equipment**				
E1090 Other equipment					
00001	Remove/reset Laundry/food Service equipment at select areas	3,000	sf	30.00	90,000
	Subtotal Equipment and Furnishings				90,000
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040 Site development					
00004	Additional grading and drainage	1	ls	35,000.00	35,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	670	lf	400.00	268,000
	Subtotal Building Sitework				303,000
	Total South Facility Direct Cost				1,311,720
	Site Logistics	5.00%			65,586
	Maximum Allowable Construction Cost				1,377,306
	Fee	2.75%			37,876
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			5,288

Exhibit 1B
State of Wyoming Penitentiary
JMB Estimate Option 1
Central Production Facility

CSI	Description	Quantity	Unit	Rate	Total
	Fixed Amount for Specified General Conditions	7.50%			103,298
	Total Estimated Construction Cost				1,523,768
	Contingencies				
	Design+Estimating Contingency	15.00%	0.15		204,516
	Escalation	15.90%	0.16		216,568
	GMP Construction Contingency	2.00%	0.02		27,271
	Mark-ups (on contingencies)	13.40%	0.13		60,192
	Total Estimated Construction Cost Including Contingencies				2,032,314

Exhibit 1C
State of Wyoming Penitentiary
JMB Estimate Option 1
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
K-Unit					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Soil Stabilization				
00001	Compaction Grouting	32,270	sf	18.00	580,860
	Subtotal Foundations				580,860
B - Shell					
	Subtotal Shell				0
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Touch-up paint	1	ls	25,000.00	25,000
C3020	Floor Finishes				
	Flooring				
00001	Replace VCT including moisture mitigation	18,872	sf	11.00	207,592
00001	Concrete sealer, Re-seal floor	12,678	sf	2.20	27,892
00001	Patch/Repairs to epoxy	1	ls	10,000.00	10,000
	Subtotal Interior Construction				270,484
D - Services					
D20	**Plumbing**				
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	20,000.00	20,000
00004	Jet roof drain system	42,282	sf	0.50	21,141
	Subtotal Services				41,141
E - Equipment and Furnishings					
E10	**Equipment**				
E1020 Institutional equipment					
	Detention furniture				
00001	Remove/reset spider tables/chairs for flooring replacement	32	ea	1,000.00	32,000
E20	**Furnishings**				
	Subtotal Equipment and Furnishings				32,000
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040 Site development					
00004	Additional grading and drainage	1	ls	35,000.00	35,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	1,130	lf	400.00	452,000
	Subtotal Building Sitework				487,000
	Total South Facility Direct Cost				1,411,485
	Site Logistics	5.00%			70,574
	Maximum Allowable Construction Cost				1,482,059
	Fee	2.75%			40,757
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			5,690
	Fixed Amount for Specified General Conditions	7.50%			111,154
	Total Estimated Construction Cost				1,639,660

Exhibit 1C
State of Wyoming Penitentiary
JMB Estimate Option 1
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
	Contingencies				
	Design+Estimating Contingency	15.00%	0.15		220,071
	Escalation	15.90%	0.16		233,039
	GMP Construction Contingency	2.00%	0.02		29,345
	Mark-ups (on contingencies)	13.40%	0.13		64,770
	Total Estimated Construction Cost Including Contingencies				2,186,884

Exhibit 2A
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
South Facility					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Pile Foundations				
00001	5" Dia micro piles, 38' avg length including 25' rock embedment, 11' o.c. avg spacing	1,097	ea	2,900.00	3,181,300
	Grade Beams + UG Plbg/Elec				
00001	GB: Excavate and stockpile for re-use, mini excavator except cells by hand + demo rat slabs and void forms, install new void forms, moisture conditions and compact soils. (Exterior Walls)	15,456	lf	150.00	2,318,400
00001	UG Plbg/Elec: Install new void forms (assume excavation/backfill accomplished via grade beam work)	5,345	lf	2.00	10,690
00001	UG Plbg/Elec: Excavate and stockpile for re-use, mini excavator except cells by hand, install new void forms, moisture conditions and compact soils.	2,858	lf	150.00	428,700
00001	Damproofing touch-up/repairs, 10% of perimeter grade beams	1,706	sf	2.00	3,412
00001	Insulation at perimeter	25,596	sf	2.90	74,228
A1030 Slabs on Grade					
	Structural Slab on Grade				
00001	Abate Mercury Containing Gym Floor	6,200	sf	16.50	102,300
00001	Demolish & remove slab on grade including excavate to subgrade	152,368	sf	12.75	1,942,692
00001	Slab on grade: 10" w/ #5 @ 14" o.c.e.w. T&B mild steel reinforcing over 6" void form, including vapor barrier and control joints.	152,368	sf	25.00	3,809,200
A20	**Basement Construction**				
	Subtotal Foundations				11,870,922
B10 - Shell					
B10	**Superstructure**				
B1010 Floor Construction					
00001	Demolish & remove 5% of load bearing CMU walls including temp shoring	773	lf	150.00	115,950
00001	Replace load bearing CMU walls	773	lf	750.00	579,750
00001	Relocate MEP mains in corridors attached to removed walls and enable access to work, 75% of walls to be removed	580	lf	150.00	87,000
00001	Relocate MEP mains in non-corridors attached to removed walls and enable access to work, 25% of walls to be removed	193	lf	150.00	28,950
00001	Replace in-wall electrical devices, allow 1 per 5lf	773	lf	50.00	38,650
00001	Built-up floor/ramps	1,674	sf	64.00	107,136
00001	Misc metals	1	ls	25,000.00	25,000
00001	Housekeeping pads	1	ls	15,000.00	15,000
B1020 Roof construction					
00001	Sprayed cementitious fireproofing patching	1	ls	50,000.00	50,000
B20	**Exterior Enclosure**				
B2010 Exterior Walls					
	Exterior Wall Construction				
00001	EIFS, 3% of EIFS	2,830	sf	10.00	28,300
00001	Replace int & ext caulking + expansion joint cover	3,773	lf	25.00	94,325
00001	Exterior masonry repair, 3% of veneer masonry	473	sf	45.00	21,285
	Parapets				
00001	Repair/patch backside of parapet	1	ls	25,000.00	25,000
B2020 Exterior Windows		EXCLUDED			
B2030 Exterior Doors		EXCLUDED			
B30	**Roofing**				
B3010 Roof Coverings					
00002	Tear-off roofing	158,152	sf	6.50	1,027,988
00002	Remove/reinstall lightning protection grounding cable	Included			
00002	New EPDM membrane system including R30 avg insulation + vapor barrier and parapet cap	158,152	sf	10.00	1,581,520
00002	Precast paver ballast	158,152	sf	6.40	1,012,173
00002	Roof carpentry repairs	158,152	sf	0.20	32,331
00002	Sheetmetal repairs	158,152	sf	0.20	32,331
	Subtotal Superstructure				4,902,689
C - Interiors					
C10	**Interior Construction**				
C1010 Partitions					
	Fixed partitions				
00001	Relocate MEP mains in corridors attached to removed walls and enable access to work, 25% of walls to be removed	1,516	lf	150.00	227,400
00001	Relocate MEP mains in non-corridors attached to removed walls and enable access to work, 75% of walls to be removed	4,547	lf	150.00	682,050
00001	Replace in-wall electrical devices, allow 1 per 5lf	6,063	lf	50.00	303,150
00001	Demolish non-load bearing CMU	86,088	sf	12.00	1,033,056

Exhibit 2A
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	CMU, non-load bearing	86,088	sf	30.00	2,582,640
00001	Replace interior security glazing in removed walls (approx 50% of total security glazing)	3,860	sf	192.00	741,120
00001	Interior railings	1	ls	20,000.00	20,000
C1020 Interior Doors					
	Interior doors, frames & hardware				
00001	At removed partitions, replace doors+frames+hardware, per leaf; allow 1 per 25lf of partition	274	ea	3,500.00	959,000
C1030 Fittings specialties					
	Fabricated toilet partitions				
00001	Toilet partitions	1	ls	15,000.00	15,000
	Protective guards, barriers & bumpers				
00001	Wall & corner protection	1	ls	15,000.00	15,000
	Identifying devices				
00001	Allow for signage+graphics, limited to areas of wall/partition replacement	152,368	sf	0.37	56,376
	Amenities and convenience items				
00001	Toilet & bath accessories	1	ls	30,000.00	30,000
00001	Storage room shelving	EXCLUDED			
00001	Office shelving	EXCLUDED			
00001	Lockers, per frame	93	ea	500.00	46,500
C20	**Stairs**				
C2010 Stair Construction					
00001	Remove+install new stick built exit stairs	4	flt	20,000.00	80,000
00001	Remove+reinstall mezzanine stair	22	ea	10,000.00	220,000
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Paint CMU, anti microbial coating	15,030	sf	9.00	135,270
00001	Paint new CMU	213,918	sf	2.20	470,620
00001	Touch-up paint existing walls that remain	1	ls	100,000.00	100,000
C3020	Floor Finishes				
	Flooring				
00001	Concrete sealer	135,521	sf	2.20	298,146
00001	Epoxy qtz	3,896	sf	10.00	38,960
00001	Carpet/VCT/SV	12,951	sf	5.00	64,755
00001	Moisture mitigation @ Epoxy/VCT/SV	5,764	sf	6.39	36,832
00001	Bases	1	ls	15,000.00	15,000
00001	Caulking of slab edges	31,000	lf	8.00	248,000
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Remove/replace ceilings to enable access for wall/partition/MEP work	50,789	sf	8.60	436,785
	Subtotal Interior Construction				8,855,660
D - Services					
D10	**Conveying Systems**				
D1010 Elevators and Lifts		EXCLUDED			
D20	**Plumbing**				
	Sanitary fixtures and connection piping				
00001	Remove/reset cell fixtures, per cell	215	ea	2,400.00	516,000
00001	New penal showers	63	ea	2,350.00	148,050
00001	New plumbing fixtures including WC, lavs, sinks, showers, mop sinks, floor drains	197,728	sf	4.25	840,344
	Sanitary waste, vent and service piping				
00001	Relocate MEP for wall/partition construction	Covered in wall/partition allowance			
00001	Repair/replace UG distribution piping for displaced services	197,728	sf	1.00	197,728
	Water treatment, storage and circulation				
00001	New water heaters/recirc pumps/expansion tanks/air separators/flues	197,728	sf	2.85	563,525
	Laboratory & industrial process services				
00001	New dental vacuum pump system	1	ea	30,000.00	30,000
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	50,000.00	50,000
00004	Jet roof drain system	197,728	sf	0.50	98,864
	Testing				
00001	Testing+sterilization	197,728	sf	0.65	128,523
	Special				
00001	Create new space for displaced systems, all trades	Not required			
D30	**Heating, Ventilation and Air Conditioning (HVAC)**				
	Heat generation and chilling (boilers/chillers)	EXCLUDED			
	Thermal storage and circulation pumps				
00001	Expansion tanks	3	ea	5,700.00	17,100
00001	Air separators	2	ea	9,300.00	18,600
00001	Pumps, primary and secondary	4	ea	13,200.00	52,800

Exhibit 2A
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	Variable frequency drives	4	ea	3,600.00	14,400
00001	Pump bases	4	ea	2,400.00	9,600
	Piping, fittings, valves and insulation				
00001	Heating hot water piping, fittings, valves and insulation to relocated pumps	1	ls	25,000.00	25,000
00001	Chilled water piping, fittings, valves and insulation to relocated pumps	1	ls	25,000.00	25,000
	Perimeter heating				
00001	Unit heaters	1	ls	20,000.00	20,000
	Air handling equipment				
	Air handling units				
00001	New AHU's to replace B138 and F115	3	ea	125,000.00	375,000
	Air distribution and return				
	Galvanized steel ductwork and fittings				
00001	Modify duct in Rms B138 and F115 to accept new AHU's	3	ea	10,000.00	30,000
00001	Ductwork ancillaries (flexible ductwork, volume dampers, fire/smoke dampers, etc.)	Covered in wall/partition allowance			
	Diffusers and return air grilles				
00001	Grilles, registers and diffusers - adjust at removed ceilings	50,789	sf	0.85	43,171
	Controls, instrumentation and balancing				
00001	DDC control system for Rms B138 and F115	3	ea	15,000.00	45,000
00001	Testing, adjusting and balancing	197,728	sf	1.50	296,592
	Special				
00001	Create new space for displaced systems, all trades, for CHP and HWP	300	sf	500.00	150,000
D40	**Fire Protection Systems**				
D4010	Fire protection sprinkler systems				
	Fire protection sprinkler systems - complete				
00001	Wet pipe sprinkler systems - adjust at replaced ceilings	50,789	sf	2.50	126,973
D50	**Electrical**				
D5010	Electrical service and distribution				
	Main service and distribution etc.				
00001	New switchboards/panelboards/transformers	197,728	sf	3.90	771,139
00001	New feeders	197,728	sf	4.20	830,458
	Emergency or uninterrupted power				
00001	Generator	EXISTING			
00001	New UPS	197,728	sf	1.10	217,501
00001	New ATS	197,728	sf	0.80	158,182
00001	New switchboards/panelboards/transformers	197,728	sf	2.85	563,525
00001	New feeders	197,728	sf	2.60	514,093
	Machine and equipment power				
	Connections and switches including conduit and wire				
00001	Plumbing and HVAC equipment, new equipment only	1	ls	25,000.00	25,000
	Testing				
00001	Testing	197,728	sf	2.00	395,456
	Special				
00001	Create new space for displaced systems, all trades, for switchboards, etc.	200	sf	500.00	100,000
D5020	Lighting and branch wiring				
	Lighting				
00001	Adjust lighting @ removed ceiling areas	50,789	sf	2.00	101,578
D5030	Communications and security systems				
	Telephone and communications systems				
	Telephone and communications systems				
00001	MDF rough-in	1	ls	5,000.00	5,000
00001	Telephone/data passive equipment (racks, patch panels, termination blocks, etc)	1	ls	50,000.00	50,000
00001	Telephone/data/WAP backbone cabling system	Covered in wall/partition allowance			
00001	Clock system	Covered in wall/partition allowance			
00001	AV systems, rough-in only	Covered in wall/partition allowance			
00001	CATV	Covered in wall/partition allowance			
00001	Distributed Antenna system	EXCLUDED			
	Alarm and security systems				
00001	Fire alarm system	Covered in wall/partition allowance			
	Security systems				
	Access control system/intercom				
00001	New electronics cabinets, primary	1	ea	250,000.00	250,000
00001	New electronics cabinets, secondary	7	ea	50,000.00	350,000
00001	New PLC platform and HMI control stations (includes CPF and K-unit)	1	ls	2,500,000.00	2,500,000
	CCTV system	BY DOC			
	Special				
00001	Create new space for displaced systems, all trades, for MDF, master control and CCTV	705	sf	500.00	352,500
	Subtotal Services				11,006,701
E - Equipment and Furnishings					
E10	**Equipment**				
E1010	Commercial equipment				

Exhibit 2A
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
South Facility

CSI	Description	Quantity	Unit	Rate	Total
00001	Remove/reset laundry equipment	1	ls	5,000.00	5,000
E1020 Institutional equipment					
	AV equipment	EXCLUDED			
	Detention furniture				
00001	New bunk, steel	225	ea	1,250.00	281,250
00001	New desk	215	ea	600.00	129,000
00001	Remove/reset Day Room podium	11	ea	1,000.00	11,000
00001	Remove/reset Day Room telephone table	6	ea	2,000.00	12,000
	Dental/medical equipment	EXCLUDED			
E1090 Other equipment					
00001	Remove/reset Servery equipment	1	ls	100,000.00	100,000
E20	**Furnishings**				
E2010 Fixed furnishings					
00001	New casework	197,728	sf	4.50	889,776
	Subtotal Equipment and Furnishings				1,428,026
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2030 Pedestrian Paving					
00001	Structural slab @ main entrance, courtyards and outdoor rec areas, same as interior	23,273	sf	25.00	581,825
00001	Structural slab at entrance stoop	17	ea	1,500.00	25,500
G2040 Site development					
00004	Additional grading and drainage	1	ls	100,000.00	100,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	2,162	lf	300.00	648,600
	Security fence adjusments to accomodate grading	1	ls	50,000.00	50,000
G30	Site Civil/Mechanical utilities	EXCLUDED			
G40	Site electrical utilities	EXCLUDED			
	Subtotal Building Sitework				1,405,925
	Total South Facility Direct Cost				39,469,923
	Site Logistics	5.00%			1,973,496
	Maximum Allowable Construction Cost				41,443,419
	Fee	2.75%			1,139,694
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			159,119
	Fixed Amount for Specified General Conditions	7.50%			3,108,256
	Total Estimated Construction Cost				45,850,489
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		5,502,059
	Escalation	9.00%	0.09		4,126,544
	GMP Construction Contingency	2.00%	0.02		907,840
	Mark-ups (on contingencies)				0
	Total Estimated Construction Cost Including Contingencies				56,386,931

Exhibit 2B
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
Central Production Facility

CSI	Description	Quantity	Unit	Rate	Total
Central Production Facility					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Soil Stabilization				
00001	Compaction Grouting	33,560	sf	18.00	604,080
	Subtotal Foundations				604,080
B10 - Shell					
B10	**Superstructure**				
B1010 Floor Construction					
00001	Repairs to masonry	1	ls	30,000.00	30,000
	Subtotal Superstructure				30,000
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Touch-up paint/finishes	1	ls	25,000.00	25,000
C3020	Floor Finishes				
	Flooring				
00001	Concrete sealer, Re-seal floor	33,560	sf	2.20	73,832
00001	Repair walk-in refrig/coolers/freezer floors	493	ea	250.00	123,250
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Repair ceilings in select areas	1	ls	25,000.00	25,000
	Subtotal Interior Construction				247,082
D - Services					
D20	**Plumbing**				
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	20,000.00	20,000
00004	Jet roof drain system	35,116	sf	0.50	17,558
	Subtotal Services				37,558
E - Equipment and Furnishings					
E10	**Equipment**				
E1090 Other equipment					
00001	Remove/reset Laundry/food Service equipment at select areas	3,000	sf	30.00	90,000
	Subtotal Equipment and Furnishings				90,000
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040 Site development					
00004	Additional grading and drainage	1	ls	35,000.00	35,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	670	lf	300.00	201,000
	Security fence adjustments to accommodate grading	1	ls	15,000.00	15,000
	Subtotal Building Sitework				251,000
	Total South Facility Direct Cost				1,259,720
	Site Logistics	5.00%			62,986
	Maximum Allowable Construction Cost				1,322,706
	Fee	2.75%			36,374
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				

Exhibit 2B
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
Central Production Facility

CSI	Description	Quantity	Unit	Rate	Total
	Permits	0.37%			5,078
	Fixed Amount for Specified General Conditions	7.50%			99,203
	Total Estimated Construction Cost				1,463,362
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		175,603
	Escalation	9.00%	0.09		131,703
	GMP Construction Contingency	2.00%	0.02		28,975
	Mark-ups (on contingencies)				0
	Total Estimated Construction Cost Including Contingencies				1,799,642

Exhibit 2C
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
K-Unit					
A - Substructure					
A10	**Foundations**				
A1020 Special Other Foundations					
	Soil Stabilization				
00001	Compaction Grouting	32,270	sf	18.00	580,860
	Subtotal Foundations				580,860
B - Shell					
	Subtotal Shell				0
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Touch-up paint	1	ls	25,000.00	25,000
C3020	Floor Finishes				
	Flooring				
00001	Replace VCT including moisture mitigation	18,872	sf	11.00	207,592
00001	Concrete sealer, Re-seal floor	12,678	sf	2.20	27,892
00001	Patch/Repairs to epoxy	1	ls	10,000.00	10,000
	Subtotal Interior Construction				270,484
D - Services					
D20	**Plumbing**				
	Surface water drainage				
00004	Roof drainage piping and fittings, heat trace existing	1	ls	20,000.00	20,000
00004	Jet roof drain system	42,282	sf	0.50	21,141
	Subtotal Services				41,141
E - Equipment and Furnishings					
E10	**Equipment**				
E1020 Institutional equipment					
	Detention furniture				
00001	Remove/reset spider tables/chairs for flooring replacement	32	ea	1,000.00	32,000
E20	**Furnishings**				
	Subtotal Equipment and Furnishings				32,000
F - Special Construction and Demolition					
	Subtotal Special Construction and Demolition				0
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040 Site development					
00004	Additional grading and drainage	1	ls	35,000.00	35,000
00004	Perimeter 10'W apron including concrete, heat traced drain and sump pit/pump @ 100' o.c.	1,130	lf	300.00	339,000
	Security fence adjustments to accommodate grading	1	ls	15,000.00	15,000
	Subtotal Building Sitework				389,000
	Total South Facility Direct Cost				1,313,485
	Site Logistics	5.00%			65,674
	Maximum Allowable Construction Cost				1,379,159
	Fee	2.75%			37,927
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			5,295
	Fixed Amount for Specified General Conditions	7.50%			103,437

Exhibit 2C
State of Wyoming Penitentiary
Adjusted JMB Estimate Option 1
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
	Total Estimated Construction Cost				1,525,818
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		183,098
	Escalation	9.00%	0.09		137,324
	GMP Construction Contingency	2.00%	0.02		30,211
	Mark-ups (on contingencies)				0
	Total Estimated Construction Cost Including Contingencies				1,876,451

Exhibit 3A
State of Wyoming Penitentiary
WJE Scope Estimated Repair Costs
South Facility

CSI	Description	Quantity	Unit	Rate	Total
South Facility					
A - Substructure					
A10	**Foundations**				
A1030 Slabs on Grade					
	Structural Slab on Grade				
00001	Demolish & remove slab on grade including excavate to subgrade	3,500	sf	12.75	44,625
00001	Slab on grade: 10" w/ #5 @ 14" o.c.e.w. T&B mild steel reinforcing over 6" void form, including vapor barrier and control joints.	3,500	sf	25.00	87,500
A20	**Basement Construction**				
	Subtotal Foundations				132,125
B10 - Shell					
B10	**Superstructure**				
B1020 Roof construction					
00001	Sprayed cementitious fireproofing patching	1	ls	50,000.00	50,000
B20	**Exterior Enclosure**				
B2010 Exterior Walls					
	Exterior Wall Construction				
00001	EIFS repairs	3,000	sf	10.00	30,000
00001	Replace int & ext sealant joints	3,773	lf	25.00	94,325
	Joint repair at structural interface (clean joint and grout)	3,000	lf	35.00	105,000
00001	General masonry repairs	500	sf	45.00	22,500
	Masonry repairs, Room A164,Vestibule C167, Elect Room F116	1	ls	50,000.00	50,000
	Subtotal Superstructure				351,825
C - Interiors					
C10	**Interior Construction**				
C1010 Partitions					
	Fixed partitions				
00001	Replace interior security glazing in removed walls (approx 50% of total security glazing)	3,860	sf	192.00	741,120
C1020 Interior Doors					
	Interior doors, frames & hardware				
00001	At removed partitions, replace doors+frames+hardware, per leaf; allow 1 per 25lf of partition	274	ea	3,500.00	959,000
C1030 Fittings specialties					
	Fabricated toilet partitions				
C30	**Interior Finishes**				
C3010	Wall finishes				
00001	Touch-up paint existing walls that remain	1	ls	50,000.00	50,000
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Remove/replace ceilings to enable access for wall/partition/MEP work	50,789	sf	8.60	436,785
	Subtotal Interior Construction				2,186,905
D - Services					
D10	**Conveying Systems**				
D1010 Elevators and Lifts		EXCLUDED			
D20	**Plumbing**				
	Sanitary fixtures and connection piping				
D30	**Heating, Ventilation and Air Conditioning (HVAC)**				
	Misc HVAC repairs to accommodate structural repairs	1	ls	25,000.00	25,000
D50	**Electrical**				
D5010 Electrical service and distribution					
	Misc electrical repairs to accommodate structural repairs	1	ls	25,000.00	25,000
D5020 Lighting and branch wiring					
	Lighting				
00001	Adjust lighting @ removed ceiling areas	50,789	sf	2.00	101,578
	Subtotal Services				151,578
E - Equipment and Furnishings					
G - Building Sitework					
G10	**Site Preparation**				

Exhibit 3A
State of Wyoming Penitentiary
WJE Scope Estimated Repair Costs
South Facility

CSI	Description	Quantity	Unit	Rate	Total
G20	**Site Improvements**				
G2030 Pedestrian Paving					
00001	Structural slab at entrance stoop	17	ea	1,500.00	25,500
G2040 Site development					
00004	Perimeter Grading	1	ls	100,000.00	100,000
00004	Allowance for storm drainage piping	1	ls	100,000.00	100,000
	Security fence adjusments to accomodate grading	1	ls	50,000.00	50,000
G30	Site Civil/Mechanical utilities	EXCLUDED			
G40	Site electrical utilities	EXCLUDED			
	Subtotal Building Sitework				275,500
	Total South Facility Direct Cost				3,097,933
	Site Logistics/Supervision	5.00%			154,897
	Maximum Allowable Construction Cost				3,252,830
	Fee	2.75%			89,453
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			12,489
	Fixed Amount for Specified General Conditions	7.50%			243,962
	Total Estimated Construction Cost				3,598,734
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		431,848
	Escalation	9.00%	0.09		323,886
	GMP Construction Contingency	2.00%	0.02		71,255
	Mark-ups (on contingencies)				0
	Total Estimated Construction Cost Including Contingencies				4,425,723

Exhibit 3B
State of Wyoming Penitentiary
WJE Scope Estimated Repair Costs
Central Production Facility

CSI	Description	Quantity	Unit	Rate	Total
Central Production Facility					
A - Substructure					
B10	**Superstructure**				
B1010 Floor Construction					
00001	Repairs to masonry	1	ls	30,000.00	30,000
	Subtotal Superstructure				30,000
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
	Replace sealant joints	450	lf	25.00	11,250
00001	Touch-up paint/finishes	1	ls	25,000.00	25,000
C3020 Ceiling Finishes					
	Ceiling finishes				
00001	Repair ceilings in select areas	1	ls	25,000.00	25,000
	Subtotal Interior Construction				61,250
D - Services					
D20	**Plumbing**				
E - Equipment and Furnishings					
E10	**Equipment**				
E1090 Other equipment					
00001	Remove/reset Laundry/food Service equipment at select areas	1	ls	50,000.00	50,000
	Subtotal Equipment and Furnishings				50,000
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040 Site development					
00004	Perimeter Grading	1	ls	35,000.00	35,000
00004	Allowance for storm drainage piping	1	ls	50,000.00	50,000
	Security fence adjustments to accommodate grading	1	ls	15,000.00	15,000
	Subtotal Building Sitework				100,000
	Total South Facility Direct Cost				241,250
	Site Logistics/Supervision	5.00%			12,063
	Maximum Allowable Construction Cost				253,313
	Fee	2.75%			6,966
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			973
	Fixed Amount for Specified General Conditions	7.50%			18,998
	Total Estimated Construction Cost				280,250
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		33,630
	Escalation	9.00%	0.09		25,222
	GMP Construction Contingency	2.00%	0.02		5,549
	Mark-ups (on contingencies)				0
	Total Estimated Construction Cost Including Contingencies				344,651

Exhibit 3C
State of Wyoming Penitentiary
WJE Scope Estimated Repair Costs
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
K-Unit					
A - Substructure					
A10	**Foundations**				
A1020	Special Other Foundations				
	Soil Stabilization				
00001	Mudjack Slabs	32,270	sf	10.00	322,700
	Subtotal Foundations				322,700
B - Shell					
	Subtotal Shell				0
C - Interiors					
C30	**Interior Finishes**				
C3010	Wall finishes				
	Repairs to masonry	1	ls	20,000.00	20,000
	Replace sealant joints	450	lf	25.00	11,250
00001	Touch-up paint	1	ls	25,000.00	25,000
C3020	Floor Finishes				
	Flooring				
00001	Replace VCT including moisture mitigation	18,872	sf	11.00	207,592
00001	Concrete sealer, Re-seal floor	12,678	sf	2.20	27,892
00001	Patch/Repairs to epoxy	1	ls	10,000.00	10,000
	Subtotal Interior Construction				301,734
D - Services					
D20	**Plumbing**				
E - Equipment and Furnishings					
E10	**Equipment**				
E1020	Institutional equipment				
	Detention furniture				
00001	Remove/reset spider tables/chairs for flooring replacement	32	ea	1,000.00	32,000
E20	**Furnishings**				
	Subtotal Equipment and Furnishings				32,000
G - Building Sitework					
G10	**Site Preparation**				
G20	**Site Improvements**				
G2040	Site development				
00004	Perimeter Grading	1	ls	35,000.00	35,000
00004	Allowance for storm drainage piping	1	ls	50,000.00	50,000
	Security fence adjustments to accommodate grading	1	ls	15,000.00	15,000
	Subtotal Building Sitework				100,000
	Total South Facility Direct Cost				756,434
	Site Logistics/Supervision	5.00%			37,822
	Maximum Allowable Construction Cost				794,255
	Fee	2.75%			21,842
	CM/GC P&P Bond - With GC's				
	GL/PL Insurance - With GC's				
	Builders Risk Insurance - With GC's				
	Permits	0.37%			3,049
	Fixed Amount for Specified General Conditions	7.50%			59,569
	Total Estimated Construction Cost				878,716
	Contingencies				
	Design+Estimating Contingency	12.00%	0.12		105,446
	Escalation	9.00%	0.09		79,084
	GMP Construction Contingency	2.00%	0.02		17,399
	Mark-ups (on contingencies)				0

Exhibit 3C
State of Wyoming Penitentiary
WJE Scope Estimated Repair Costs
K-Unit

CSI	Description	Quantity	Unit	Rate	Total
	Total Estimated Construction Cost Including Contingencies				1,080,645

State of Wyoming Penitentiary
Estimate Comparisions
Summary

Description	Original Estimate Amount	Adusted Est Amount	WJE Amount
South Unit	83,013,256	56,386,931	4,425,723
Central Production Facility	2,032,314	1,799,642	344,651
K-Unit	2,186,884	1,876,451	1,080,645
Total	87,232,454	60,063,024	5,851,019