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GEOLOGY AND SOILS REPORT

Carriage Meadows South
El Paso County, Colorado

PREPARED FOR:

Lorson Ranch Metropolitan District No.1
212 N. Wahsatch Ave, Ste. 301
Colorado Springs, CO 80903

JOB NO. 152427

June 15, 2016
Amended June 29, 2016
Amended October 7, 2016

Respectfully Submitted,
RMG – Rocky Mountain Group

Kelli Zigler, P.G.
Professional Geologist

Reviewed by

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Geotechnical Project Engineer

ARCHITECTS RMG ENGINEERS

ROCKY MOUNTAIN GROUP

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Job No. 152427

October 7, 2016

Lorson Ranch Metropolitan District No.1
212 N. Wahsatch Ave, Ste. 301
Colorado Springs, CO 80903

Re: Response to
Colorado Geological Survey Review Comments
Carriage Meadows South at Lorson Ranch
El Paso County, Colorado

Dear Lorson Ranch Metropolitan District No.1:

RMG-Rocky Mountain Group (RMG) prepared the "*Preliminary Soils and Geology Report*" (RMG Job No. 152427, last dated June 15, 2016) for the proposed development project comprising 234 single-family residential lots and an approximately 13.70-acre commercial area located southeast of the intersection of Marksheffel Road and Fontaine Boulevard in El Paso County, Colorado. The report was reviewed by personnel of the Colorado Geological Survey (CGS). Review comments from the CGS are presented in a letter issued by El Paso County Planning & Community Development Department, dated August 2, 2016, and is included at the end of this report (amended October 7, 2016) in Appendix B. The purpose of this letter is to provide our response to the CGS review comments. The responses and modifications noted herein have been incorporated into our amended report.

For clarity and ease of review we have reiterated each of the CGS Comments followed by our response.

Concerning Preliminary Soils and Geology Report (CGS)

- **CGS Comment:** *"The RMG report indicates that the original channel of Jimmy Camp Creek was filled during the realignment of the channel, and that the fill soils were placed according to Kumar and Associates as structural fill. Site observations indicate that the southern portion of the site may have been filled and graded, but the northern portion of the site does not appear to have been filled and graded yet. The RMG test borings do not indicate that fill material was encountered on the site other than TB-10 (near where Lorson Blvd will cross the creek). The subsurface borings seem to indicate that the stream channel was NOT filled as reported by Kumar and Associates."*

  RMG Response: We concur that not all of the site has been filled and graded yet. This is substantiated by the lack of fill in many of the test borings. However, the suggestion that "*the subsurface borings seem to indicate that the stream channel was NOT filled as reported by Kumar and Associates*" is not supported by the available data.

The northernmost approximately 1,250 feet of the original Jimmy Camp Creek channel (within the subject lot) lies within the current Jimmy Camp Creek channel and/or the embankment along the west side of Jimmy Camp Creek. Likewise, the southernmost approximately 850 feet of the original Jimmy Camp Creek channel (within the subject lot) also lies within the current Jimmy Camp Creek channel. Only the central portion of the original Jimmy Camp Creek channel (within the subject lot) lies outside of the current Jimmy Camp Creek channel and/or embankment. This is the only portion of the site where the RMG test borings could have encountered the fill observed and tested by Kumar and Associates.

The majority of the original Jimmy Camp Creek channel in the central portion of the site appears to have been less than 50 feet wide, with one area widening out to almost 100 feet. There are approximately 5 RMG test borings in this portion of the site. Given the relatively narrow width of the original creek channel and the approximately 400- to 600-foot on-center spacing between the test borings, the fact that no fill was identified in those 5 test borings is not sufficient data to indicate that the fill reported by Kumar and Associates is not present on the site.

Based on the reports provided by Kumar and Associates and the available historical imagery, it is our opinion that the fill reported by Kumar and Associates is in place. Based on the compaction test reports provided to RMG, the depth of fill placed within the original creek channel appears to have been less than 4 feet in depth across the majority of the test locations, except the area of the embankment and the FMIC ditch. While some relatively small areas of untested fill may be present outside of the creek channel and/or the embankment as a result of the construction activities performed at that time, we consider the likelihood that the untested fill in these areas exceeds a depth of 12 inches to be low.

It is likely that any foundations placed in these areas will extend down below the depth of the untested fill. However, if untested fill is encountered at or below the foundation bearing elevation of the proposed structures, it will be assumed that this fill was not moisture-conditioned and compacted in a manner consistent with the **Structural Fill** recommendations contained within our report. Such fills should not be considered suitable for support of shallow foundations without further evaluation. As a component of the site-specific building permitting and construction process, a site-specific Soil Investigation is required by the Pikes Peak Regional Building Department (PPRBD). We anticipate that the site-specific Soil Investigation will require removal (overexcavation) and replacement with appropriately compacted soil materials as indicated under the **Structural Fill** section of our report.

- **<u>CGS Comment:</u>** *"The RMG report inaccurately uses some references included in the report (specifically Reference numbers 12, 14 and 15) that do not include the site in their study area. In some instances, these references are used as "evidence" of lack of hazard, which is misleading. As an example, the site is not included as part of the Colorado Springs Landslide Susceptibility Map (CGS MS-42) study boundary, but on page 11 of the RMG report, it states "*The subject site is not located within a mapped area of landslide susceptibility according to the Colorado Geological Survey (CGS) Map of 2003.*" An area*

not within a hazard study area boundary should NOT be presented as evidence of no hazard!"

RMG Response: The intent is not to use References 14 and 15 as "evidence" of lack of hazard but to clarify that publically available documentation was reviewed. As those documents did not include an evaluation of land outside the incorporated city limits of Colorado Springs at the time of the map preparation, we have deleted references to them. Reference 10 has been omitted for the same reason. Reference 12 (Noe, David C., 2007, A Guide to Swelling Soils for Colorado Homebuyers and Homeowners), does not appear to be limited (geographically) in a way that would exclude southern El Paso County, Colorado.

- **CGS Comment**: *"The RMG report recommends over-excavation and replacement with properly compacted, moisture-treated structural fill, subgrade stabilization, and foundations designed with a minimum dead load to resist uplift. Additional investigation, characterization and analysis will be needed to determine the depth and extent of required over-excavation, and to verify RMG's foundation system recommendations (pages 20-21)."*

  RMG Response: We concur that a site specific Subsurface Soil Investigation shall be performed for all proposed structures including (but not limited to) residences, community or common buildings, retaining walls and pump houses, commercial buildings, etc. However, regarding your comment that "…*foundations designed with a minimum dead load to resist uplift*", that recommendation (while it may be feasible) was not included within our report.

- **CGS Comment:** *"For a development of the proposed density (234 lots on 106 acres) over-excavation typically occurs over the entire area within a specific construction phase determined to require over-excavation, at the grading phase of development, before wet utilities are installed. After over-lot grading has been completed, additional, lot-specific geotechnical investigations are conducted to: characterize soil and bedrock engineering properties such as density, strength, and swell levels; determine groundwater levels; determine maximum bearing and minimum dead-load pressures; and develop final design criteria for foundations, floor systems, pavements, subsurface drainage, etc. Even after ground modifications and over-lot grading are complete, it is possible that some of the over-excavated and replaced soils will include low-density or expansive soils."*

  RMG Response: We concur that there is a possibility that some of the overexcavated and replaced soils will include low-density or expansive soils, which is why we recommend that a site specific Subsurface Soil Investigation shall be performed for all proposed structures including (but not limited to) residences, community or common buildings, retaining walls and pump houses, commercial buildings, etc.

  Regarding your comment that "…*over-excavation typically occurs over the entire area within a specific construction phase determined to require over-excavation, at the grading phase of development, before wet utilities are installed*", that is not the typical construction process commonly utilized in the El Paso County, Colorado area. The overexcavation for single-family homes is not typically performed by the developer at the time of overlot grading. Rather, overexcavation is typically performed by the individual

builders on a lot-by-lot basis at the time of foundation construction, based on the recommendations contained within the site specific Subsurface Soil Investigation report.

The Anticipated Foundation Systems presented in section 11.0 of our report are not intended to provide specific recommendations for mitigation measures to be performed during the land development phase of construction. Rather, they are intended to provide the developer and prospective builders with a preliminary idea of what foundation systems and/or soil mitigation measures they should expect, if they were to procure lots from that development for the purpose of residential construction.

- **CGS Comment:** *"Based on the close proximity of Jimmy Camp Creek and the adjacent ditch, groundwater should be expected to occur at shallow depths, at least seasonally, that could preclude full-depth basements, especially along the eastern lots. On page 21 of the RMG report, it is noted "proposed detention pond and existing Jimmy Camp Creek 'main tributary' may be located at a higher elevation than the proposed foundation." Since lowermost floor and crawlspace levels must be located at least three feet, and preferably five feet above maximum anticipated groundwater levels, full-depth basements should be considered feasible only if updated, site-specific water level observations and grading plans indicate that the 3-foot separation between lowermost floor or crawlspace levels and the maximum anticipated groundwater surface can be maintained year-round."*

  RMG Response: Groundwater is not the same as surface water. The presence of a creek bed does not necessarily indicate the presence of a shallow groundwater table. Shallow groundwater was not encountered in our test borings for this development. Furthermore, conditions consistent with a wide-spread shallow groundwater table were not encountered nor observed within the lots of the proposed development, nor have we encountered significant signs of a side-spread shallow groundwater table in the course of investigations we have performed on the surrounding properties.

  Based on our knowledge of the area and engineering design and construction techniques employed in the El Paso County area at this time, it is our opinion that there is insufficient reason to preclude full-depth basements on any of the lots in this subdivision at this time. If shallow groundwater conditions are found to exist at the time of the site specific Subsurface Soil Investigations, the feasibility of basement construction and/or any recommended mitigation measures are to be addressed at that time.

  Regarding your comment that the "*lowermost floor and crawlspace levels must be located at least three feet, and preferably five feet above maximum anticipated groundwater levels*", this is not a requirement of either El Paso County or the Pikes Peak Regional Building Department. While homebuilders may elect to utilize this criterion, it is not a regulatory requirement.

- **CGS Comment:** *"The need for an area-wide underdrain should be evaluated."*

  RMG Response: As noted in Section 9.0 of the RMG report, *"It is common local practice for underdrains to be placed at the bottom of sanitary sewer trenches within drive lanes. Underdrains placed in the sanitary sewer trenches in areas where groundwater is anticipated will likely be the "active" type, which uses a perforated drain*

pipe. In areas where groundwater is not anticipated, "passive" type underdrains may be used." The report later states, *"...based on information received from Core Engineering Group, there is no suitable gravity outfall for an underdrain system for this development. If an underdrain system is used, it will likely necessitate construction and maintenance of a pumping station to collect and redirect the discharge from the underdrain system. One potential alternative to this approach would be to provide individual sump pits and pumps for each residence to collect and redirect discharge water from all recommended subsurface foundation drains ..."* The RMG report also provided construction details for both passive and active underdrain systems in Figures 24 and 25. It is our opinion that our report adequate addresses the concept of an area-wide underdrain system, provides details for both types of underdrain systems commonly used, and provides an alternative suggestion to be used if an underdrain system is not used.

- **CGS Comment:** *"RMG states in their report that they did not address the potential for embankment failure along Jimmy Camp Creek. This should be considered for Jimmy Camp Creek, as well as the adjacent ditch."*

  RMG Response: The embankment along the west side of Jimmy Camp Creek, adjacent to the proposed development, was reportedly constructed approximately 10 years ago. At its base, the embankment is approximately 180 feet wide. Per the Preliminary Site Grading and Erosion Control Plans for Carriage Meadows South by Core Engineering Group last dated June, 2016, Core Project No. 100.030, the elevation at the top of the embankment is approximately 5,715 feet. Per the Early Grading and Erosion Control Plans for The Meadows at Lorson Ranch, Filing No. 4 by Core Engineering Group last dated March, 2014, Core Project No. 100.027, the grade elevation of the properties on the east side of Jimmy Camp Creek varies from 5,696 feet to 5,706 feet. Also, per the Letter of Map Revision (LOMR) referenced in this amended report, the Base Flood Elevations provided by FEMA are approximately level with the established grades along the east side of Jimmy Camp Creek (5,696 feet to 5,706 feet, as noted above).

  Based on the information provided in the revised LOMR prepared by FEMA, the maximum 100-year flood elevation is not anticipated to exceed the height of the established grades to the east of Jimmy Camp Creek. Even if the volume of water flowing through Jimmy Camp Creek were to exceed the 100-year flood values predicted by FEMA, the overflow waters from the creek would "bleed" off into the development to the east (Meadows at Lorson Ranch, Filing No. 4) rather than building up behind the embankment and generating the force required to cause failure of that 180-foot wide embankment. Furthermore, because the current channelization of Jimmy Camp Creek is below the base of the embankment, erosion of the embankment by the creek waters is not anticipated to pose a significant risk to the integrity of the embankment.

  The ditch adjacent to Jimmy Camp Creek is a privately held and maintained irrigation canal. The water level inside the canal is reportedly controlled by personnel of the Fountain Mutual Irrigation Company (FMIC) and/or the water users. As such, the water is typically maintained at a level intended to provide the required water to "downstream" users without overtopping the ditch. Likewise, the sides of the ditch are reportedly maintained by personnel of the FMIC and/or the water users. It is not anticipated that the sides of the ditch will erode to the point that the ditch waters are released into the proposed development. Likewise, it is not anticipated that the water level will be allowed

to rise to a level that overtops the ditch and releases the water into the proposed development.

It is our opinion that the potential for failure of the embankment along the west side of Jimmy Camp Creek is very low, and that no special measures are necessary at this time. It is also our opinion that the potential for failure of the ditch along the west side of Jimmy Camp Creek is very low, and that no special measures are necessary at this time.

- **CGS Comment:** *"The preliminary plat geologic hazard note should be updated to reflect the current RMG report revision (June 29, 2016)."*

  RMG Response: It is our opinion that the referenced document should be updated to reflect the amended RMG report (dated October 7, 2016).

- **CGS Comment:** *"Grading plans should be reviewed by a qualified geotechnical engineer to ensure recommendations have been addressed."*

  RMG Response: The purpose of this report is to address geologic conditions (either hazards or constraints) that are anticipated to affect the proposed development and to provide preliminary information regarding what foundation concepts are anticipated to be suitable for the proposed residential structures. The recommendations contained within this report do not provide specific construction recommendations for the land development phase, and none of the recommendations contained herein are anticipated to alter the land development procedures typically performed in the El Paso County area. Therefore, it is our opinion that there are no recommendations contained herein that warrant a review of the grading plans by a qualified geotechnical engineer.

- **CGS Comment:** *"Accelerated erosion in the Jimmy Camp Creek bed and banks was noted during the site visit. This should be considered during evaluations of the channelization and overall long-term stability of the creek re-alignment."*

  RMG Response: RMG was not retained to evaluate erosion of the creek channelization or the overall long-term stability of the creek re-alignment. That is outside the scope of this report. However, given the height of the embankment in relation to the surrounding properties and the size of the embankment (as described above), it is our opinion that erosion of the creek channelization does not pose a significant risk to the proposed development at this time.

- **CGS Comment:** *"A geotechnical engineer should observe and evaluate all excavations for site grading, foundations, and utility installation to determine whether conditions are consistent with design assumptions, and to identify areas that may need additional mitigation."*

  RMG Response: We concur that a geotechnical engineer should observe and evaluate all excavations for foundations and utility installation to determine whether conditions are consistent with design assumptions, and to identify areas that may need additional mitigation. This is consistent with the "standard of care" and with typical construction practices in this area. However, it is not common practice in the El Paso County,

Colorado region for geotechnical engineers to observe or evaluate lot specific site grading, either during or after construction.

- **<u>CGS Comment:</u>** *"The storm water ponds should be lined to prevent water infiltration into the subsurface."*

  <u>RMG Response:</u> The design of the stormwater ponds is outside the scope of this report. However, given the depth to groundwater in our test borings and the lack of significant signs of a wide-spread shallow groundwater table at this site, water infiltration from the proposed stormwater ponds into the subsurface does not pose a significant risk to the development. Therefore, it is our opinion that the need (or lack thereof) for pond liners should be determined by based on the recommendations contained within the approved Drainage Plan for the site.

Concerning Carriage Meadows Geology and Soils Report by RMG and CGS review letter

- **<u>Comment:</u>** *"Provide a map (or add to figure 22) of the hazards referenced in the report overlain by the preliminary plan. This will identify specific lots that are not suitable for basements, include artificial fil where structural fill was previously identified, expansive soils (no basements or shallow foundations) or may need underdrains or other mitigation techniques. Identify the floodplain and those lots or roads in said floodplain. Map the potential unstable slopes on this figure to clearly show no lots are proposed in these areas unless mitigation is proposed. Does the southeast portion of the site still have floodplain located on it? There are lots shown here. See Figure 23 revised FEMA map post LOMR). Should a test boring be completed in the area, nearest to the channel that may or may not be in the FEMA floodplain if lots are proposed near the channel and proposed drainage way?"*

  <u>RMG Response:</u> As noted above, it is our opinion that there is insufficient reason to preclude full-depth basements on any of the lots in this subdivision at this time. That determination shall be made based on conditions encountered in the lot-specific Subsurface Soil Investigation.

  Expansive soils were not identified in the test borings at depths anticipated to affect foundation construction. However, expansive soils have been identified in the immediate area. The data available at this time is not sufficient to map the presence of expansive soils across this site. However, such mapping is not anticipated to be necessary at this time, as the presence of expansive soils is not anticipated to preclude construction at this site. If expansive soils are encountered in the lot-specific Subsurface Soil Investigation and/or Open Excavation Observation performed at the time of construction, they can be mitigated through the use of typical construction practices utilized in the El Paso County area.

  The comment above notes "*…expansive soils (no basements or shallow foundations)…*". There is no requirement by either El Paso County or the Pikes Peak Regional Building Department that precludes the use of basements or shallow foundations in the presence of expansive soils. Furthermore, as noted in our original report, "*…in this case, a deep foundation system would not be advised based on the lack of competent bedrock and groundwater conditions.*" The potential need for underdrains or other mitigation techniques has already been discussed, both in our original report and within this

document. It is our opinion that there is insufficient reason to preclude full-depth basements or shallow foundations on any of the lots in this subdivision.

The areas of fill identified by Kumar and Associates have been added to Figure 22 of the amended report dated October 7, 2016. The approximate boundary of the 100-year floodplain has also been added to Figure 22 of the amended report dated October 7, 2016. This boundary does not intersect any of the proposed roads, but it does cross the southernmost portion of lots 40 through 45. It is not anticipated that there will be adequate separation between the floodplain and the proposed residences on lots 40 through 42 and 45. Additional care may be required on lots 43 and 44 to ensure that the residence does not encroach within the 100-year floodplain. These areas should be marked as "No Build" zones on the approved plat and/or development plans.

No potentially unstable slopes were identified that will impact the lots currently proposed for this site. El Paso County (EPC) Land Development Code (LDC) references the County's Engineering Criteria Manual (ECM) as criteria for preparation of Geology and Soils Reports. In Section C.2.2.E "Geologic Interpretation", of Appendix C of the ECM, the ECM delineates the difference between "Geologic Hazards" and "Geologic Constraints. The ECM definitions are:

1. *Geologic Hazards*
   Geologic hazards include landslides, avalanche, rockfall, mudflows, debris flows, radioactivity, etc.
2. *Geologic Constraints*
   Geologic constraints include expansive soil or rock, potentially unstable slopes, high groundwater levels, soil creep, hydrocompaction, shallow bedrock, erosion, etc.

The only geologic hazard identified in the report that will impact residential construction on the proposed lots is the presence of the floodplain along the southernmost portion of lots 40 through 45. As noted above, that hazard has been mapped in the amended report.

If we can be of further assistance in discussing the contents of this Geology and Soils Report or analysis of the proposed development, from a geologic/geotechnical engineering point-of-view, please feel free to contact us.

Cordially,

RMG – Rocky Mountain Group

Kelli Zigler

Kelli Zigler, P.G.
Professional Geologist

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1.0 GENERAL SITE AND PROJECT DESCRIPTION

1.1 Project Location

The project is generally located southeast of the intersection of Marksheffel Road and Fontaine Boulevard in El Paso County, Colorado. The proposed subdivision name is Carriage Meadows South. The approximate location of the site is shown on the Site Vicinity Map, Figure 1.

1.2 Existing Land Use

The site currently consists of three parcels with a combined total area of approximately 85.92 acres. The three parcels included are:

- Schedule No. 5500000343 which consists of approximately 58.92 acres and is located on the northern to central portion of the site. The parcel is currently not developed.
- Schedule No. 5500000263 consists of approximately 22 acres and is located on the southern portion of the site. The parcel is currently not developed.
- Schedule No. 5522009003 consists of approximately 5 acres and is located near the central portion of the site along the western boundary. The parcel is currently developed and contains a single-family residence with well and septic system.
- Jimmy Camp Creek "main tributary" is also included and is located to the east of the proposed lots. Tracts D, E, F and G consist of approximately 20 acres.

The northern and southern parcels are zoned "Agricultural grazing land/PUD" Planned Unit Development. The 5 acre parcel near the central portion of the site is zoned "RR-5" Residential Rural per the County Zoning. The 5 acre parcel currently has an existing split level single-family residence (reportedly constructed in 1973) of approximately 2,407 square feet. The residence is currently occupied. A well and septic were also located on the property.

1.3 Project Description

The majority of the site will be developed as a single-family residential subdivision and contain approximately 234 single family lots and an approximately 13.70-acre commercial area. Each lot is proposed to contain one new single-family residence. The proposed development will consist of the replat of the three existing parcels into one parcel with an approximately acreage of 106.69 acres.

It is our understanding that the existing 5 acre parcel with the Schedule No. 5522009003 will be replatted and downsized to approximately 1.2 acres. The existing residence, well and septic system are anticipated to remain for a few years and eventually be included into this development. The residence will be demolished and removed at that time, as will the well and septic system. The utility building located on the parcel with the Schedule No. 550000343 is anticipated to be demolished and removed prior to commencement of overlot grading operations.

The northwestern portion of the property will be zoned commercial with approximately 13.70 acres. It is uncertain at this time whether this commercial area will be developed at the same time

as the residential portions of the site, or at a later date. Currently, this proposed commercial area is vacant.

An approximately 5.56-acre area in the northeastern portion of the site will be zoned RMH Residential, to be developed at some future date.

The Jimmy Camp Creek "main tributary" is also included in this development and will be zoned as Tracts E and F, totaling approximately 18.82 acres that are to remain undeveloped.

Rocky Mountain Group (RMG) was retained to explore the subsurface conditions at the site and develop geotechnical engineering recommendations for the proposed land development operations.

2.0 QUALIFICATIONS OF PREPARERS

This Preliminary Soils and Geology report was prepared by a professional geologist as defined by Colorado Revised Statures section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42)

The principle investigators for this study are Kelli Zigler, P.G. and Tony Munger, P.E. Ms. Zigler is a professional Geologist with over 16 years of experience in the geological and geotechnical engineering field. Ms. Zigler holds a Bachelor of Science in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations in Colorado.

Tony Munger is a licensed professional engineer with over 16 years of experience in the construction engineering (residential) field. Mr. Munger and holds a Bachelor of Science in Architectural Engineering from the University of Wyoming.

3.0 STUDY OVERVIEW

The purpose of this investigation is to characterize the general geotechnical and geologic site conditions, and present our opinions of the potential effect of these conditions on the proposed development of single-family residences within the referenced site. As such, our services exclude evaluation of the environmental and/or human, health-related work products or recommendations previously prepared, by others, for this project.

Revisions to the conclusions presented in this report may be issued based upon submission of the development plan. This study has been prepared in accordance with the requirements outlined in the El Paso County Land Development Code (LDC) specifically Chapter 8 last updated 01/06/2015 applicable sections include 8.4.9. and the Engineering Criteria Manual (ECM), specifically Appendix C last updated July 29, 2015.

This report presents the findings of the study performed by RMG relating to the geotechnical and geologic conditions of the above-referenced site. Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction which may indicate conditions that require re-evaluation of some of the criteria presented in this report.

3.1 Scope and Objective

This report presents the findings of our Geology and Soils Investigation for the Lorson Ranch East, which is located in southern El Paso County, Colorado.

The purpose of our report is to adhere to the guidelines outlined in Appendix C of the ECM and Chapter 8.4.9 of the LDC. The occurrences of potential geologic hazards were evaluated and our opinions of the observed conditions on the proposed development with the respect to the intended usage are outlined in this report.

This report presents the findings of the study performed by RMG relating to the geology and soil conditions of the above-referenced site.

3.2 Site Evaluation Techniques

The information included in this report has been compiled from:

- Field reconnaissance
- Geologic and topographic maps
- Review of selected publicly available, pertinent reports
- Available aerial photographs
- Geologic research and analysis

Geophysical investigations were not considered necessary for characterization of the site geology at this time.

3.3 Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations specifically addressed to this site were available for our review and are listed below:

1. *Federal Emergency Management Agency*, Washington, D.C. 20472, Issue date May 7, 2007, Effective date August 29, 2007 for Map Number 08041C0957 F.
2. *Construction Plans for Jimmy Camp Creek Realignment*, prepared by Drexel, Barrell & Co., Job No. C7668-2, dated August 18, 2005.
3. *Fill Observation and Testing, Lorson Ranch Roadways and Drainage Construction*, El Paso County, Kumar and Associates, Inc., Project Number 052-253, Daily Report No: 12-16, 26, 27, 48, 53, 54, 56, 59, 60, 80-90, 102, 107, 112, 117-121, dated Dec. 14, 2005 through July 17, 2006.

4. Preliminary Site Grading Construction plans for Carriage Meadows South, Early Grading/Erosion Control Plans Fontaine Blvd, El Paso County, Colorado, prepared by Core Engineering Group, LLC, Project No. 100.030 dated June 2016.
5. Preliminary Drainage Plan, Carriage Meadows South at Lorson Ranch, prepared by Core Engineering Group, LLC, Project No. 100.030, dated June 2016.

4.0 SITE CONDITIONS

At the time of our site reconnaissance, road construction was occurring along the western boundary, north and south along Marksheffel Road. Access to the site was from the north.

4.1 Proposed Land Use and Zoning

It is our understanding that the single-family home, well and septic system on the replatted 1.2 acres lot will remain until further notice. It is our understanding that these will remain for a couple of years, and then be demolished. At that time, the parcel will be incorporated into this development. However, it is also our understanding that this 1.2-acre area will be included within Tract A. No future structures are anticipated to be built within this area.

The project is to consist of single-family residential construction on 234 lots and commercial construction in the proposed 13.70-acre area at the Carriage Meadows South subdivision. The residential structures are anticipated to be one to two-stories in height with multi-car garages. The homes may either be constructed with or without basements. The configuration of the future commercial structures is not known at this time.

A separate 4.68 acre parcel, with the Schedule No. 5522009004, resides south of the proposed 13.70 acre commercial area included in this investigation. This parcel is to remain and is excluded from this investigation.

Figure 1 presents the general boundaries of our investigation.

4.2 Topography

Based on our site observations, the ground surface generally slopes gently down to the south and east across the entire site. The elevation difference across the site from northwest to southeast is approximately 32 feet. The Jimmy Camp Creek "main tributary" runs along the eastern property line. The Jimmy Camp Creek "main tributary" was dry at the time of the site reconnaissance.

4.3 Vegetation

Vegetation across the site generally consists of tall native grasses, weeds and deciduous trees. The majority of the trees surround the existing single-family residence. Sparse trees are located through-out the reminder of the property.

5.0 FIELD INVESTIGATION

The subsurface conditions within the property were explored by drilling 17 exploratory borings extending to depths of approximately 25 to 30 feet below the existing ground surface. The number of borings is in excess of the minimum one test boring per 10 acres of development up to 100 acres and one additional boring for every 25 acres of development above 100 acres as required by the ECM, Section C.3.3.

The test borings were drilled with a power-driven, continuous-flight auger drill rig. Samples were obtained during drilling of the test borings in general accordance with ASTM D-1586 and D-3550, utilizing a 2-inch O.D. Split Barrel Sampler and a 2½-inch O.D. California sampler, respectively. Results of the penetration tests are shown on the drilling logs. The Preliminary Lot Layout with Test Boring Locations plan is presented in Figure 3. An Explanation of Test Boring Logs is shown in Figure 4, and the Test Boring Logs are shown in Figures 5 through 13.

Soil laboratory testing was performed as part of this investigation. The laboratory tests included moisture content, dry density, grain-size analyses, Atterberg Limits, Swell/Consolidation tests and one FHA swell test. A Summary of Laboratory Test Results is presented in Figure 14. Soils Classification Data is presented in Figures 15 through 18. Swell/Consolidation Test Results are presented in Figures 19 through 21.

6.0 GEOLOGIC AND SUBSURFACE CONDITIONS

6.1 General Physiographic Setting

The site is located within the western flank of the Colorado Piedmont section of the Great Plains physiographic province. The Colorado Piedmont, formed during Late Tertiary and Early Quaternary time (approximately 2,000,000 years ago), is a broad, erosional trench which separates the Southern Rocky Mountains from the High Plains. During the Late Mesozoic and Early Cenozoic Periods (approximately 70,000,000 years ago), intense tectonic activity occurred, causing the uplifting of the Front Range and associated downwarping of the Denver Basin to the east. Relatively flat uplands and broad valleys characterize the present-day topography of the Colorado Piedmont in this region.

6.2 General Geology

The general geology of the area is typically stream terrace deposits and alluvium soils overlying the Pierre Shale. Four geologic units were mapped in the vicinity of the site and are identified (Morgan, et al., 2003) as:

- al: alluvium is loose, unconsolidated (not cemented together into a solid rock) soil or sediments, which has been eroded, reshaped by water in some form, and redeposited in a non-marine setting. Alluvium is typically made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel.

- a QP: Piney Creek Alluvium (Upper Holocene) – alluvium is associated with the Jimmy Camp Creek. The alluvium contains pebble lenses. Unmapped deposits are subject to flooding. The top of terrace alluvium is estimated to be approximately 20 feet above major streams. Permeability is low, easily excavated and compacted. Foundation stability is generally fair. Clay portions of this unit may have low to moderate swell potential when wetted.

- Kp: Pierre Shale – (Upper Cretaceous) Underlain by the Piney Creek Alluvium. Permeability is generally low, excavation and compaction generally easy. Foundation stability is less than fair. The majority of the formation has low to high swell potential. Slope stability is generally poor and slopes steeper than 5 degrees may slide, if the toe of the slope is removed.

- af: Artificial Fill – man-placed fill was not encountered in our test borings. However, an existing single-family residence and multiple utility buildings reside on the property. It is anticipated that fill conditions may exist around and beneath the structures.

The General Geology is presented in the Geologic Conditions Map, Figure 22.

6.3 U.S. Soil Conservation Service

The U.S. Soil Conservation Service along with United States Department of Agriculture (USDA) has identified the soils on the property as:

- 28 - Ellicott Loamy coarse sand, 0 to 5 percent slopes. The Ellicott soils were mapped by the USDA to be located along Jimmy Camp Creek and the southeastern portion of the site. The Ellicott Loamy course sands encompass approximately 50.3 acres for a total of 46.1 percent of the property. Properties of the Ellicott Loamy course sand include, somewhat excessively drained soil, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequent flooding, and landforms include depressions and swales.

- 30 – Fort Collins loam, 0 to 3 percent slopes. The Fort Collins loam was mapped by the USDA to be located near the central portion of the property and traversing to the south and southwest property corner. The Fort Collins loam encompasses approximately 25 acres for a total of 22.9 percent of the property. Properties of the Fort Collins loam include, well-drained soil, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding is none, and landforms are flat.

- 52 – Manzanst clay loam, 0 to 3 percent slopes. The Manzanst clay loam was mapped by the USDA to be located near the northwest corner of the property. The Manzanst clay loam encompasses approximately 33.5 acres for a total of 30.8 percent of the property. Properties of the clay loam include, well-drained soils, depth of the water table is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding is not, and landforms include terraces and drainage-ways.

- 59- Nunn clay loam, 0 to 3 percent slopes. The Nunn clay loam was mapped by the USDA to be located near the southwest corner of the property. The Nunn clay loam encompasses

approximately 0.2 acres for a total of 0.2 percent of the property. Properties of the clay loam include, well drained soils, depth of the water is anticipated to be greater than 6.5 feet, runoff is anticipated to be low, frequency of flooding is not, and landforms include terraces and fans.

6.4 Subsurface Materials

The subsurface materials encountered in the test borings were classified using the Unified Soils Classification System (USCS) and the materials were grouped into the general categories of silty sand fill, native silty sand and native sandy clay.

Additional descriptions and the interpreted distribution (approximate depths) of the subsurface materials are presented on the Test Boring Logs. The classifications shown on the logs are based upon the engineer's classification of the samples at the depths indicated. Stratification lines shown on the logs represent the approximate boundaries between material types and the actual transitions may be gradual and vary with location.

6.4.1 Bedrock Conditions

Bedrock was not encountered in the test borings for this investigation. The bedrock beneath the site is considered to be part of the Pierre Shale Formation.

6.4.2 Structural Features

Structural features such as schistocity, folds, zones of contortion or crushing, joints, shear zones or faults were not observed on the site, surrounding the site or in the soil samples collected for laboratory testing.

6.4.3 Surficial (Unconsolidated) Deposits

Various lake and pond sediments, swamp accumulations, sand dunes, marine and non-marine terrace deposits, talus accumulations, creep or slope wash were not observed along the Jimmy Camp Creek "main tricutary". Slump and slide debris was also not observed.

6.4.4 Drainage of Water and Groundwater

The overall topography of the site slopes down to the south and east towards the Jimmy Camp Creek "main tributary". Groundwater was encountered in 11 of the test borings at depths ranging from approximately 19 to 29 feet at the time of drilling. When checked 5 days subsequent to drilling groundwater was encountered in 16 of the test borings at depths ranging from approximately 21 to 29 feet below the existing ground surface.

Evidence of meandering along the Jimmy Camp "main tributary" was not visible at the time of the site reconnaissance. The Jimmy Camp Creek "main tributary" is currently a defined drainage way. Review of the historical photos provided by Google Earth depict that the Jimmy Camp main tributarty was rerouted after March 2006. Prior to 2006, the natural drainage of the Jimmy Camp Creek "main tributary" was undefined and meandered through the existing property.

6.4.5 Features of Special Significance

Features of special significance such as accelerated erosion, (advancing gully head, badlands or cliff reentrants) were not observed on the property.

Features indicating settlement or subsidence such as fissures, scarplets and offset reference features were also not observed on the property.

Features indicating, creep, slump or slide masses in bedrock and surficial deposits were also not observed on the property.

6.5 Engineering Geology

The Engineering Geology is presented below. Charles Robinson and Associates have mapped two environmental engineering units the site as:

- 2A: Stable alluvium, colluvium and bedrock on gentle to moderate slopes (5-12%).
- 7A: Physiographic floodplain where erosion and deposition presently occur and is generally subject to recurrent flooding. Includes 100-year along major streams where floodplain studies have been conducted and Base Flood Elevations have been determined.

The Engineering Geology is presented on the Geologic Conditions Map presented in Figure 22.

6.6 Mineral Resources

Under the provision of House Bill 1529, it was made a policy by the State of Colorado to preserve for extraction commercial mineral resources located in a populous county. Review of the *Master Plan for Mineral Extraction*, indicate the site is identified as Valley Fill which consists of sand and gravel with silt and clay deposited by water. The test borings indicated the wind-blown sand and alluvial terrace deposits were encountered at shallow depths and are not considered to be economical. Extraction of the clay resources are also not considered to be economical compared to materials available elsewhere within the county.

6.7 Permeability

The permeability of a soil measures how well air and water can flow within the soil. Soil permeability varies according to the type of soil and other factors.

The infiltration rate of a soil refers to how much water a type of soil can absorb over a specific time period. Infiltration rates are determined by soil permeability and surface conditions, and usually are measured in inches per hour.
Misinterpretation

The soils encountered in the test borings, at the time of drilling were silty sand fill, native silty sand and native sandy clay. Silty to clayey sand (man-placed and native) was encountered at the surface in all of the test borings and extended to approximately 8 to 30 feet below the existing surface. Underlying the sand, sandy clay was encountered in five of the test borings and extended

from 14 feet to 30-foot termination depth of the borings. The permeability of the upper sands is anticipated to be moderate to high. The permeability of the sandy clay is anticipated to be low.

7.0 POTENTIAL GEOLOGIC CONDITIONS

The El Paso County Engineering Criteria Manual recognizes and delineates the difference between hazards and constraints. A geologic hazard is one of several types of adverse geologic conditions capable of causing significant damage or loss of property and life. Geologic hazards are defined in Section C.2.2 Sub-section E.1 of the ECM. A geologic constraint is one of several types of adverse geologic conditions capable of limiting or restricting construction on a particular site. Geologic constraints are defined in Section C.2.2 Sub-section E.2 of the ECM. The following sections discuss potential geologic conditions that commonly exist within El Paso County, Colorado.

7.1 Landslides

Landslides are a form of mass wasting slope failure that consists of relatively rapid downward sliding, falling, or flowing of a mass of soil, rock, or a mixture of the two. Landslides typically have one or more distinct failure surfaces. They typically occur on slope sides where the shear strength of a material is exceeded by the driving mass or weight of the material and may be induced by the presence of groundwater, heavy precipitation, and seismic events.

RMG reviewed the electronic (online) version of the Colorado Landside Inventory map prepared by the Colorado Geological Survey (CGS). The subject site is not in an area identified as a previously mapped landslide.

The CGS is in the process of digitizing all mapped landslides that have been published in geologic and geologic hazard maps of Colorado. Mapped landslides can be queried for the publication citation and the map unit using the website:

https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=9dd73db7fbc34139abe51599396e2648.

Based on the site conditions observed and the available information referenced herein, the subject property is not considered to be prone to landslides.

7.2 Rockfall

Rockfall is the falling of a newly detached mass of rock from a cliff or down a very steep slope, and is considered to be a type of landslide with a very rapid rate of down-slope movement. It usually occurs on mountainside or other steep slopes during periods of abundant moisture and frequent freeze-thaw cycles, and is caused by the loss of support from underneath or detachment from a larger rock mass. Ice wedging, root growth, or ground shaking, erosion or chemical weathering may start the fall. The rocks may freefall, bounce, tumble, roll, or slide down slope and can vary considerably in size.

The subject site does not have exposed cliffs or very steep slopes above or around it to generate rockfall. The subject property is not considered to be prone to rockfall.

7.3 Debris Flows and Debris Fans

Debris flows consist of water with a high sediment load of sand, cobbles and boulders flowing down a stream, ravine, canyon, arroyo or gully, and are typically activated by heavy or long-term rains or snowmelts which cause rapid erosion and transport of surficial materials down slope of drainages. Debris fans are created when debris flows reach a valley with a much lower gradient. As the energy level drops, the sediment load is deposited creating the fan shape.

Debris flows and fans have not been mapped or visually identified in the immediate proximity of the subject property site. The gradient and source materials along the Jimmy Camp Creek "main tributary" are, in general, not conducive for generation of debris flows.

7.4 Faults and Seismicity

Faults are a discontinuity in a volume of rock, across which there has been significant displacement as a result of rock mass movement.

There are several geologic faults within ten to fifteen miles west of the site. The Rampart Range Fault, which is associated with the Ute Pass Fault complex, has been active during geologically recent times and could affect the site if it did rupture.

Earthquakes felt at this site will most likely result from minor shifting of the granite mass within the Pikes Peak Batholith which includes pull from minor movements along faults found in the Denver basin (Kirkham and Rodgers, 1981). Ground motions resulting from small earthquakes are more likely to affect structures at this site and will likely only affect slopes stability to a minimal degree.

The Pikes Peak Building Code, 2011 Edition, indicates maximum considered earthquake spectral response accelerations of 0.185g for a short period (S_s) and 0.059g for a 1-second period (S_1). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class C, with an average a shear wave velocity ranging from 1,200 to 2,500 feet per second for the materials in the upper 100 feet.

7.5 Steeply Dipping Bedrock

Steeply dipping bedrock is a geological hazard common along the Rocky Mountain Front Range piedmont where uplifted sedimentary formations containing thin layers of moderately to highly expansive shale are encountered near the ground surface e.g., Noe and Dodson 1995; Noe 1997. Problematic formations in the region, most notably the Pierre Shale, are characterized by relatively thin vertically oriented beds that can exhibit dissimilar swelling characteristics from one particular bed to the next.

The site is lies outside of the mapped zone of areas susceptible to differential heave in expansive steeply dipping bedrock. Bedrock was encountered in ten of test borings drilled for this

investigation, but indications of dipping bedrock were not observed in the soil samples collected. The site is generally not considered to be prone to steeply dipping bedrock.

7.6 Unstable or Potentially Unstable Slopes

Slope stability is the potential of soil covered slopes to withstand and undergo movement. The stability of a slope is determined by the balance of shear stress and shear strength. Previously stable slopes may initially be affected by preparatory factors, making the slope conditionally unstable. Factors that may trigger a slope failure may be climatic events that can make a slope actively unstable, leading to mass movements. Mass movements can be caused by an increase in shear stress, such as loading, lateral pressure, and transient forces. Alternatively, shear strength may be decreased by weathering, changes in pore water pressure, and organic material.

The north bank of Jimmy Camp Creek "main tributary" has a slope of approximately 4:1 (horizontal:vertical). Man-made erosion protection in the form of check damns comprised of large cobbles and boulders were observed throughout the creek.

Additional erosion to the banks of Jimmy Camp Creek due to an excessive flow of water down the creek may have the potential to undercut or erode the banks of the creek, resulting in the development of local slumps and creeping along the banks of the creek at some point in the future.

According to the LDC, Chapter 8.4.2 Section B.3 Unsuitable Building Areas, areas that are identified as having certain characteristics "… *shall be deemed unsuitable for building and shall be identified as no build areas on the plat."* One such characteristic is *"Areas where slopes are greater than 30%."* These areas have typically been designated as "No Build" areas in the recent past.

Unstable slopes or apparent signs of ongoing slope movement were not observed around or on the property. The subject site is also not in an area identified as containing unstable slopes in the Colorado Landslide Inventory map referenced in section 7.1 of this report.

We believe the surficial soils will classify as Type C materials as defined by OSHA in 29CFR Part 1926, date January 2, 1990. OSHA requires temporary slopes made in Type C materials be laid back at ratios no steeper than 1.5:1 (horizontal to vertical) unless the excavation is shored or braced. Flatter slopes will be necessary should groundwater conditions be encountered.

7.7 Ground Subsidence

Subsidence is the motion of the ground surface (usually, the Earth's surface) as it shifts downward relative to a datum such as sea-level.

Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydrocompaction).

The presence of sinkholes and collapse were not observed on the site. The site lies outside of the Colorado Springs Subsidence Investigation report (Dames and Moore, 1985). Evidence of

underground mining in the presence of coal was not encountered in the test boring samples. The site is generally not considered to be prone to ground subsidence.

7.8 Hydrocompactive and Potentially Expansive Soils (Moisture Sensitive Soils)

Hydrocompactive soils are prone to collapse (settlement) when exposed to increases in moisture content and/or loads from foundations. Hydrocompactive characteristics are typical of depositional soils (alluvium or colluvium deposits). Based upon the available laboratory test results, the soils tested did exhibit compression values ranging from 0.1 to 3.2 percent when inundated with water under surcharge loads of 1,000 psf. The soils also exhibited swell values ranging from 0.5 to 1.2 percent when inundated with water under surcharges loads of 1,000 psf. The soils tested generally exhibit low to moderate hyrdocompactive characteristics and low to moderate expansion potential.

The soils on site can be problematic, particularly when they become wet under a load. The windblown surficial soils can consolidate when water is introduced to the subsurface. Several of the test borings drilled for this investigation exhibited low-density soils at depth.

7.9 Radioactivity/Radon Gas

*"**Radon Act 51** passed by Congress set the natural outdoor level of radon gas (0.4 pCi/L) as the target radon level for indoor radon levels. The US EPA has set an action level of 4 pCi/L. At or above this level of radon, the EPA recommends you take corrective measures to reduce your exposure to radon gas".*

Most of Colorado is generally considered to have the potential of high levels of radon gas, based on the information provided at: http://county-radon.info/CO/El_Paso.html. There is not believed to be unusually hazardous levels of radon from naturally occurring sources at this site.

7.10 Flooding and Surface Drainage

The Jimmy Camp Creek "main tributary" resides along the eastern property boundary. The Flood Insurance Study report and Flood Insurance Rate Map for FEMA Map Number 08041C0957F has been revised by The City of Fountain, Colorado, Case No. 06-08-B643P by means of a Letter of Map Revision (LOMR). This has resulted in a revised delineation of the regulatory floodway. The revised delineation went into effect August 29, 2007. The Letter of Map Revision Determination Document is presented in Appendix B.

The Jimmy Camp Creek "main tributary" resides in Zone AE which is defined by FEMA as areas subject to inundation by the 1-percent-annual chance-flood event determined by detailed methods. Base Flood Elevations are shown. This area extends onto the southern edge of lots 40 through 45. These areas shall be designated as "No Build". The Base Flood Elevations have also been revised by FEMA. The remainder of the site now lies in the Zone X as determined by Federal Emergency Management Agency (FEMA). Zone X is defined by FEMA as an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood.

The remainder of the site now lies in the Zone X. Zone X is defined by FEMA as an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood.

7.11 Springs and High Groundwater

Based on the site observations, review of the Fountain Quadrangle of El Paso County, 7.5 minute series (Topographic) dated 2000, and Google Earth images dating back to September 1999, springs do not appear to originate on the subject site. However, the Jimmy Camp Creek "main tributary" has been re-aligned. Groundwater was encountered at depths of 19 feet or greater in the test borings for this investigation at the time of drilling (on May 5, 2016) and when checked 6 days subsequent to drilling.

Fluctuations in groundwater and subsurface moisture conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Development of the property and adjacent properties may also affect groundwater levels.

7.12 Erosion and Corrosion

The upper sands encountered at the site are susceptible to erosion by wind and flowing water. The claystone at this site typically has low resistivity values (less than 2,000 ohm-cm) and is likely to be potentially corrosive to buried, ferrous metal piping and other structures. The sandy clay is also likely to contain elevated amounts of water soluble sulfates which are potentially corrosive to Portland cement concrete.

8.0 BEARING OF GEOLOGIC CONDITIONS UPON PROPOSED DEVELOPMENT

Geologic hazards (as described in section 7.0 of this report) and geologic constraints (also as described in section 7.0 of this report) were found to be present at this site.

The geologic hazards anticipated to affect this site are Flooding, Faults/Seismicity and Radioactivity/Radon Gas.

The most significant geologic constraints to development recognized at this site are *potential for expansive and hydrocompactive soils.* It may be necessary to design and implement mitigation alternatives at the site.

The geologic conditions encountered at this site are relatively common to the immediate area and mitigation can be accomplished by implementing common engineering and construction practices.

8.1 Hydrocompactive and Potentially Expansive Soils (Moisture Sensitive Soils)

The potential for settlement and heave resulting from hydrocompaction and expansion, respectively, are typically addressed in site-specific geotechnical engineering investigations and open excavation observations for each proposed structure.

Shallow foundations are anticipated for structures within this development. Foundation design and construction are typically adjusted for hydrocompactive and expansive soils. Mitigation of expansive soils and bedrock are typically accomplished by overexcavation and replacement with structural fill, subexcavation and replacement with on-site moisture-conditioned soils, and/or the installation of deep foundation systems. However, in this case, a deep foundation system would not be advised based on the lack of competent bedrock and groundwater conditions. Floor slab movements on the order of one to three inches are possible after mitigation. Where movements of this magnitude cannot be tolerated, structural floors may be implemented.

8.2 Shallow Groundwater

Shallow groundwater conditions were not identified in this investigation. Groundwater was measured at depths of 19 feet or greater below the existing ground surface. However, grading plans were not reviewed prior to this report being issued. If shallow groundwater conditions are encountered during the Site Specific Soils Investigations and Open Excavation Observations, mitigations can include a combination of surface and subsurface drainage systems, vertical drainboard, etc.

In general, if groundwater was encountered within 4 to 6 feet of the proposed basement slab elevation, an underslab drain should be anticipated in conjunction with the perimeter drain. Perimeter drains are anticipated for each individual lot to prevent the infiltration of water and to help control wetting of potentially expansive and hyrdocompactive soils in the immediate vicinity of foundation elements. It must be understood that the drain is designed to intercept some types of subsurface moisture and not others. Therefore, the drain could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

8.3 Flooding

Since the Jimmy Camp Creek "main tributary" has undergone realignment and the FEMA Map has been revised. The Jimmy Camp Creek "main tributary" resides in Zone AE which is defined by FEMA as areas subject to inundation by the 1-percent-annual chance-flood event determined by detailed methods. This area extends onto the southern edge of lots 40 through 45. These areas shall be designated as "No Build". The remainder of the site now lies in the Zone X. Zone X is defined by FEMA as an area of minimal flood hazard that is determined to be outside the Special Flood Hazard Area and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood.

8.4 Surface Grading and Drainage

The ground surface should be sloped from the buildings with a minimum gradient of 10 percent for the first 10 feet. This is equivalent to 12 inches of fall across this 10-foot zone. If a 10-foot zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum 5 feet from the foundation and sloped parallel with the wall with a minimum slope of 2 percent to intercept the surface water and transport it around and away from the structure. Roof drains should extend across backfill zones and landscaped areas to a region that is graded to direct flow away from the structure. Homeowners should maintain the surface grading

and drainage recommended in this report to help prevent water from being directed toward and/or ponding near the foundations.

Landscaping should be selected to reduce irrigation requirements. Plants used close to foundation walls should be limited to those with low moisture requirements and irrigated grass should not be located within 5 feet of the foundation. To help control weed growth, geotextiles should be used below landscaped areas adjacent to foundations. Impervious plastic membranes are not recommended.

Irrigation devices should not be placed within 5 feet of the foundation. Irrigation should be limited to the amount sufficient to maintain vegetation. Application of more water will increase the likelihood of slab and foundation movements.

The recommendations listed in this report are intended to address normal surface drainage conditions, assuming the presence of groundcover (established vegetation, paved surfaces, and/or structures) throughout the regions upslope from this structure. However, groundcover may not be present due to a variety of factors (ongoing construction/development, wildfires, etc.). During periods when groundcover is not present in the "upslope" regions, higher than normal surface drainage conditions may occur, resulting in perched water tables, excess runoff, flash floods, etc. In these cases, the surface drainage recommendations presented herein (even if properly maintained) may not mitigate all groundwater problems or moisture intrusion into the structure. We recommend that the site plan be prepared with consideration of increased runoff during periods when groundcover is not present on the upslope areas.

8.5 Fill Soils

Man-placed fill was encountered in test boring TB-10. TB-10 is located near the western portion of the Jimmy Camp Creek "main tributary". The Jimmy Camp Creek "main tributary" was realigned in 2006, and the fill soils from this realignment may be encountered within the original streambed. It is our understanding that these fill soils were observed and tested during placement by Kumar & Associates, as shown on the Fill Observation and Testing Reports referenced herein. Based on our review of these reports, it appears that the fill soils described above were (in general) placed with adequate compactive effort. However, even in approved fill soils, isolated areas of unsuitable fill may exist.

Fill soils may be considered unsuitable for a variety of reasons. These include (but are not limited to) non-engineered fills, fill soils containing trash or debris, fill soils that appear to have been improperly placed and/or compacted, etc. If unsuitable soils are encountered during the Site Specific Soils Investigation and/or the Open Excavation Observation, they may require removal (overexcavation) and replacement with compacted structural fill.

The alignment of the original streambed was not evident at the time of the site reconnaissance, due to the tall thick vegetation. The original streambed had been filled in and the fill placement was reportedly observed and compaction testing was reportedly performed by Kumar & Associates, Inc. The compaction testing for fill observation and testing for Lorson Ranch Roadway and Drainage Construction documentation was reviewed. After review of the Kumar & Associates, Inc compaction testing and the construction plans for Jimmy Camp Creek Realignment the fill soils

encountered in this area will be considered "engineered". The fill soils should be acceptable for the overlot grading process.

An existing single-family residence with multiple utility buildings exists near the central portion of the site. It is assumed that man-placed backfill may be encountered in the vicinity of these structures during construction. It is unlikely that these backfill soils were observed and/or tested during placement. As such, these fill soils will also be considered "non-engineered" and should be removed and replaced if they are to underlie the proposed new structures.

8.6 Proposed Grading, Cuts and Masses of Fill

Preliminary grading plans were provided and reviewed at the time the report was issued. It appears that limited grading is proposed. It is assumed based on the test borings for this investigation that the excavations will encounter silty to clayey sands near the surface overlying interbedded layers of sandy clay. The on-site sand soils can be used as site grading fill.

Prior to placement of overlot fill or removal and recompaction of the existing materials, topsoil, low-density native soil, fill and organic matter should be removed from the fill area. The subgrade should be scarified, moisture conditioned to within 2% of the optimum moisture content, and recompacted to the same degree as the overlying fill to be placed. The placement and compaction of fill should be periodically observed and tested by a representative of RMG during construction.

Guideline Site Grading Specifications are included in the Appendix A.

8.7 Onsite Waste Disposal

It is our understanding that on-site wastewater treatment systems are not proposed. Based on the Preliminary Plan by Thomas and Thomas dated September 26, 2016, sewer services will be dedicated to Widefield Water and Sanitation District.

8.8 Radioactivity/Radon Gas

Based upon a Map of Radon Zones by the Colorado Department of Public Health and Environment (CDPHE) (Ref. 6), two zones of radon potential are indicated in Colorado, Zone 1 - High Radon Potential (probable indoor radon average >4 pCi/L) and Zone 2 -Moderate Radon Potential (probable indoor radon average 2-4 pCi/L). El Paso County is located within Zone 1.

As indicated previously, there is not believed to be an unusual hazard from naturally occurring sources of radon activity. Providing increased ventilation of basements, crawlspaces and sealing of joints can mitigate the buildup of radon gas. Radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards.

8.9 Erosion and Corrosion

The upper sands encountered at the site are susceptible to erosion by wind and flowing water. The clays at this site typically have low resistivity values (less than 2,000 ohm-cm) and are likely to be

potentially corrosive to buried, ferrous metal piping and other structures. The sandy clay is also likely to contain elevated amounts of water soluble sulfates which are potentially corrosive to Portland cement concrete.

To help mitigate potential corrosion, buried ferrous metal piping, conduit, and similar construction materials should be coated, wrapped or otherwise protected to avoid or reduce contact with the on-site soils. For environments corrosive to concrete, sulfate-resistant cement and additives should be used.

8.10 Seismicity

The Pikes Peak Building Code, 2011 Edition, indicates maximum considered earthquake spectral response accelerations of 0.185g for a short period (S_s) and 0.059g for a 1-second period (S_1). Based on the results of our experience with similar subsurface conditions, we recommend the site be classified as Site Class C, with an average a shear wave velocity ranging from 1,200 to 2,500 feet per second for the materials in the upper 100 feet. Specific recommendations should be provided by the Geotechnical Engineer during the design phase of the project.

8.11 Special Recommendations

The existing detention pond is to remain and be expanded. This location is identified as Tract H on the preliminary development plan provided by Thomas and Thomas. Additionally, the Jimmy Camp Creek "main tributary" extends along the eastern boundary of the site. Based on the relative elevation of these water features to the proposed structures and the conditions encountered in the subsurface soil investigation and the open excavation observation for each lot, additional drainage features may be recommended.

It appears the current Jimmy Camp Creek "main tributary" alignment will remain undisturbed. Development and construction activities performed along the Jimmy Camp Creek "main tributary" shall be performed in such a way that they do not disturb or undercut the existing embankment. Personnel of RMG have not reviewed this existing embankment for adequacy. If the embankment were to fail, significant amounts of water could be discharged into the subject site in a rapid manner. This could result in flooding of the structures and erosion of the surface materials, and potentially could result in loss of subgrade stability below foundations leading to additional foundation movement. However, based on the elevation of Jimmy Camp Creek "main tributary" per the construction plans for the Jimmy Camp Creek Realignment, the proposed low channel flow is approximately 4 to 6 feet lower in elevation than the existing ground surface and the proposed FEMA elevations. This should reduce the risk of flooding.

9.0 BURIED UTILITIES

Based upon the conditions encountered in the exploratory test borings, we anticipate that the soils encountered in the utility trench excavations will consist of silty to clayey sands overlying interbedded layers of sandy clay. It is anticipated that the sands will be encountered at very loose to medium dense relative densities and the clays at soft to very stiff consistencies. Depending on the depth of excavations, temporary shoring and hydraulic water pumps may be required to prevent the collapse of trenches and the accumulation of water at the bottom of the excavation.

We believe the sand will classify as Type C materials and the bedrock as Type B materials as defined by OSHA in 29 CFR Part 1926. OSHA requires that temporary excavations made in Type B and C materials be laid back at ratios no steeper than 1:1 (horizontal to vertical) and 1½:1 (horizontal to vertical), respectively, unless the excavation is shored and braced. Excavations deeper than 20 feet, or when water is present, should always be braced or the slope designed by a professional engineer.

Utility mains such as water and sanitary sewer lines are typically placed beneath paved roadways. The settlement of the utility trench backfill can have a detrimental effect on pavements and roadway surfaces. We recommend that utility trench backfill be placed in thin loose lifts, moisture conditioned as required and compacted to the recommendations outlined in the **Backfill** section of this report. The placement and compaction of utility trench backfill should be observed and tested by a representative of RMG Engineers during construction.

It is a common local practice for underdrains to be placed at the bottom of sanitary sewer trenches within drive lanes. Underdrains placed in the sanitary sewer trenches in areas where groundwater is anticipated will likely be the "active" type, which uses a perforated drain pipe. In areas where groundwater is not anticipated, “passive” type underdrains may be used. Typical underdrain details are presented in Figures 22 and 23. The outfall for the sanitary sewer trench underdrain was not known at the time of this investigation because the development plan and grading plan were not available for our review. However, based on information received from personnel of Core Engineering Group, there is no suitable gravity outfall for an underdrain system for this development. If an underdrain system is used, it will likely necessitate construction and maintenance of a pumping station to collect and redirect the discharge from the underdrain system. One potential alternative to this approach would be to provide individual sump pits and pumps for each residence to collect and redirect discharge water from all recommended subsurface foundation drains. If this option is selected, care should be taken to ensure that the sump pumps have outfall to a location that is graded to direct the discharge water away from the surrounding structures and to a suitable collection or drainage area.

10.0 PAVEMENTS

Preliminary Roadway Layout plans were provided prior to the report issue date. Roadways throughout the proposed development are anticipated to be classified as Urban/Residential, Local and Residential Collectors in accordance with Appendix D of the ECM. The actual pavement section design for individual streets will be completed following overlot grading and rough cutting of the street subgrade.

For preliminary planning purposes, estimated full-depth pavement sections have been evaluated based on current design criteria. For purposes of this report, we anticipate the subgrade soils will primarily have an American Association of State Highway and Transportation Officials (AASHTO) Soil Classification of A-1-B, A-2-4, A-3, A-4 and A-6 with an estimated California Bearing Ratio (CBR) value of approximately 5 to 15.

The above value is for preliminary planning purposes and may vary upon final design, dependent upon the soil material used for subgrade construction.

11.0 ANTICIPATED FOUNDATION SYSTEMS

Based on the information presented previously, conventional shallow foundation systems consisting of standard spread footings/stemwalls are anticipated to be suitable for the proposed residential structures. It is assumed that the deepest excavation cuts will be approximately 6 to 8 feet below the final ground surface not including overexcavation which may be required on a lot-by-lot basis.

Due to their swell potential, the sandy clay is not suitable for support of shallow foundations or floor slabs. Where expansive soils are encountered near foundation or floor slab levels, they should be removed and replaced with granular, non-expansive structural fill. Where expansive soils are encountered near spread footing foundation or floor slab levels, they should be removed and replaced with granular, non-expansive structural fill. Foundation systems which may reduce or eliminate the need for overexcavation include (but are not limited to) post-tension slabs-on-grade, integral stiffened (ribbed) slab foundations, driller pier (caisson) foundations with or without a structural floor, etc.

If loose or hyrdocompactive sands are encountered, they may require additional compaction. In some cases, removal and recompaction may be required for loose soils. Similarly, if shallow groundwater conditions result in unstable soils, unsuitable for bearing of residential foundations, these soils may require stabilization prior to construction of foundation components.

The foundation system for each lot should be designed and constructed based upon recommendations developed in a detailed Subsurface Soil Investigation completed after site development activities are complete. The recommendations presented in the Subsurface Soil Investigation should be verified by an Open Excavation Observation following the excavation on each lot.

11.1 Subexcavation and Moisture-Conditioned Fill

Based upon the field exploration and laboratory testing, subexcavation and replacement may be required in some areas. Prior to performing excavation and/or filling operations, vegetation, organic and deleterious material shall be cleared and disposed of in accordance with applicable requirements. The excavation should extend to a minimum depth below and laterally beyond the bottom of foundations as determined based on final grading plans.

11.2 Foundation Stabilization

If moisture conditions encountered at the time of foundation excavation result in water flow into the excavation and/or destabilization of the foundation bearing soils, stabilization techniques should be implemented. Various stabilization methods can be employed, and can be discussed at the time of construction. However, a method that affords potentially a reduced amount of overexcavation (versus other methods) and provides increased performance under moderately to severely unstable conditions is the use of a layered geogrid and structural fill system.

Additionally, dependent upon the rate of groundwater flow into the excavation, a geosynthetic vertical drain and an overexcavation perimeter drain may be required around the lower portions of the excavation to allow for installation of the layered geogrid and structural fill system.

11.3 Foundations Drains

A subsurface perimeter drain is recommended around portions of the structure which will have habitable or storage space located below the finished ground surface. This includes crawlspace areas but not the walkout trench, if applicable.

Shallow groundwater conditions were not encountered in the test borings at the time of field exploration. However, as noted above, the proposed detention pond and the existing Jimmy Camp Creek "main tributary" may be located at a higher elevation than the proposed foundations. Depending on the conditions encountered during the lot specific Subsurface Soils Investigation and the conditions observed at the time of the Open Excavation Observation, additional subsurface drainage systems may be recommended.

Core Engineering has determined that after designing the grading for Carriage Meadows South, the following conclusion regarding the feasibility of an underdrain system was determined. There is no suitable gravity outfall for an underdrain system for this development. So, either the system would have to be pumped, each perimeter drain may need sump pumps, or some other means of handling discharge from the perimeter drains for the foundations may be required.

One such system is an underslab drainage layer to help intercept groundwater before it enters the slab area should the groundwater levels rise. In general, if groundwater was encountered within 4 to 6 feet of the proposed basement slab elevation, an underslab drain should be anticipated. Another such system would consist of a subsurface drain and/or vertical drain board placed around the perimeter of the overexcavation to help intercept groundwater and allow for proper placement and compaction of the replacement structural fill. Careful attention should be paid to grade and discharge of the drain pipes of these systems.

It must be understood that the drain systems are designed to intercept some types of subsurface moisture and not others. Therefore, the drains could operate properly and not mitigate all moisture problems relating to foundation performance or moisture intrusion into the basement area.

11.4 Design Parameters

The allowable bearing pressure of the surface sands should be determined by a detailed site specific Subsurface Soils Investigation. Bearing directly on the clay and/or hydrocompactive sands is not recommended.

12.0 ADDITIONAL STUDIES

The findings, conclusions and recommendations presented in this report were provided to evaluate the suitability of the site for future development. Unless indicated otherwise, the test borings, laboratory test results, conclusions and recommendations presented in this report are not intended

for use for design and construction. ***We recommend that a site specific Subsurface Soil Investigation be performed for all proposed structures including (but not limited to) residences, community or common buildings, retaining walls and pumphouses, commercial buildings, etc.***

To develop recommendations for construction of the proposed roadways, a pavement design investigation should be performed. This investigation should consist of additional test borings, soil laboratory testing and specific recommendations for the design and construction of roadway pavement sections.

13.0 CONCLUSIONS

Based upon our evaluation of the geologic conditions, it is our opinion that the proposed development is feasible. Except for the potential of flooding, the geologic hazards identified are not considered unusual for the Front Range region of Colorado. Mitigation of geologic hazards is most effectively accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic hazards should be mitigated by implementing appropriate planning, engineering, and local construction practices.

Potential mitigation alternatives include (but are not limited to) overexcavation and replacement of unsuitable soils and the design and construction of surface and subsurface drainage systems which are commonly used in the El Paso County vicinity.

14.0 CLOSING

This report has been prepared for the exclusive purpose of providing geologic hazards information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

This report has been prepared for the exclusive use by **Lorson Ranch Metropolitan District No. 1** for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical and geological engineering practices. The analyses and recommendations in this report are based in part upon data obtained from test borings, site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG should be retained to review the recommendations presented in this report considering the varied condition, and either verify or modify them in writing.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

The scope of services for this project does not include, either specifically or by implication, environmental assessment of the site or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to biological or toxicological issues, are beyond the scope of this report. If the Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

15.0 REFERENCES

1. Carroll, C.J. & Crawford, T.A., 2000, Geologic Map of the Fountain Quadrangle, El Paso County, Colorado, Colorado Geological Survey, Open File Report 00-3.

2. Charles S. Robinson and Associates, Inc., 1977, El Paso County, Colorado – Potential Geologic Hazards and Surficial Deposits, Environmental and Engineering Geologic Maps and Tales for Land Use.

3. City of Colorado Springs, Land Use Review Division, Hillside and Airport Overlay Map, August 2008.

4. City of Colorado Springs, Land Use Review Division, Streamside Overlay Map, March, 2009.

5. City of Colorado Springs, 2010, Zoning Code, Chapter 7, Article 4, Part 5, Geologic Hazard Study and Mitigation.

6. Colorado Department of Public Health and Environment, Map of Radon Zones, http://www.cdphe.state.co.us/hm/rad/radon/

7. Dames & Moore, April 1985, Colorado Springs Subsidence Investigation, Colorado Division of Mined Land Reclamation.

8. El Paso County Assessor's Office Public Record Property Information, 2012. www.co.el.paso.co.us

9. Federal Emergency Management Agency, March 17, 1997, Flood Insurance Rate Map, Community Map Number 08041C05957F.

10. United States Department of Agriculture Soils Conservation Service, 1980, *Soil Survey of El Paso County Area, Colorado.*

    http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

11. On-site Wastewater Treatment Systems (OWTS) Regulations, El Paso County, Colorado, Chapter 8, effective April 10, 2014.

12. Colorado Geologic Survey, Colorado Landslide Inventory:

    https://cologeosurvey.maps.arcgis.com/apps/webappviewer/index.html?id=9dd73db7fbc34139abe51599396e2648

13. International Code Council, 2006, International Building and International Residential Codes.

14. Noe, David C., 2007, A Guide to Swelling Soils for Colorado Homebuyers and Homeowners, Second Edition revision, Colorado Geological Survey, Special Publication 43.

15. Wait, T.C. & White, J.L., 2006. Rockfall Hazard Susceptibility in Colorado Springs, El Paso County, Colorado. Colorado Geological Survey, Open-File Report 06-3.

16. Kirkham, R. M., Rogers, W. P., Powell, L., Morgan, M. L., Matthews, V., and Patty, G. R., 2004-2007, Colorado Earthquake Map Server: Colorado Geological Survey Bulletin 52b.

    http://geosurvey.state.co.us/Default.aspx?tabid=270

17. Federal Emergency Management Agency, Washington, D.C. 20472, Issue date May 7, 2007, Effective date August 29, 2007 for Map Number 08041C0957F.

18. Construction Plans for Jimmy Camp Creek Realignment, prepared by Drexel, Barrell & Co., Job No. C7668-2, dated August 18, 2005.

19. Fill Observation and Testing, Lorson Ranch Roadways and Drainage Construction, El Paso County, Kumar and Associates, Inc., Project Number 052-253, daily report no: 12-16, 26, 27, 48, 53, 54, 56, 59, 60, 80-90, 102, 107, 112, 117-121, dated Dec. 14, 2005 to July 17, 2006.

20. Preliminary Site Grading Construction plans for Carriage Meadows South, Early Grading/Erosion Control Plans Fontaine Blvd, El Paso County, Colorado, prepared by Core Engineering Group, LLC, Project No. 100.030 dated June 2016.

21. Preliminary Drainage Plan, Carriage Meadows South at Lorson Ranch, prepared by Core Engineering Group, LLC, Project No. 100.030, dated June 2016.

FIGURES

NOT TO SCALE

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SITE VICINITY MAP

CARRIAGE MEADOWS SOUTH
EL PASO COUNTY, CO
LORSON RANCH METRO DISTRICT NO. 1

JOB No. 152427

FIG No. 1

DATE 6-29-2016

REFERENCE

AERIAL PHOTOGRAPH PROVIDED BY GOOGLE

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2016 AERIAL PHOTOGRAPH

CARRIAGE MEADOWS SOUTH
EL PASO COUNTY, CO
LORSON RANCH METRO DISTRICT NO. 1

JOB No. 152427

FIG No. 2

DATE 6-29-2016

DENOTES APPROXIMATE LOCATION OF TEST BORINGS

REFERENCE NOT TO SCALE

JOB No. 152427

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CARRIAGE MEADOWS SOUTH
EL PASO COUNTY, CO

LORSON RANCH METRO DISTRICT NO. 1

ENGINEER:	TM
DRAWN BY:	KZ
CHECKED BY:	TM
ISSUED:	6-14-16
REVISION:	DATE:
	JOB #:

PRELIMINARY LOT LAYOUT WITH TEST BORING LOCATIONS

SHEET No.

FIG-3

SOILS DESCRIPTION

FILL: SAND, SILTY TO CLAYEY

SANDY CLAY

SILTY SAND

SILTY TO CLAYEY SAND

SYMBOLS AND NOTES

XX — STANDARD PENETRATION TEST - MADE BY DRIVING A SPLIT-BARREL SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-1586. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).

XX — UNDISTURBED CALIFORNIA SAMPLE - MADE BY DRIVING A RING-LINED SAMPLER INTO THE SOIL BY DROPPING A 140 LB. HAMMER 30", IN GENERAL ACCORDANCE WITH ASTM D-3550. NUMBER INDICATES NUMBER OF HAMMER BLOWS PER FOOT (UNLESS OTHERWISE INDICATED).

FREE WATER TABLE

DEPTH AT WHICH BORING CAVED

BULK — DISTURBED BULK SAMPLE

AUG — AUGER "CUTTINGS"

1 — RMG SOIL TYPE - SEE REPORT TEXT FOR DESCRIPTION

4.5 — WATER CONTENT (%)

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EXPLANATION OF TEST BORING LOGS

JOB No. 152427

FIGURE No. 4

DATE 6/29/16

TEST BORING: 1 DATE DRILLED: 5/6/16 REMARKS: GROUNDWATER @ 25.0 ' 5/6/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, brown, medium dense, moist	5			25	9.4
SAND, SILTY TO CLAYEY, with clay seams, light brown to brown, very loose to to medium dense, moist to wet	10			6	13.6
	15			7	20.1
	20			10	4.7
	25 ▽				
	30			13	16.4

TEST BORING: 2 DATE DRILLED: 5/6/16 REMARKS: GROUNDWATER @ 24.0 ' 5/6/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, brown, loose, moist to wet	5			5	2.8
	10			10	6.7
	15			6	3.0
	20			6	8.0
	▽ 25				
					21.0

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 5

DATE 6/14/16

TEST BORING: 3 DATE DRILLED: 5/6/16 REMARKS: GROUNDWATER @ 21.0 ' 5/6/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY TO CLAYEY, tan to brown, loose to medium dense, moist to wet	5			7	5.7
	10			7	8.8
	15			14	5.0
	20			12	1.9
	25				
	30			7/6"	13.9

TEST BORING: 4 DATE DRILLED: 5/6/16 REMARKS: NO GROUNDWATER ON 5/6/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, tan to brown, very loose to loose, moist	5			5	19.7
	10			6	3.2
	15			6	8.1
	20			9	3.1
	25				
					16.6

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 6

DATE 6/14/16

TEST BORING: **5**
DATE DRILLED:
5/6/16
REMARKS:
GROUNDWATER @ 21.0 '
5/11/16

SAND, SILTY, tan to brown, loose to medium dense, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	5	8.7
10	10	4.1
15	11	1.6
20	16	3.3
25	5	15.3

TEST BORING: **6**
DATE DRILLED:
5/6/16
REMARKS:
GROUNDWATER @ 22.0 '
5/11/16

SAND, SILTY, tan to brown, loose, moist

CLAY, SANDY, brown, medium stiff to stiff, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	6	8.2
10	9	8.2
15	9	2.8
20	7	19.0
25	10	28.4

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 7

DATE 6/14/16

TEST BORING: 7 DATE DRILLED: 5/5/16 REMARKS: GROUNDWATER @ 25.0 ' 5/11/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, tan to brown, loose to medium dense, moist	5			11	4.5
	10			9	10.0
CLAY, SANDY, tan to brown, medium stiff to very stiff, moist to wet	15			18	13.4
	20			19	16.2
	25 ▽				
	30			7	27.2

TEST BORING: 8 DATE DRILLED: 5/5/16 REMARKS: NO GROUNDWATER ON 5/11/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, brown, loose, moist	5			9	6.3
	10			18	8.8
	15			8	9.9
	20			6	1.9
	25				12.3

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 8

DATE 6/14/16

TEST BORING: **9**
DATE DRILLED:
5/6/16
REMARKS:
GROUNDWATER @ 21.0 '
5/6/16

SAND, SILTY, tan to brown, very loose to loose, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	2	5.3
10	5	4.4
15	6	1.9
20 ▽		
25	4/6"	21.8

TEST BORING: **10**
DATE DRILLED:
5/6/16
REMARKS:
GROUNDWATER @ 29.0 '
5/6/16

FILL: SAND, SILTY, brown, loose, moist

SAND, SILTY, gray to tan and brown, loose to medium dense, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	9	15.6
10	31	13.7
15	12	6.4
20	8	7.4
25 ▽		
30	14	9.7

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 9

DATE 6/14/16

TEST BORING: **11**
DATE DRILLED:
5/5/16
REMARKS:
NO GROUNDWATER ON
5/11/16

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	SAND, SILTY, tan to brown, loose to medium dense, moist			
5			8	9.9
10			7	8.2
15			17	3.4
20			9	9.1
25			12	3.6

TEST BORING: **12**
DATE DRILLED:
5/5/16
REMARKS:
GROUNDWATER @ 22.0 '
5/5/16

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
	SAND, SILTY, with sandy silt seams, tan to brown, loose to medium dense, moist			
5			13	5.0
10			10	10.6
15			10	9.3
	CLAY, SANDY, brown, stiff to very stiff, moist to wet			
20			24	11.8
25			12	21.6

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 10

DATE 6/14/16

TEST BORING: 13 DATE DRILLED: 5/6/16 REMARKS: GROUNDWATER @ 23.0 ' 5/6/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, loose to medium dense, moist to wet	5			24	8.4
	10			24	4.0
	15			11	4.4
	20			8	5.1
	25			10	17.1

TEST BORING: 14 DATE DRILLED: 5/6/16 REMARKS: GROUNDWATER @ 22.5 ' 5/11/16	DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY TO CLAYEY, brown, medium dense, moist	5			20	12.8
SAND, SILTY, tan to brown, loose to medium dense, moist to wet	10			34	2.0
	15			7	6.6
	20			12	4.7
CLAY, SANDY, brown, soft, moist to wet	25			4	27.7

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 11

DATE 6/14/16

TEST BORING: **15**
DATE DRILLED:
5/6/16
REMARKS:
GROUNDWATER @ 25.0 '
5/6/16

SAND, SILTY, with sandy silt seams, tan to brown, very loose to medium dense, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	8	7.8
10	9	13.5
15	10	14.4
20	7	5.4
25	3	23.9

TEST BORING: **16**
DATE DRILLED:
5/5/16
REMARKS:
GROUNDWATER @ 22.5 '
5/5/16

SAND, SILTY, tan to brown, loose to medium dense, moist

CLAY, SANDY, tan to brown, soft to medium stiff, moist to wet

DEPTH (FT)	BLOWS PER FT.	WATER CONTENT %
5	7	11.2
10	11	22.4
15	11	11.1
20	7	21.3
25	4	29.4

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 12

DATE 6/14/16

TEST BORING: **17**
DATE DRILLED:
5/5/16
REMARKS:
GROUNDWATER @ 22.0 '
5/5/16

DEPTH (FT)	SYMBOL	SAMPLES	BLOWS PER FT.	WATER CONTENT %
SAND, SILTY, with gravel, tan to brown, loose to medium dense, moist to wet				
5			8	10.4
10			14	5.9
15			10	4.9
20			14	3.2
25				
30			8	20.7

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TEST BORING LOGS

JOB No. 152427

FIGURE No. 13

DATE 6/14/16

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	% Swell/ Collapse	FHA Expansion Pressure (psf)
1	4.0	9.4							
1	9.0	13.6		32	14		48.7		364
1	14.0	20.1							
1	19.0	4.7							
1	29.0	16.4							
2	4.0	2.8		NP	NP	0.3	5.5		
2	9.0	6.7							
2	14.0	3.0							
2	19.0	8.0							
2	28.0	21.0							
3	4.0	5.7							
3	9.0	8.8							
3	14.0	5.0		NP	NP	10.8	6.5		
3	19.0	1.9							
3	29.0	13.9							
4	4.0	19.7							
4	9.0	3.2							
4	14.0	8.1							
4	19.0	3.1		NP	NP	9.3	3.2		
4	28.0	16.6							
5	4.0	8.7							
5	9.0	4.1		NP	NP	0.8	20.4		
5	14.0	1.6							
5	19.0	3.3							
5	24.0	15.3							
6	4.0	8.2		NP	NP	0.0	37.3		
6	9.0	8.2							
6	14.0	2.8							
6	19.0	19.0	97.1	NP	NP		54.0	- 0.1	
6	24.0	28.4							
7	4.0	4.5							
7	9.0	10.0							
7	14.0	13.4	98.0	31	14		82.6	0.5	
7	19.0	16.2							

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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 152427
FIGURE No. 14
PAGE 1 OF 3
DATE 6/29/16

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	% Swell/ Collapse	FHA Expansion Pressure (psf)
7	29.0	27.2							
8	4.0	6.3							
8	9.0	8.8	101.0	NP	NP		59.4	1.2	
8	14.0	9.9							
8	19.0	1.9							
8	28.0	12.3							
9	4.0	5.3		NP	NP	0.0	6.3		
9	9.0	4.4							
9	14.0	1.9							
9	19.0	4.3							
9	24.0	21.8							
10	4.0	15.6							
10	9.0	13.7							
10	14.0	6.4	95.4	NP	NP	0.0	34.3	- 1.1	
10	19.0	7.4							
10	29.0	9.7							
11	4.0	9.9							
11	9.0	8.2							
11	14.0	3.4							
11	19.0	9.1		NP	NP	1.2	21.1		
11	24.0	3.6							
12	4.0	5.0							
12	9.0	10.6							
12	14.0	9.3		NP	NP	0.0	58.3		
12	19.0	11.8							
12	24.0	21.6							
13	4.0	8.4		NP	NP	1.5	14.9		
13	9.0	4.0							
13	14.0	4.4							
13	19.0	5.1							
13	24.0	17.1							
14	4.0	12.8		NP	NP	0.3	40.2		
14	9.0	2.0							
14	14.0	6.6							

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SUMMARY OF LABORATORY TEST RESULTS

JOB No. 152427
FIGURE No. 14
PAGE 2 OF 3
DATE 6/29/16

Test Boring No.	Depth	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plasticity Index	% Retained No.4 Sieve	% Passing No. 200 Sieve	% Swell/ Collapse	FHA Expansion Pressure (psf)
14	19.0	4.7							
14	24.0	27.7							
14	29.0			29	13	0.3	61.8		
15	4.0	7.8							
15	9.0	13.5	88.4	NP	NP		64.1	- 2.3	
15	14.0	14.4							
15	19.0	5.4							
15	24.0	23.9							
16	4.0	11.2							
16	9.0	22.4							
16	14.0	11.1	88.4	NP	NP	0.0	69.9	- 3.2	
16	19.0	21.3							
16	24.0	29.4		40	18	0.3	41.9		
17	4.0	10.4		NP	NP	0.2	29.9		
17	9.0	5.9							
17	14.0	4.9							
17	19.0	3.2							
17	29.0	20.7							

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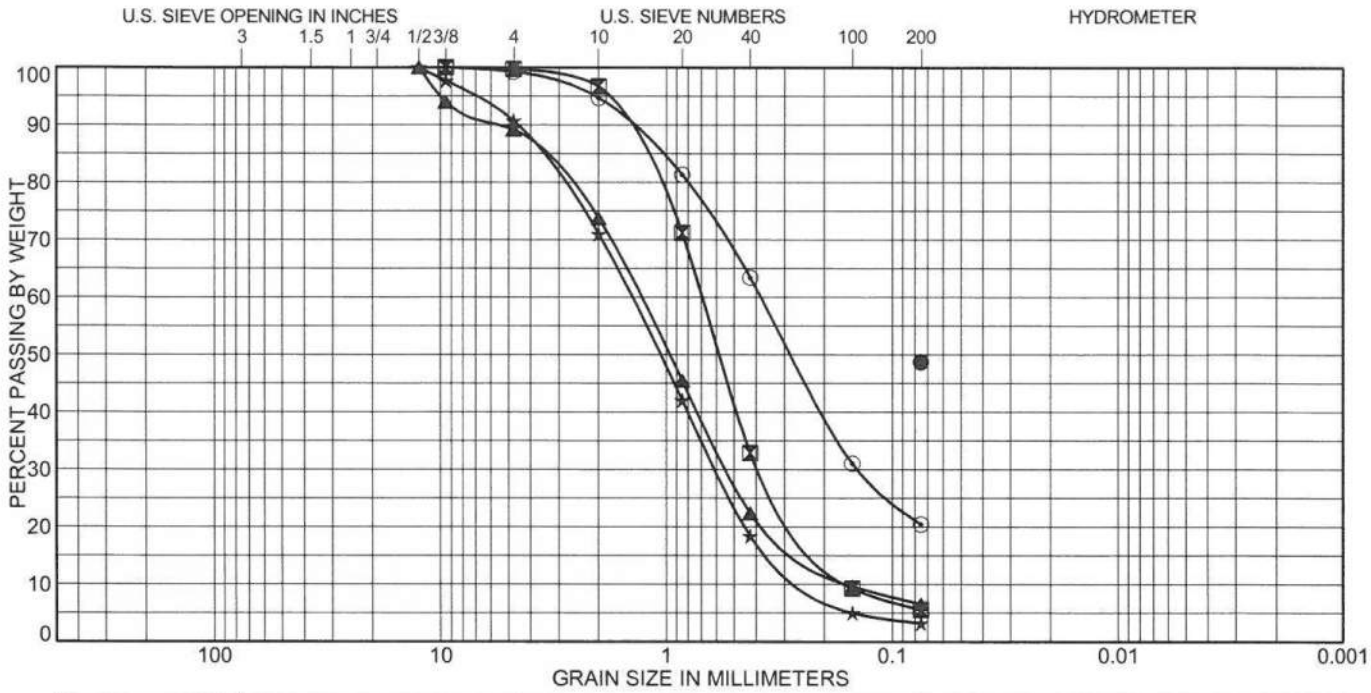
SUMMARY OF LABORATORY TEST RESULTS

JOB No. 152427
FIGURE No. 14
PAGE 3 OF 3
DATE 6/29/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring		Depth (ft)	Classification	LL	PL	PI
●	1	9.0	**CLAYEY SAND(SC)**	32	18	14
⊠	2	4.0	**POORLY GRADED SAND with SILT(SP-SM)**	NP	NP	NP
▲	3	14.0	**WELL-GRADED SAND with SILT(SW-SM)**	NP	NP	NP
★	4	19.0	**WELL-GRADED SAND(SW)**	NP	NP	NP
⊙	5	9.0	**SILTY SAND(SM)**	NP	NP	NP

Test Boring		Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	1	9.0			48.7	
⊠	2	4.0	0.3	94.2	5.5	
▲	3	14.0	10.8	82.6	6.5	
★	4	19.0	9.3	87.5	3.2	
⊙	5	9.0	0.8	78.8	20.4	

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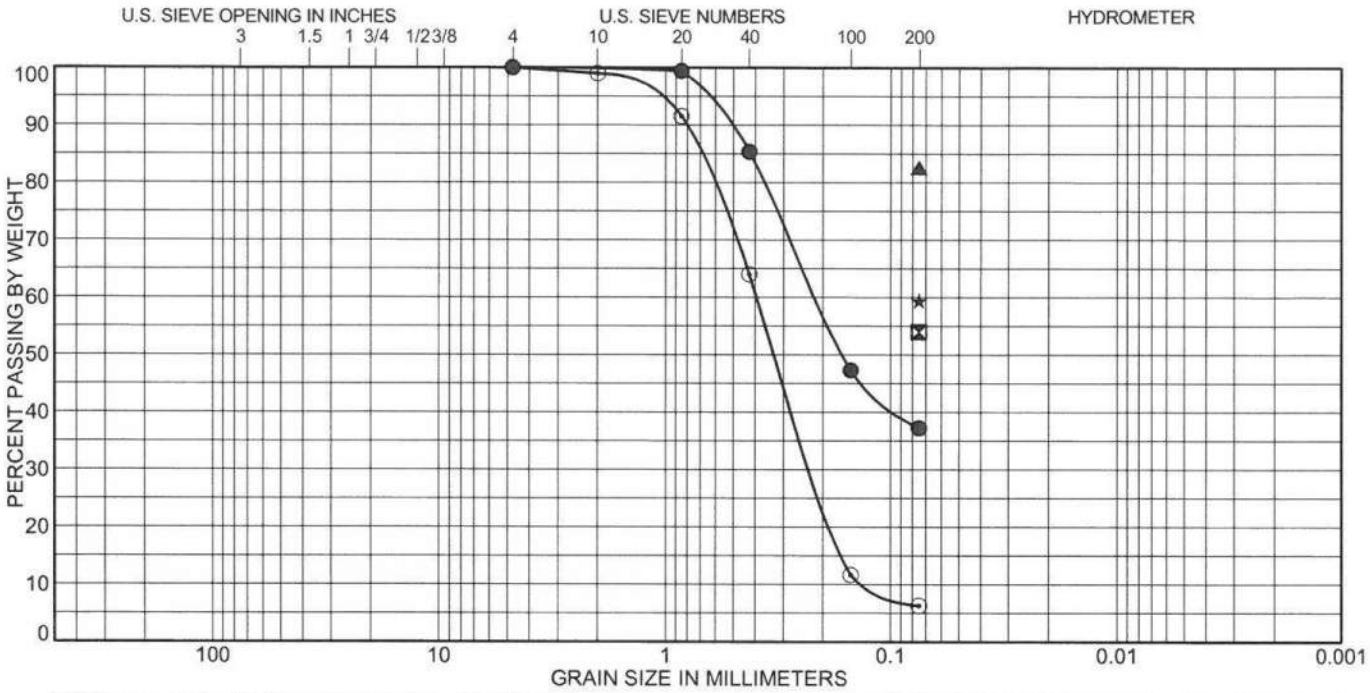
SOIL CLASSIFICATION DATA

JOB No. 152427

FIGURE No. 15

DATE 6/29/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Test Boring	Depth (ft)	Classification	LL	PL	PI
●	6	4.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊠	6	19.0	**SANDY SILT(ML)**	**NP**	**NP**	**NP**
▲	7	14.0	**LEAN CLAY with SAND(CL)**	**31**	**17**	**14**
★	8	9.0	**SANDY SILT(ML)**	**NP**	**NP**	**NP**
⊙	9	4.0	**POORLY GRADED SAND with SILT(SP-SM)**	**NP**	**NP**	**NP**

	Test Boring	Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	6	4.0	0.0	62.7	37.3	
⊠	6	19.0			54.0	
▲	7	14.0			82.6	
★	8	9.0			59.4	
⊙	9	4.0	0.0	93.7	6.3	

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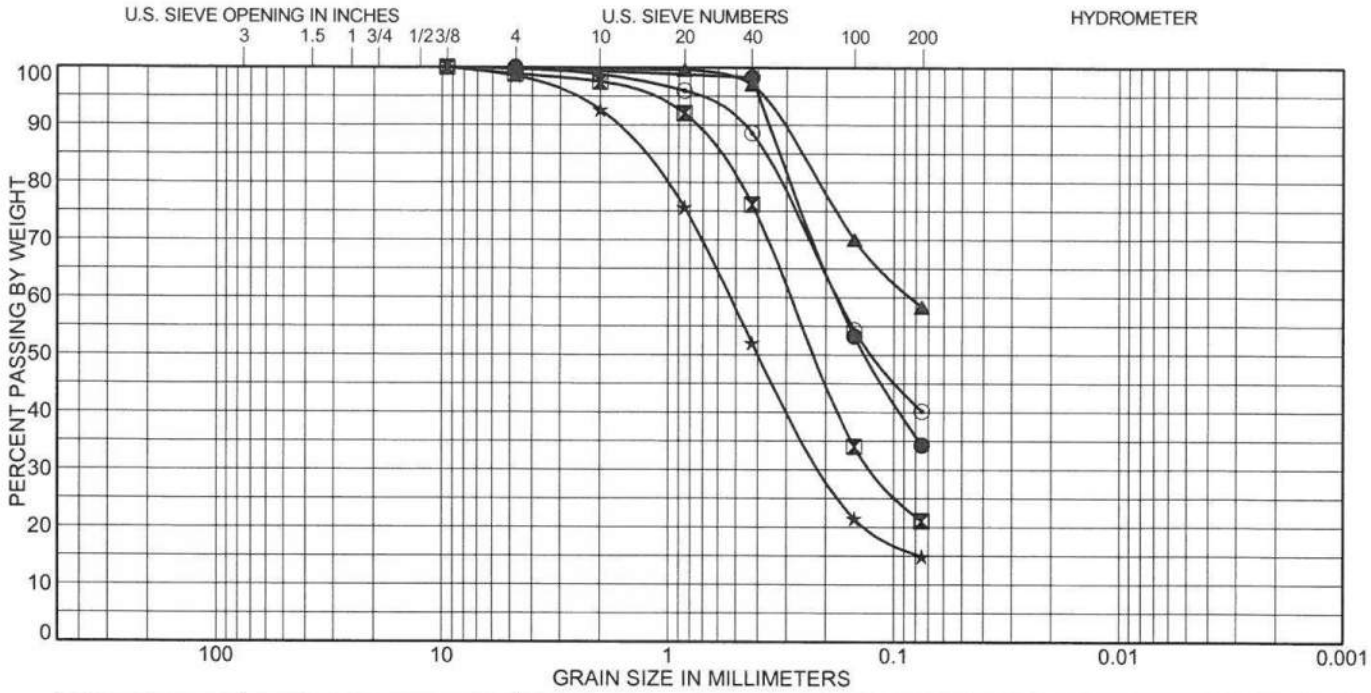
SOIL CLASSIFICATION DATA

JOB No. 152427

FIGURE No. 16

DATE 6/29/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring		Depth (ft)	Classification	LL	PL	PI
●	10	14.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊠	11	19.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
▲	12	14.0	**SANDY SILT(ML)**	**NP**	**NP**	**NP**
★	13	4.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**
⊙	14	4.0	**SILTY SAND(SM)**	**NP**	**NP**	**NP**

Test Boring		Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	10	14.0	0.0	65.7	34.3	
⊠	11	19.0	1.2	77.7	21.1	
▲	12	14.0	0.0	41.7	58.3	
★	13	4.0	1.5	83.6	14.9	
⊙	14	4.0	0.3	59.5	40.2	

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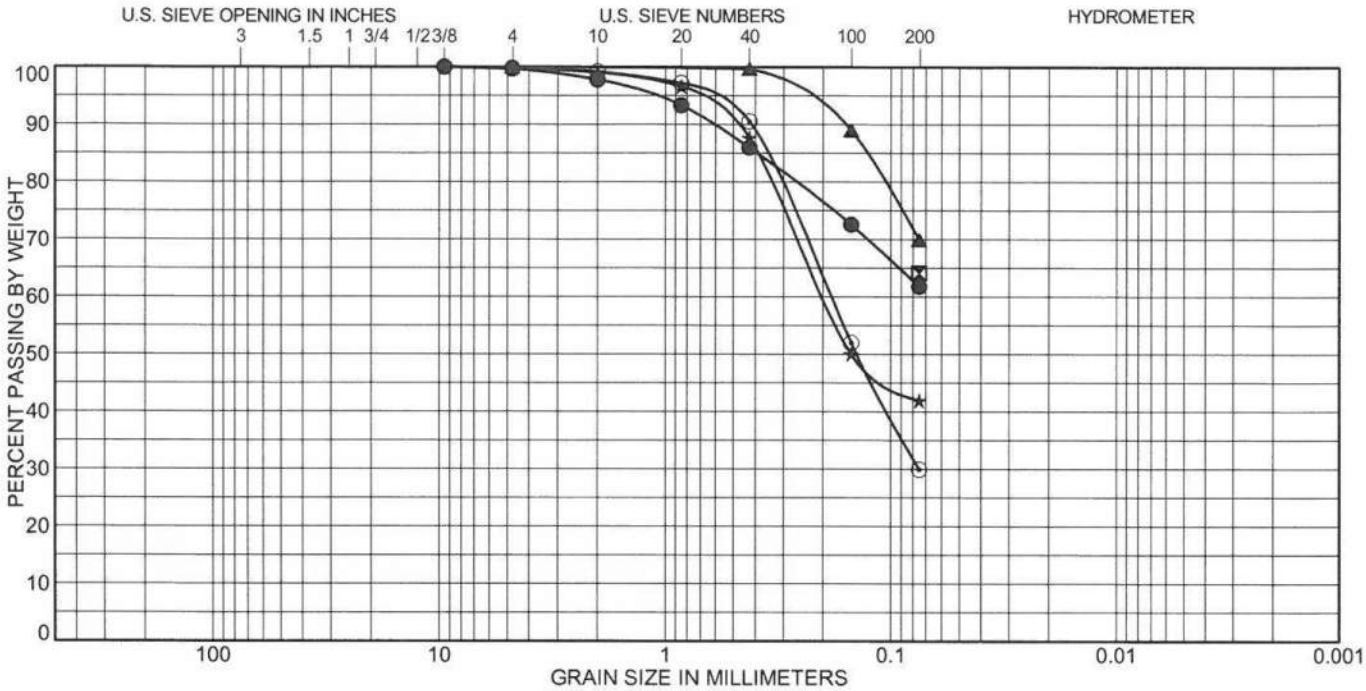
SOIL CLASSIFICATION DATA

JOB No. 152427

FIGURE No. 17

DATE 6/29/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Test Boring		Depth (ft)	Classification	LL	PL	PI
●	14	29.0	SANDY LEAN CLAY(CL)	29	16	13
⊠	15	9.0	SANDY SILT(ML)	NP	NP	NP
▲	16	14.0	SANDY SILT(ML)	NP	NP	NP
★	16	24.0	CLAYEY SAND(SC)	40	22	18
⊙	17	4.0	SILTY SAND(SM)	NP	NP	NP

Test Boring		Depth (ft)	%Gravel	%Sand	%Silt	%Clay
●	14	29.0	0.3	37.9	61.8	
⊠	15	9.0			64.1	
▲	16	14.0	0.0	30.1	69.9	
★	16	24.0	0.3	57.8	41.9	
⊙	17	4.0	0.2	69.9	29.9	

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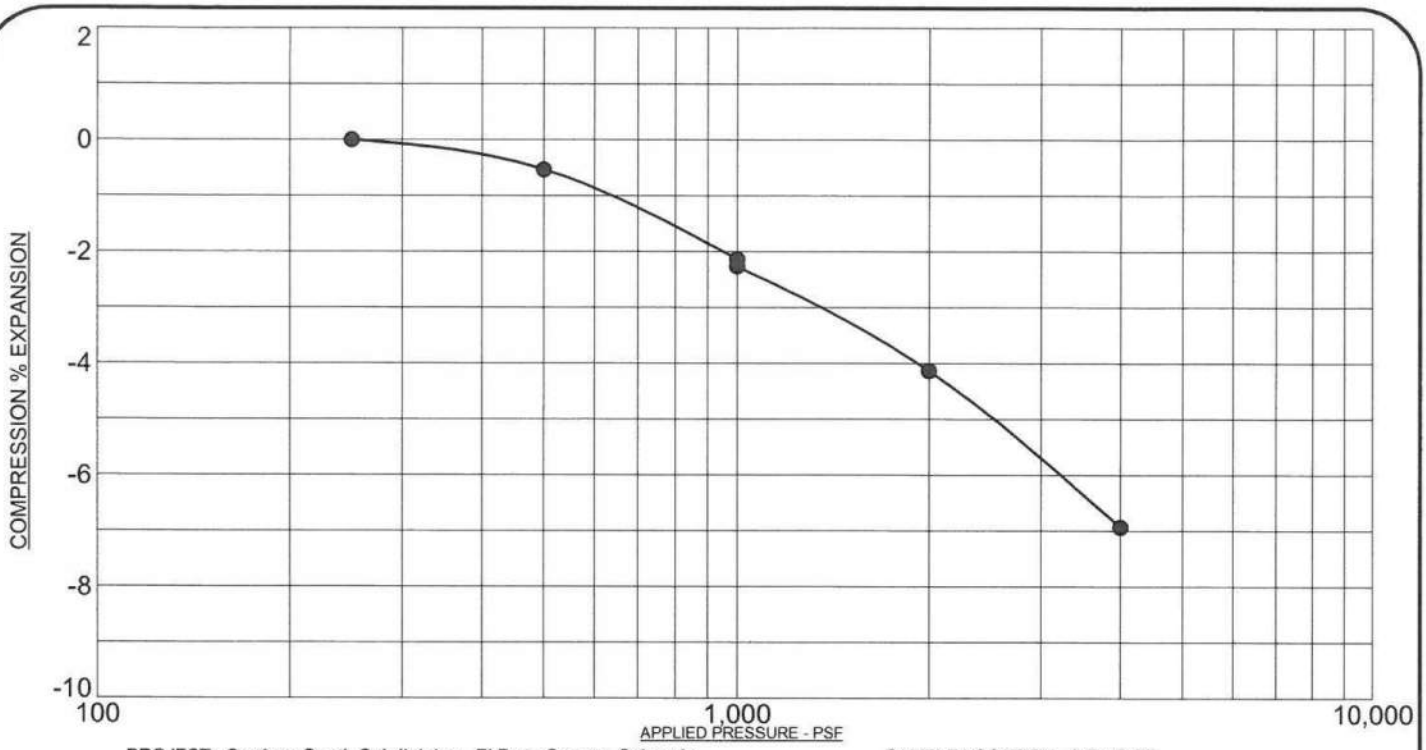
SOIL CLASSIFICATION DATA

JOB No. 152427

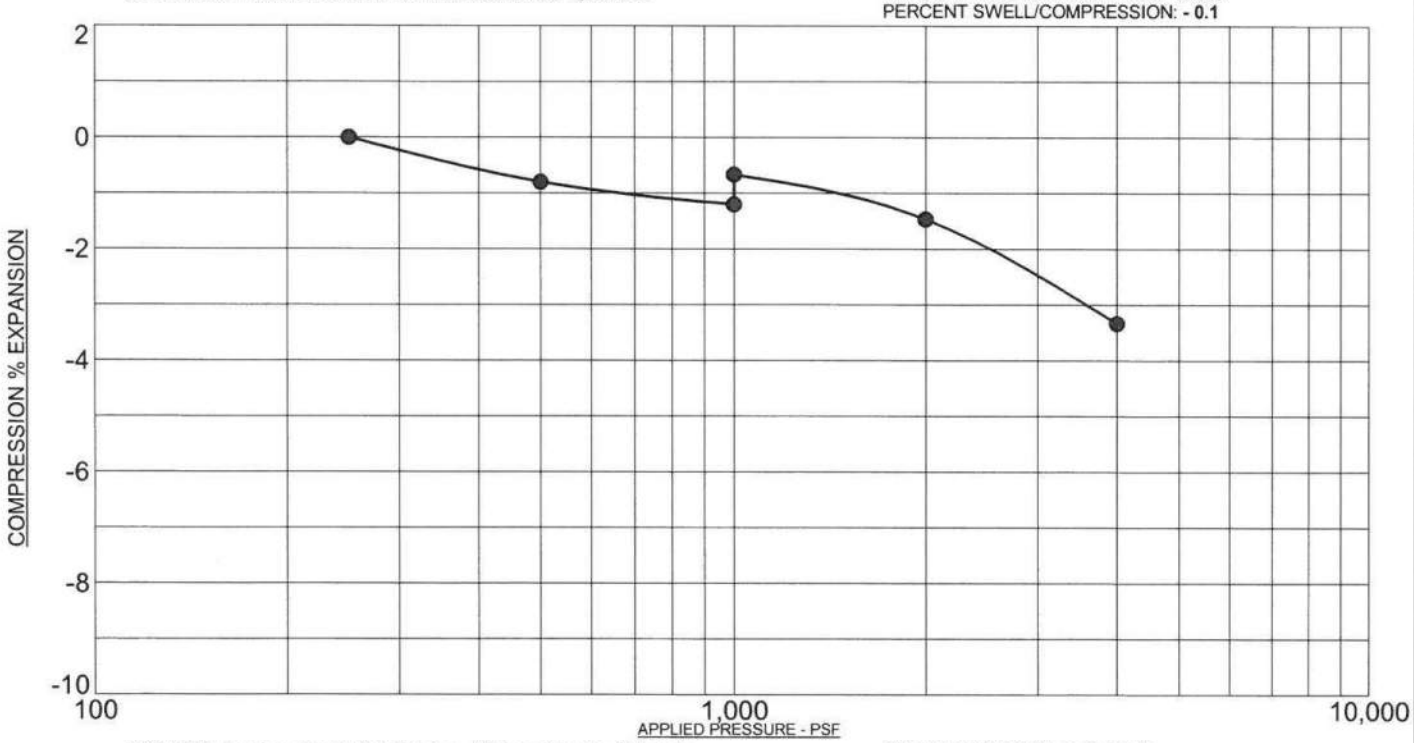
FIGURE No. 18

DATE 6/29/16



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **CLAY, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **6 @ 19 FT**
NATURAL DRY UNIT WEIGHT: **97.1 PCF**
NATURAL MOISTURE CONTENT: **19.0%**
PERCENT SWELL/COMPRESSION: **- 0.1**



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **CLAY, SANDY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **7 @ 14 FT**
NATURAL DRY UNIT WEIGHT: **98.0 PCF**
NATURAL MOISTURE CONTENT: **13.4%**
PERCENT SWELL/COMPRESSION: **0.5**

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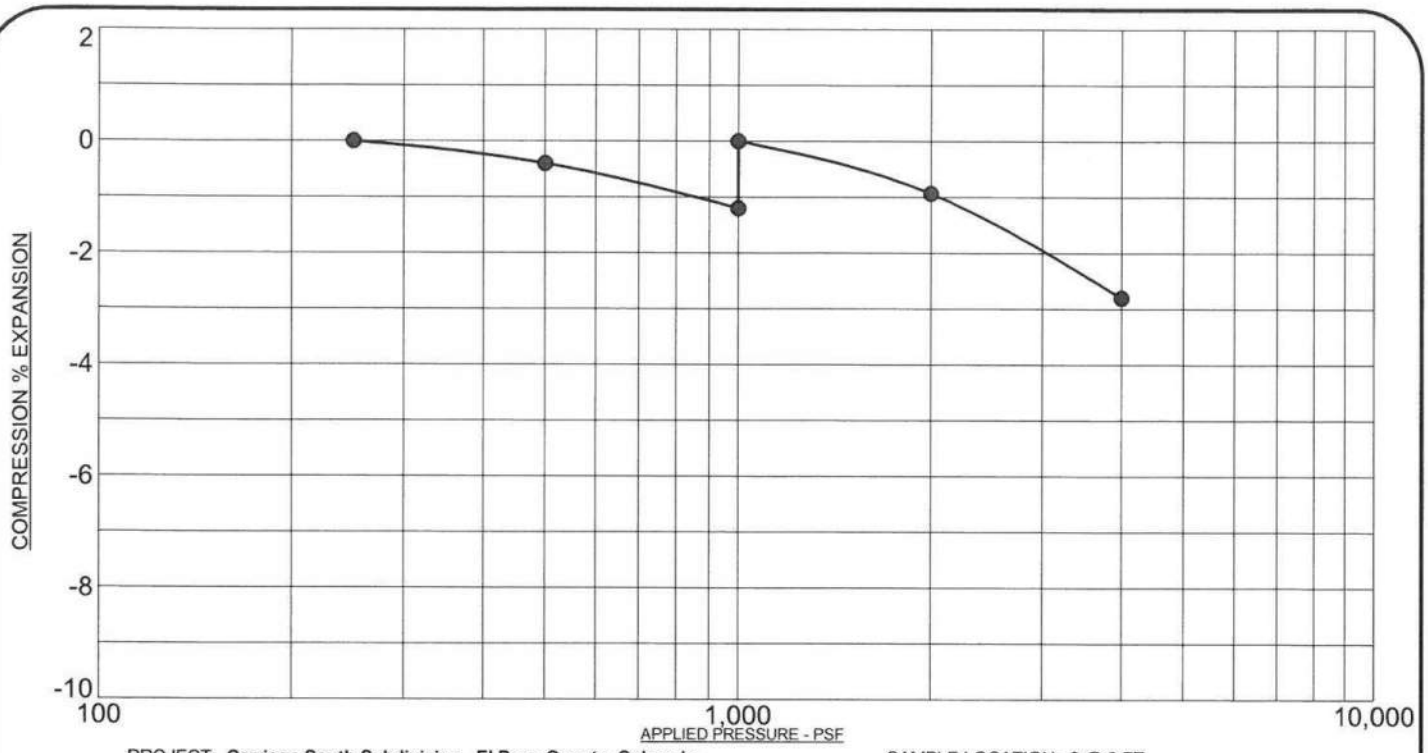
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 152427

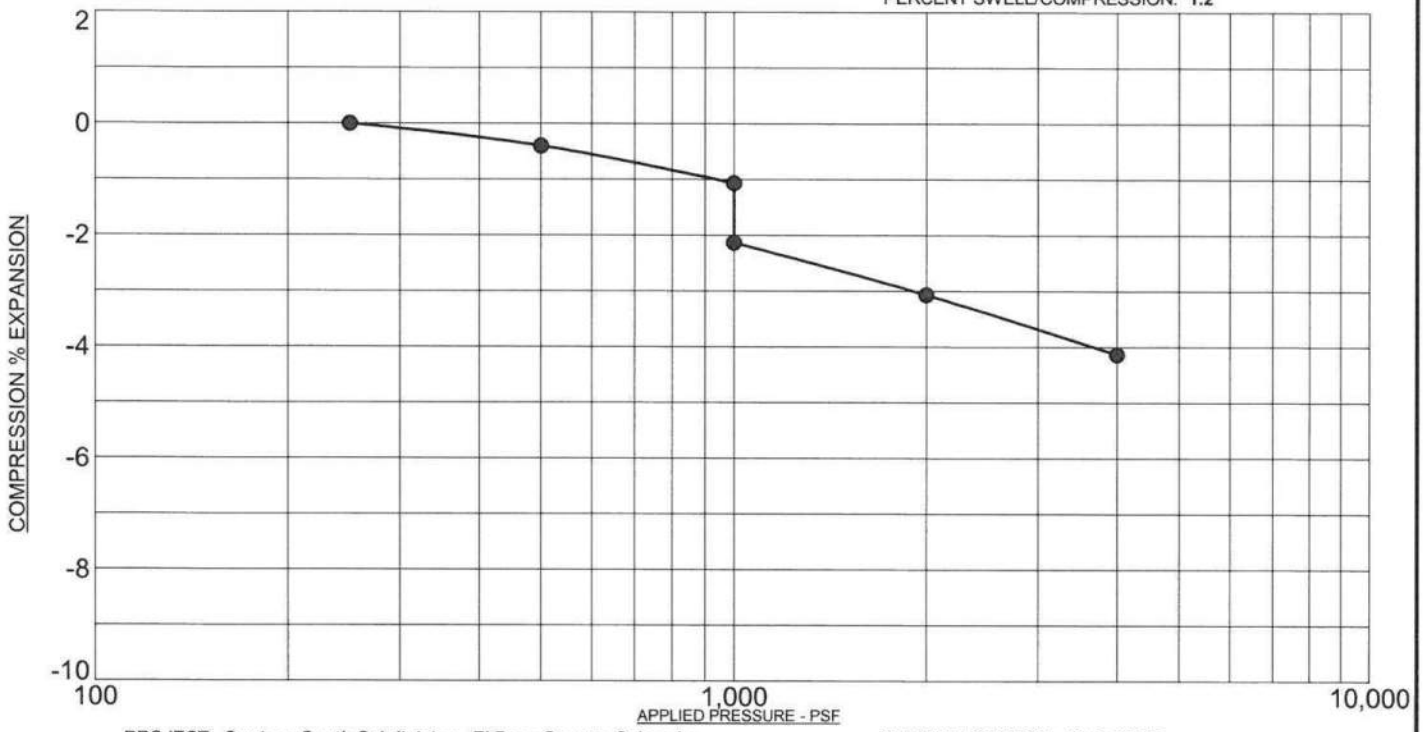
FIGURE No. 19

DATE 6/29/16



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **SAND, SILTY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **8 @ 9 FT**
NATURAL DRY UNIT WEIGHT: **101.0 PCF**
NATURAL MOISTURE CONTENT: **8.8%**
PERCENT SWELL/COMPRESSION: **1.2**



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **SAND, SILTY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **10 @ 14 FT**
NATURAL DRY UNIT WEIGHT: **95.4 PCF**
NATURAL MOISTURE CONTENT: **6.4%**
PERCENT SWELL/COMPRESSION: **- 1.1**

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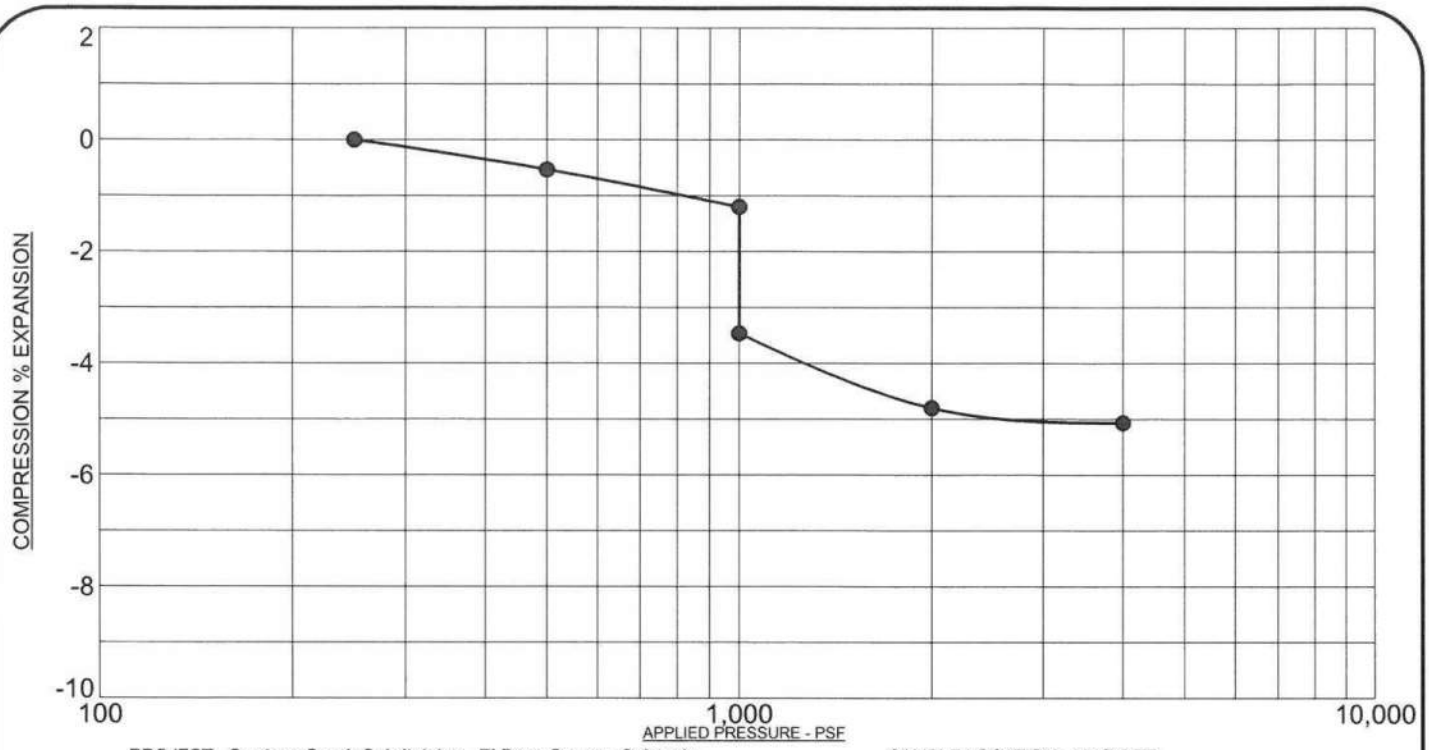
SWELL/CONSOLIDATION TEST RESULTS

JOB No. 152427

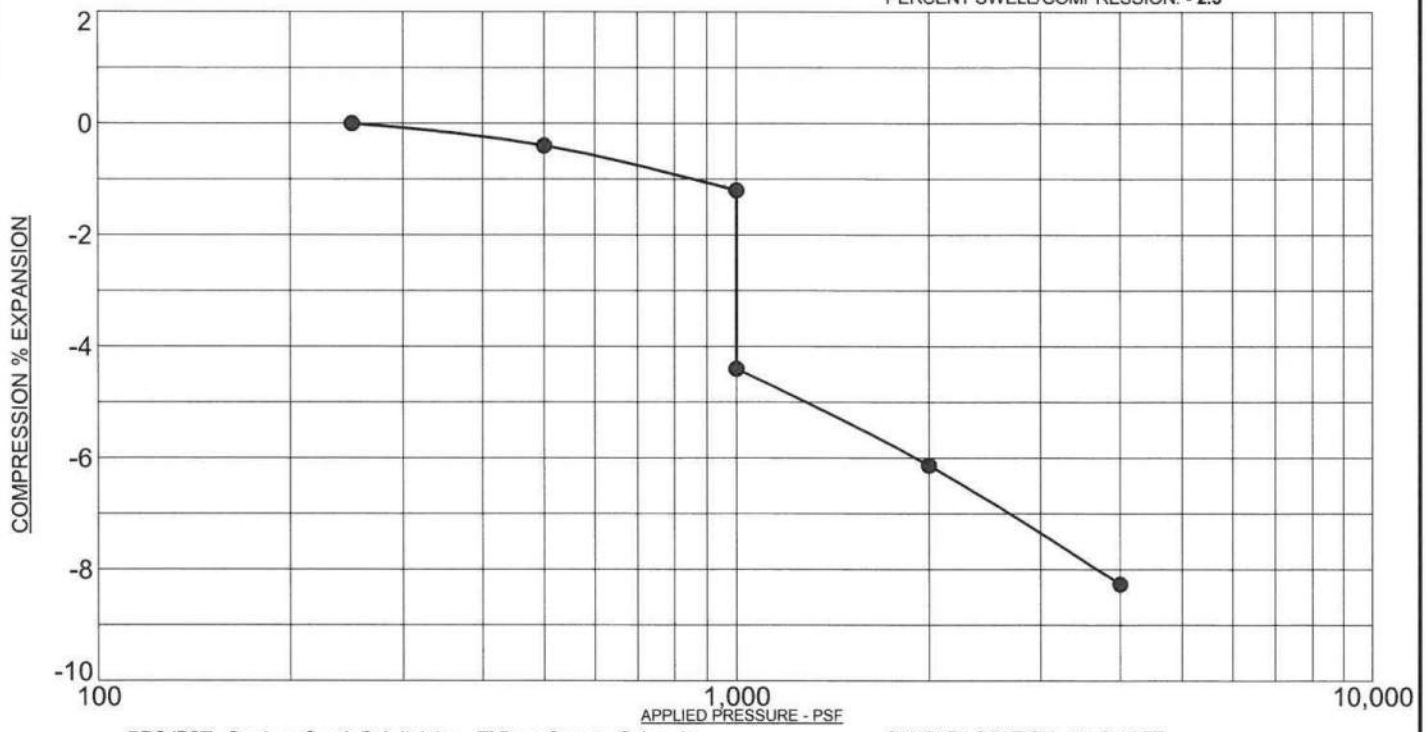
FIGURE No. 20

DATE 6/29/16



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **SAND, SILTY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **15 @ 9 FT**
NATURAL DRY UNIT WEIGHT: **88.4 PCF**
NATURAL MOISTURE CONTENT: **13.5%**
PERCENT SWELL/COMPRESSION: **- 2.3**



PROJECT: **Carriage South Subdivision, El Paso County, Colorado**
SAMPLE DESCRIPTION: **SAND, SILTY**
NOTE: SAMPLE WAS INUNDATED WITH WATER AT 1,000 PSF

SAMPLE LOCATION: **16 @ 14 FT**
NATURAL DRY UNIT WEIGHT: **88.4 PCF**
NATURAL MOISTURE CONTENT: **11.1%**
PERCENT SWELL/COMPRESSION: **- 3.2**

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SWELL/CONSOLIDATION TEST RESULTS

JOB No. 152427

FIGURE No. 21

DATE 6/29/16

2A - STABLE ALLUVIUM

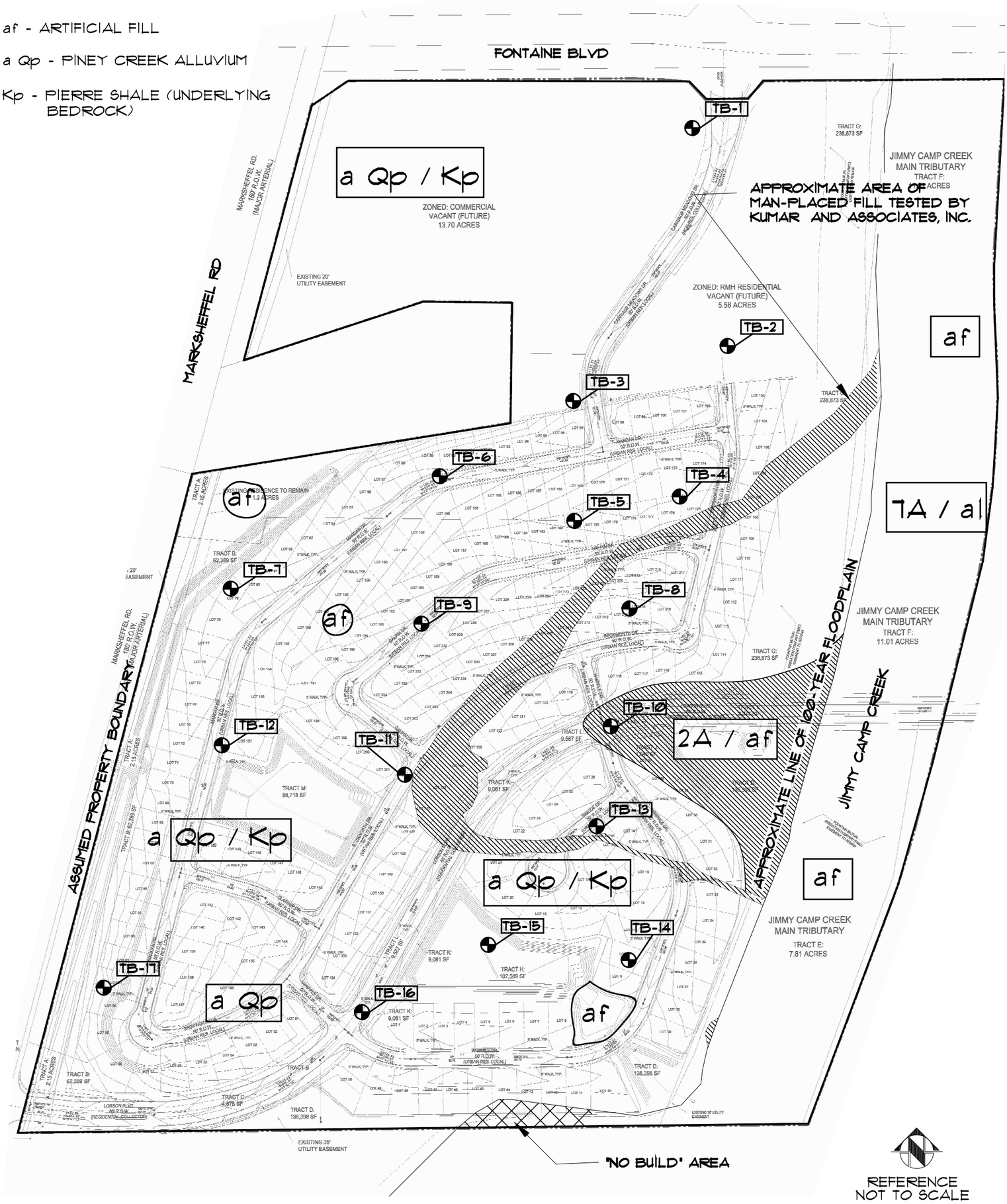
7A - PHYSIOGRAPHIC FLOODPLAIN

al - ALLUVIUM

af - ARTIFICIAL FILL

a Qp - PINEY CREEK ALLUVIUM

Kp - PIERRE SHALE (UNDERLYING BEDROCK)



DENOTES APPROXIMATE LOCATION OF TEST BORINGS

CARRIAGE MEADOWS SOUTH
EL PASO COUNTY, CO

LORSON RANCH METRO
DISTRICT NO. 1

GEOLOGIC CONDITIONS MAP

SHEET No. FIG-22

ENGINEER:	TH
DRAWN BY:	KZ
CHECKED BY:	TH
ISSUED:	6-14-16
REVISION:	10-7-16

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Woodland Park Office:
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Monument Office:
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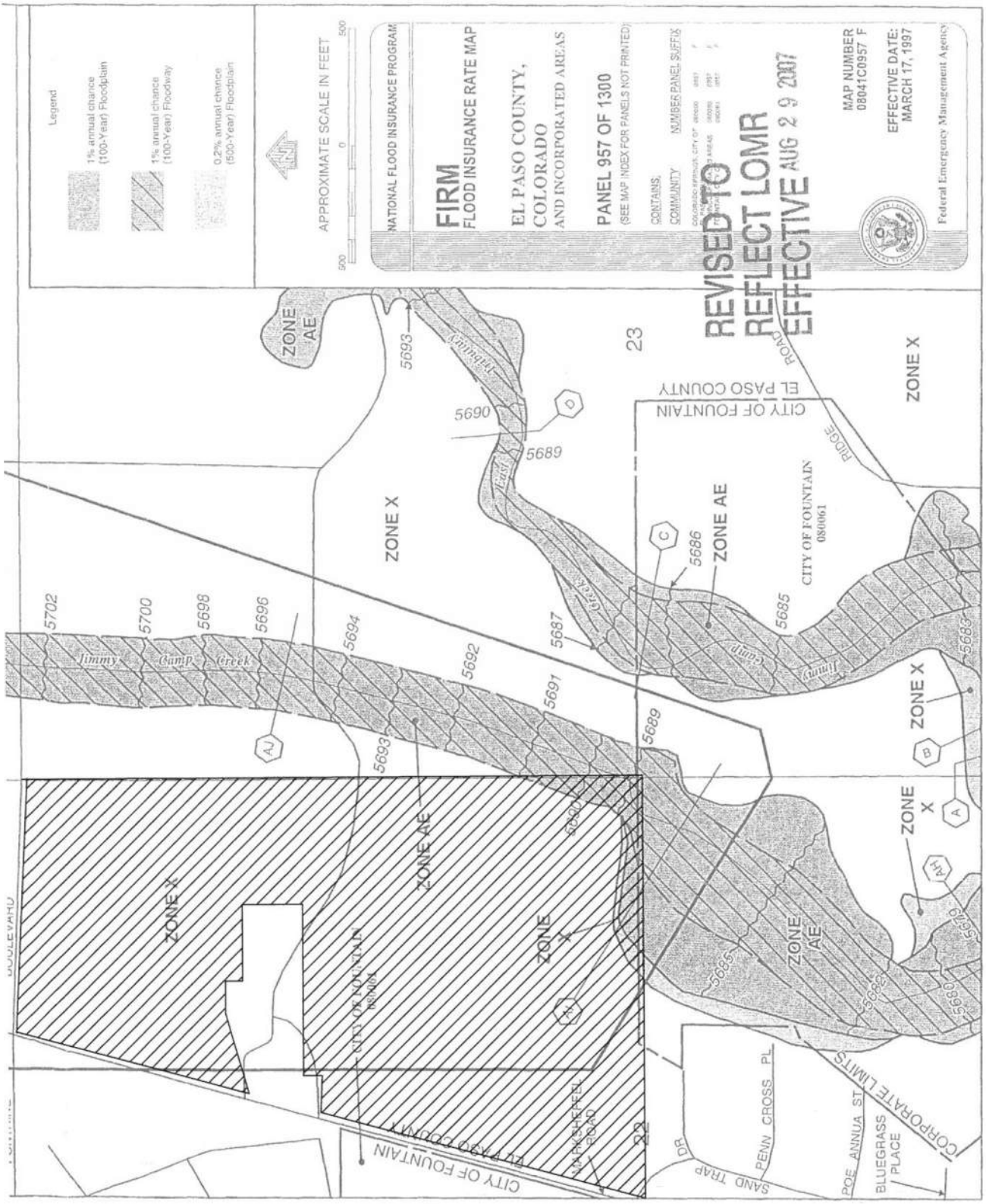

NOT TO SCALE

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FEMA MAP REVISED TO REFLECT LOMR

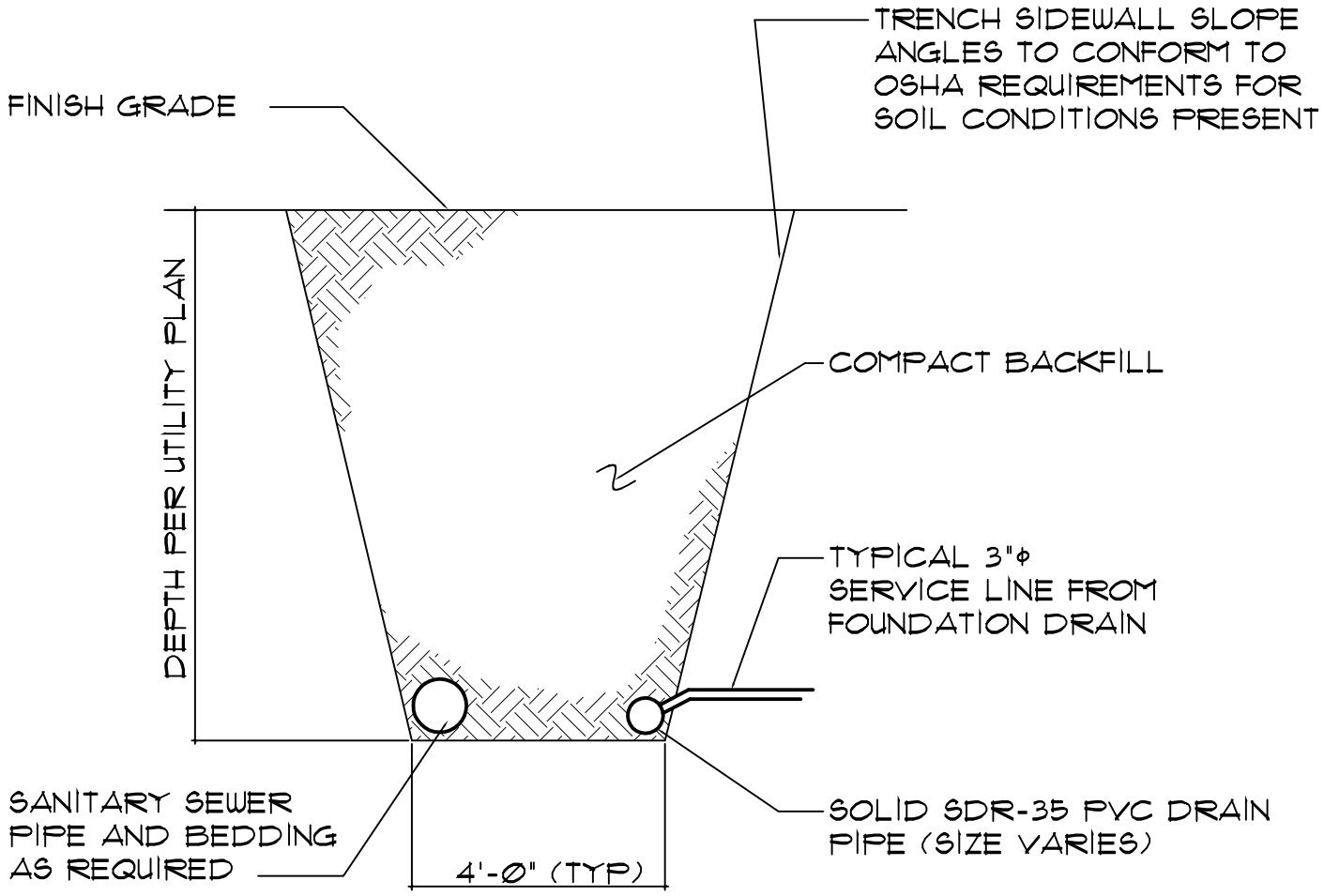
CARRIAGE MEADOWS SOUTH
EL PASO COUNTY, CO
LORSON RANCH METRO DISTRICT NO. 1

JOB No. 152427

FIG No. 23

DATE 6-29-2016

NOTE: TO BE USED WHERE NO SHALLOW GROUNDWATER IS KNOWN TO EXIST



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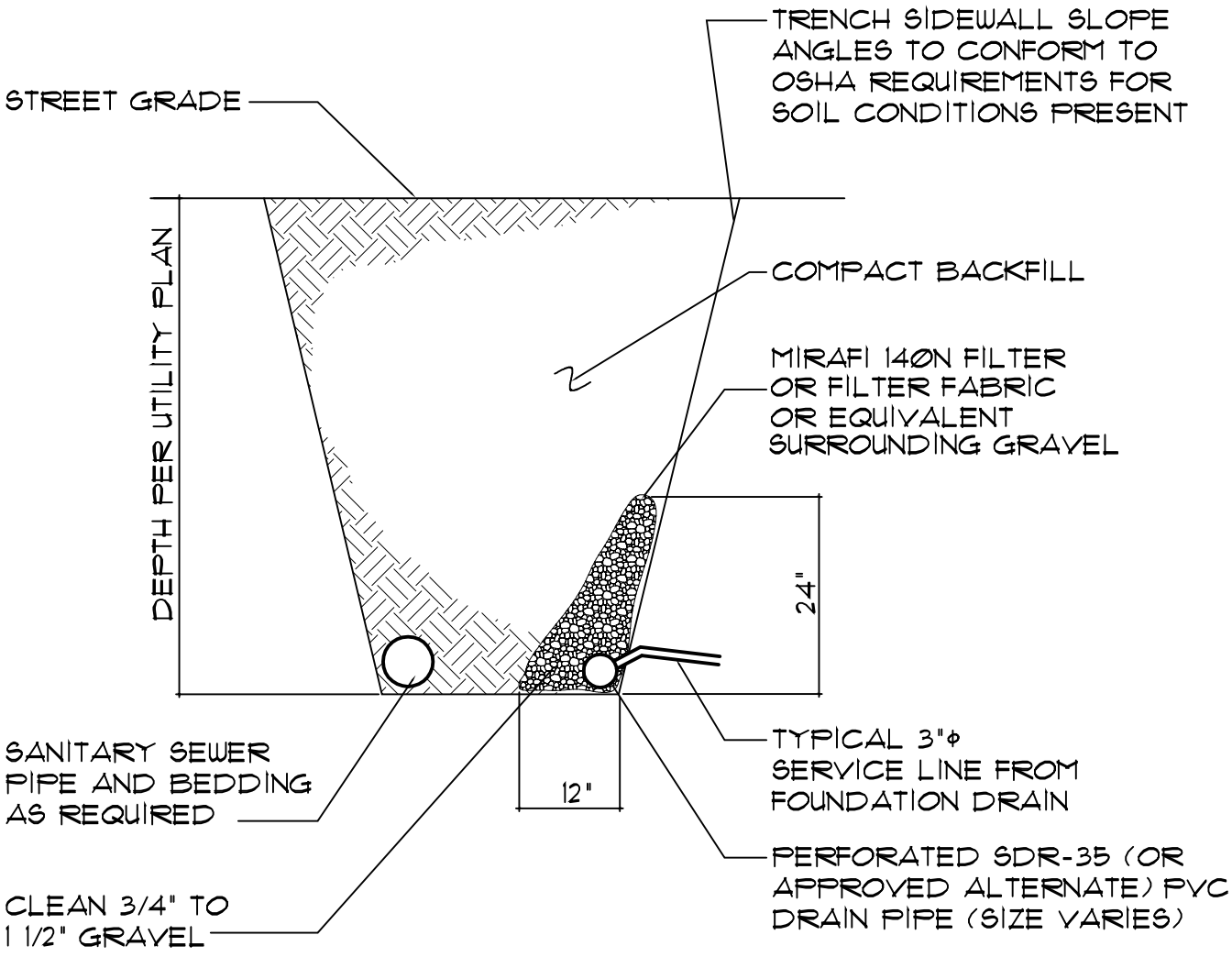
PASSIVE DRAIN IN SANITARY SEWER TRENCH

FIG No. 24

NOTE: TO BE USED IN CASES WHERE GROUNDWATER IS FOUND DURING TRENCHING OR WHERE SHALLOW GROUNDWATER IS KNOWN TO EXIST



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ACTIVE DRAIN IN SEWER UTILITY TRENCH

FIG No. 25

APPENDIX A
GUIDELINE SITE GRADING SPECIFICATIONS

Guideline Site Grading Specifications

Description: Unless specified otherwise by local or state regulatory agencies, these guideline specifications are for the excavation, placement and compaction of material from locations indicated on the plans, or staked by the Engineer, as necessary to achieve the required elevations. These specifications shall also apply to compaction of materials that may be placed outside of the project.

General: The Geotechnical Engineer shall approve fill materials, method of placement, moisture contents and percent compactions, and shall give written approval of the compacted fill.

Clearing Site: The Contractor shall remove trees, brush, rubbish, vegetation, topsoil and existing structures before excavation or fill placement is commenced. The Contractor shall dispose of the cleared material to provide the Owner with a clean job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures. Clearing shall also include removal of existing fills that do not meet the requirements of this specification and existing structures.

Preparation of Slopes or Drainage Areas to Receive Fill: Natural slopes or slopes of drainage gullies where grades are 20 percent (5:1, horizontal to vertical) or steeper shall be benched prior to fill placement. Benches shall be at least 10 feet wide. Benches may require additional width to accommodate excavation or compaction equipment. At least one bench shall be provided for each 5 feet or less of vertical elevation difference. The bench surface shall be essentially horizontal perpendicular to the slope or at a slight incline into the slope.

Scarifying: Topsoil and vegetation shall be removed from the ground surface in areas to receive fill. The surface shall be plowed or scarified a minimum of 12 inches until the surface is free from ruts, hummocks or other uneven features which would prevent uniform compaction by the equipment to be used.

Compacting Area to Receive Fill: After the area to receive fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, moisture conditioned to a proper moisture content and compacted to the maximum density as specified for the overlying fill. Areas to receive fill shall be worked, stabilized, or removed and replaced, if necessary, in accordance with the Geotechnical Engineer's recommendations in preparation for fill.

Fill Materials: Fill material shall be free from organic material or other deleterious substances, and shall not contain rocks or lumps having a diameter greater than six inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer or imported to the site and shall be approved by the Geotechnical Engineer prior to placement. It is recommended that the fill materials have nil to low expansion potential, i.e., consist of silty to slightly clayey sand.

- The moisture-conditioned materials should be placed in maximum 6" compacted lifts. These materials should be compacted to a minimum of 92 percent of the maximum Modified Proctor dry density or 95 percent of the maximum Standard Proctor dry density. Material not meeting the above requirements shall be reprocessed.

Materials used for moisture-conditioned structural fill should be approved by RMG prior to use. Moisture-conditioned structural fill should not be placed on frozen subgrade or allowed to freeze during moisture conditioning and placement.

Moisture Content: Fill materials shall be moisture conditioned to within limits of optimum moisture content specified. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas or imported to the site.

The contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water to the fill material during placement. The Contractor may be required to rake or disk the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with watering equipment, approved by the Geotechnical Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are eroded.

Should too much water be added to the fill, such that the material is too wet to permit the desired compaction to be obtained, compacting and work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework the wet material in an approved manner to hasten its drying.

Compaction of Fill Areas: Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill materials shall be placed such that the thickness of loose material does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical Engineer. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area.

Moisture Content and Density Criteria:

A. Fill placed in roadways and utility trenches should be moisture conditioned and compacted in accordance with El Paso County Specifications.
B. Fill placed outside of roadways and utility trenches should be compacted to at least 92% of the maximum Modified Proctor density (ASTM D-1557) or at least 95% of

the maximum Standard Proctor density (ASTM D-698) at a moisture content within 2% of optimum.

Compaction of Slopes: Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and such that there is no appreciable amount of loose soil on the slopes. Compaction of slopes may be done progressively in increments of three to five feet in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

Density Testing: Field density testing shall be performed by the Geotechnical Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

Observation and Testing of Fill: Observation by the Geotechnical Engineer shall be sufficient during the placement of fill and compaction operations so that he can declare the fill was placed in general conformance with Specifications. All observations necessary to test the placement of fill and observe compaction operations will be at the expense of the Owner.

Seasonal Limits: No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer indicates the moisture content and density of previously placed materials are as specified.

Reporting of Field Density Tests: Density tests made by the Geotechnical Engineer shall be submitted progressively to the Owner. Dry density, moisture content, percent compaction, and approximate location shall be reported for each test taken.

APPENDIX B

Letter of Map Revision (LOMR) as presented by Core Engineering

Federal Emergency Management Agency

Washington, D.C. 20472

MAY 07 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Lionel Rivera
Mayor, City of Colorado Springs
P.O. Box 1575
Colorado Springs, CO 80901

IN REPLY REFER TO:
Case No.: 06-08-B643P
Follows Conditional
Case No.: 05-08-0286R
Community Name: City of Colorado Springs, CO
Community No.: 080060
Effective Date of This Revision: AUG 29 2007

Dear Mayor Rivera:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235-4830, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

For: William R. Blanton Jr., CFM, Chief
Engineering Management Section
Mitigation Division

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Insurance Study Report

cc: The Honorable Dennis Hisey
Chairman, El Paso County
Board of Commissioners

The Honorable Jeri Howells
Mayor, City of Fountain

[redacted]
Pentacor Engineering LLC

[redacted]
Landhuis Company

Mr. Phil Wuthier, P.E., CFM
Regional Floodplain Administrator
Pikes Peak Regional Building Department

 | Issue Date: MAY 07 2007 | Effective Date: AUG 29 2007 | Case No.: 06-08-B643P | LOMR-APP

Follows Conditional Case No.: 05-08-0286R

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Colorado Springs El Paso County Colorado	CHANNEL RELOCATION	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 080060		
IDENTIFIER	Lorson Ranch Development – Jimmy Camp Creek	APPROXIMATE LATITUDE & LONGITUDE: 38.690, -104.686 SOURCE: USGS QUADRANGLE DATUM: NAD 27	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 08041C0957 F DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 108P and 109P FLOODWAY DATA TABLE: 5

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Jimmy Camp Creek – from approximately 3,240 feet downstream to approximately 3,650 feet upstream of Fontaine Boulevard

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Jimmy Camp Creek	Zone AE	Zone AE	NONE	YES
	Zone X (shaded)	Zone X (shaded)	YES	NONE
	Floodway	Floodway	NONE	YES
	BFEs*	BFEs	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 080059 **Name:** El Paso County, Colorado

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM NO.: 08041C0957 F DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 107P and 108P FLOODWAY DATA TABLE: 5

CID Number: 080061 **Name:** City of Fountain, Colorado

AFFECTED MAP PANELS	AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM NO.: 08041C0957 F DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 107P FLOODWAY DATA TABLE: 5

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD 29)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Jimmy Camp Creek	Approximately 2,660 feet upstream of Fontaine Boulevard	5,727	5,725	08041C0957 F
	Approximately 2,760 feet upstream of Fontaine Boulevard	5,728	5,727	08041C0957 F

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. This revision is effective as of the date of this letter. However, until the 90-day period has elapsed, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER Name: *El Paso County News*
Dates: 05/23/2007 05/30/2007

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Patrick F. Sacbibit, P.E., CFM, Project Engineer
Engineering Management Section
Mitigation Division

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF COLORADO SPRINGS AND THE UNINCORPORATED AREAS OF EL PASO COUNTY, COLORADO, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On March 17, 1997, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Colorado Springs and in the unincorporated areas of El Paso County, Colorado, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the Base (1-percent-annual-chance) Flood Elevations (BFEs) for certain locations in these communities is appropriate. The modified BFEs revise the FIRM for the communities.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate the effects of channel realignment and channelization along Jimmy Camp Creek from approximately 3,240 feet downstream to approximately 3,650 feet upstream of Fontaine Boulevard. This has resulted in a revised delineation of the regulatory floodway, increases and decreases in SFHA width, and increased and decreased BFEs for Jimmy Camp Creek. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
[2]Approximately 2,000 feet downstream of Fontaine Boulevard	5,693	5,692
[2]Approximately 2,500 feet upstream of Fontaine Boulevard	5,726	5,723
[1]Approximately 2,660 feet upstream of Fontaine Boulevard	5,727	5,725
[1]Approximately 2,760 feet upstream of Fontaine Boulevard	5,728	5,727

*National Geodetic Vertical Datum, rounded to nearest whole foot
[1]City of Colorado Springs
[2]Unincorporated areas of El Paso County

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Dennis Hisey
Chairman, El Paso County
Board of Commissioners
27 East Vermijo Avenue
Colorado Springs, CO 80903

OR

The Honorable Lionel Rivera
Mayor, City of Colorado Springs
P.O. Box 1575
Colorado Springs, CO 80901

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Jimmy Camp Creek (Cont'd)								
AA	25,770	180	1,464	9.9	5,632.5	5,632.5	5,633.1	0.6
AB	27,710	300	2,552	5.6	5,641.1	5,641.1	5,641.5	0.4
AC	30,850	140	926	15.4	5,652.4	5,652.4	5,652.4	0.0
AD	31,610	220	1,367	10.5	5,659.8	5,659.8	5,659.9	0.1
AE	33,590	570	2,391	5.9	5,668.8	5,668.8	5,669.4	0.6
AF	34,870	450	1,890	6.8	5,674.5	5,674.5	5,674.5	0.0
AG	35,090	650	3,215	4.0	5,675.6	5,675.6	5,675.6	0.0
AH	36,070	200	1,109	11.6	5,678.9	5,678.9	5,678.9	0.0
AI	37,850	380	2,497	5.2	5,688.0	5,688.0	5,688.5	0.5
AJ	39,710	293	1,538	8.4	5,695.1	5,695.1	5,695.2	0.1
AK	41,060	274	1,481	8.7	5,704.7	5,704.7	5,704.7	0.0
AL	42,525	290	1,333	9.5	5,714.2	5,714.2	5,714.2	0.0
AM	43,890	445	1,454	8.7	5,729.6	5,729.6	5,729.7	0.1
AN	47,160	225	1,218	10.3	5,741.7	5,741.7	5,741.9	0.2
AO	48,820	440	1,455	8.1	5,753.9	5,753.9	5,754.6	0.7
AP	49,960	340	1,590	7.4	5,762.4	5,762.4	5,762.6	0.2
AQ	51,500	252	1,222	9.7	5,772.9	5,772.9	5,772.9	0.0
AR	53,060	646	2,265	5.2	5,785.1	5,785.1	5,786.1	1.0
AS	54,660	160	878	13.4	5,803.1	5,803.1	5,803.1	0.0
AT	56,750	320	1,466	7.8	5,823.3	5,823.3	5,823.5	0.2
AU	57,440	390	1,168	9.2	5,830.2	5,830.2	5,830.3	0.1
AV	58,240	140	711	10.4	5,839.0	5,839.0	5,839.2	0.2
AW	59,460	110	648	11.0	5,849.0	5,849.0	5,849.0	0.0
AX	60,580	150	656	10.8	5,859.6	5,859.6	5,859.7	0.1
AY	61,260	170	686	10.3	5,867.0	5,867.0	5,867.0	0.0
AZ	61,390	150	757	9.4	5,867.5	5,867.5	5,868.3	0.8

EVISED ATA

[1]Feet Above Confluence With Fountain Creek

REVISED TO REFLECT LOMR EFFECTIVE AUG 2 9 2007

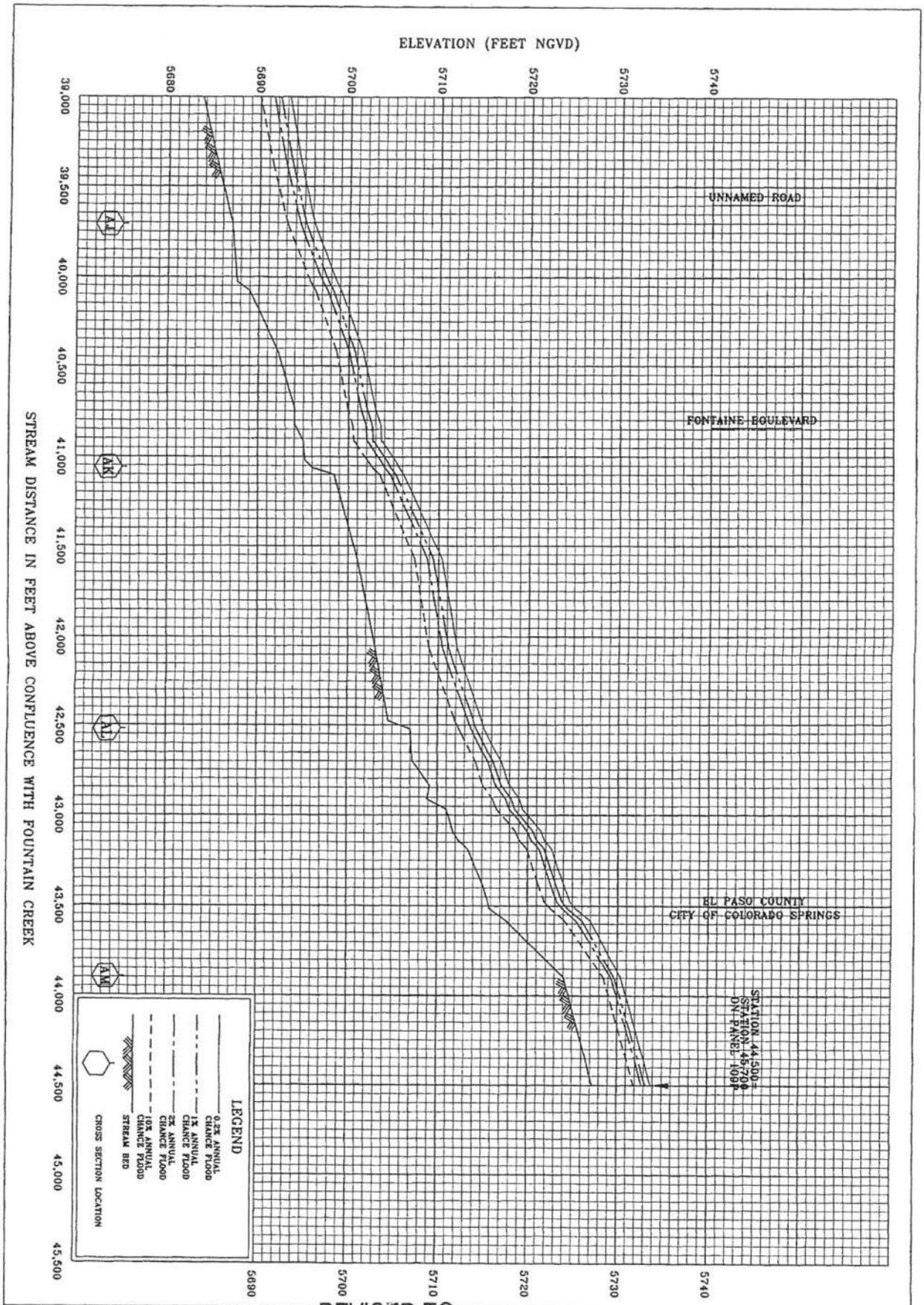
TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

JIMMY CAMP CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

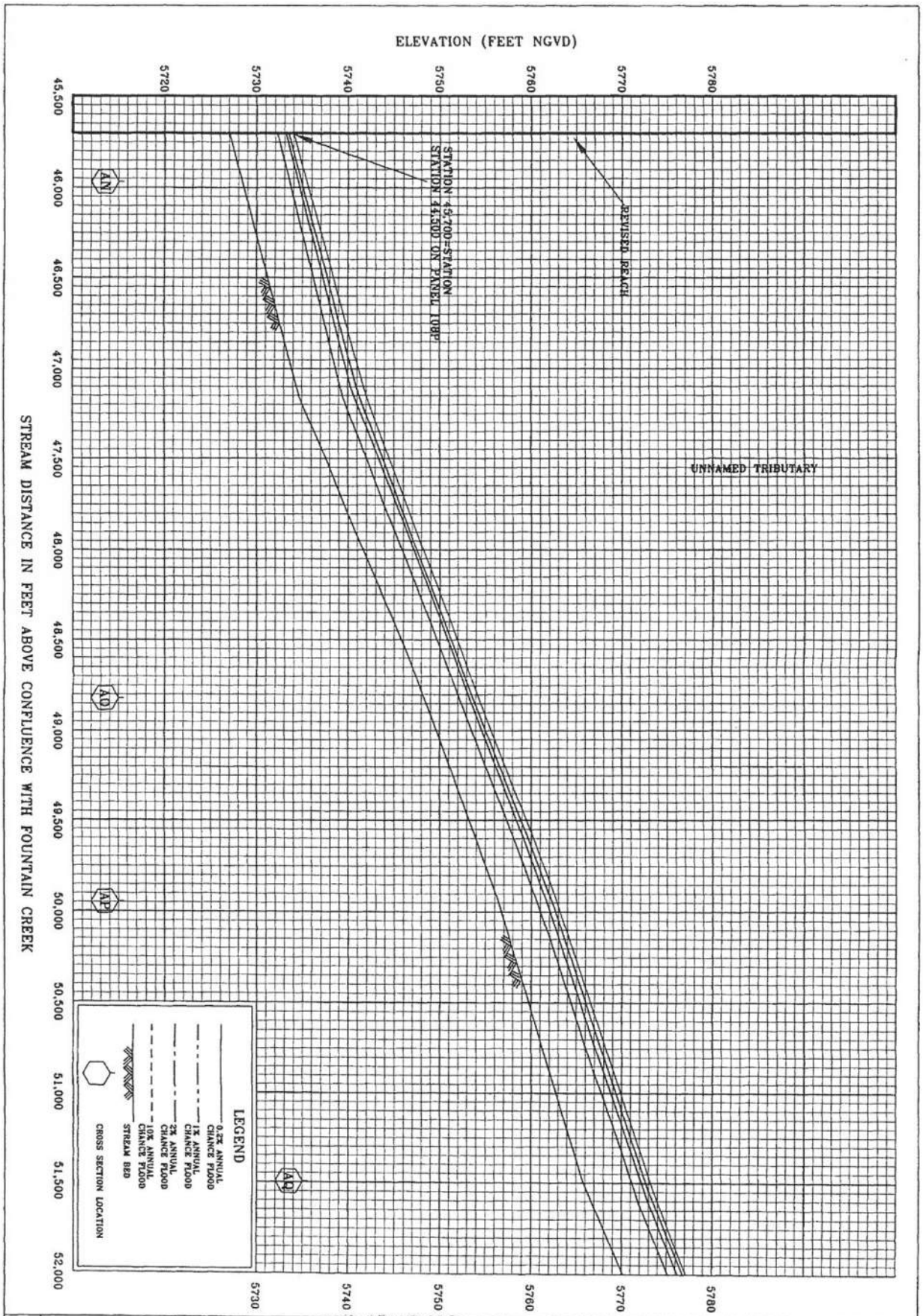
EL PASO COUNTY, CO
AND INCORPORATED AREAS

REVISED TO
REFLECT LOMR
EFFECTIVE AUG 2 9 2007

FLOOD PROFILES

JIMMY CAMP CREEK

108P



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH FOUNTAIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

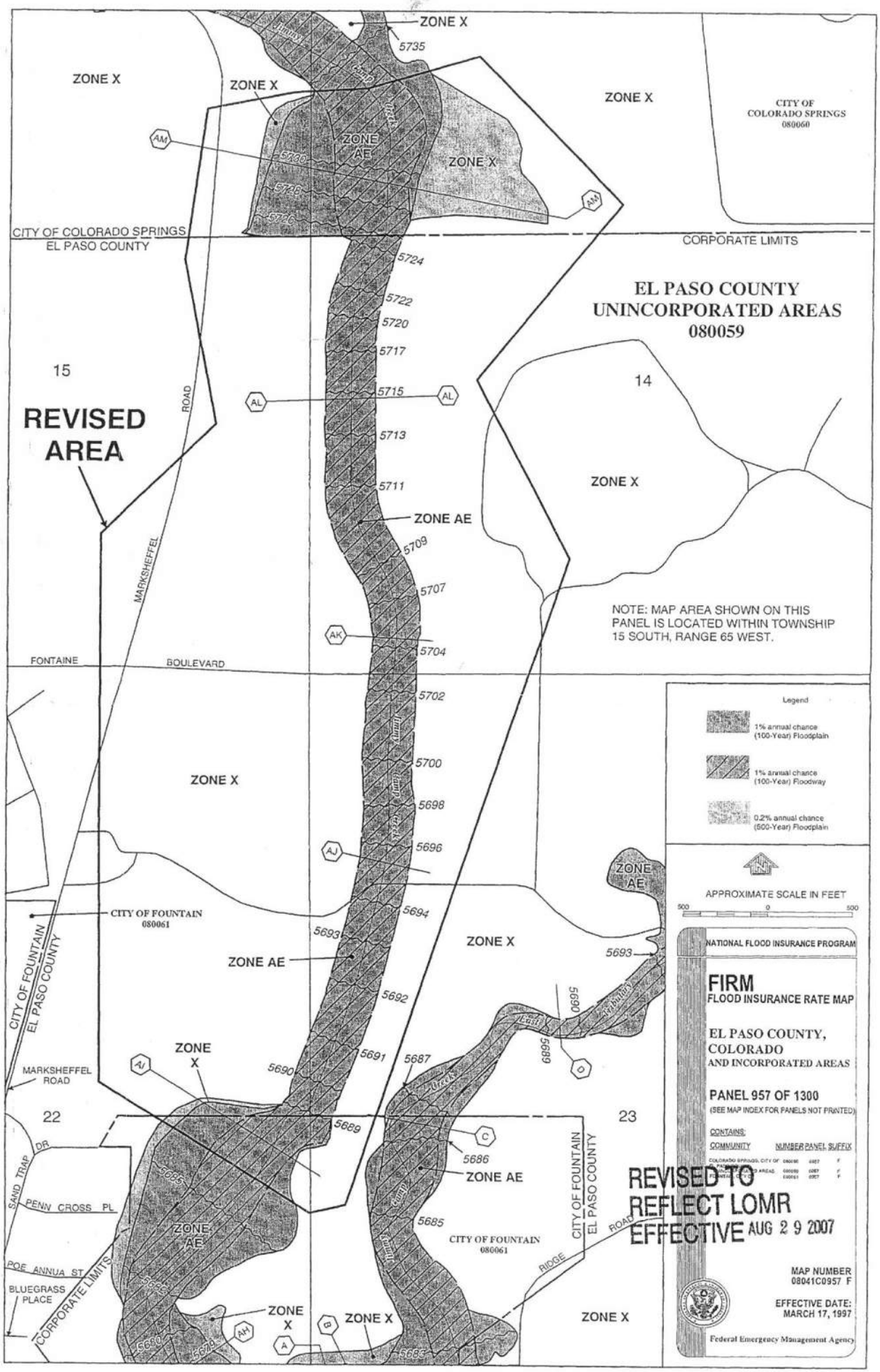
EL PASO COUNTY, CO
AND INCORPORATED AREAS

REVISED TO
REFLECT LOMR
EFFECTIVE AUG 2 9 2007

FLOOD PROFILES

JIMMY CAMP CREEK

109P


ZONE X
5735
ZONE X
ZONE X
ZONE X
CITY OF COLORADO SPRINGS
080060
ZONE AE
ZONE X
AM
5730
5728
5726
AM
CITY OF COLORADO SPRINGS
EL PASO COUNTY
CORPORATE LIMITS
5724
5722
5720
5717
EL PASO COUNTY
UNINCORPORATED AREAS
080059
15
14
AL
5715
AL
REVISED
AREA
5713
5711
ZONE X
ZONE AE
5709
5707
NOTE: MAP AREA SHOWN ON THIS
PANEL IS LOCATED WITHIN TOWNSHIP
15 SOUTH, RANGE 65 WEST.
AK
5704
FONTAINE
BOULEVARD
5702
5700
ZONE X
5698
AJ
5696
ZONE AE
CITY OF FOUNTAIN
080061
5694
5693
ZONE X
5693
ZONE AE
5692
5690
5689
ZONE
X
AI
5691
5687
O
MARKSHEFFEL
ROAD
22
23
5689
C
5686
ZONE AE
SAND TRAP DR
PENN CROSS PL
5685
ZONE
AE
CITY OF FOUNTAIN
080061
CITY OF FOUNTAIN
EL PASO COUNTY
RIDGE ROAD
POE ANNUA ST
BLUEGRASS
PLACE
CORPORATE LIMITS
ZONE
X
AH
A
B
ZONE X
ZONE X
5683
Legend
1% annual chance
(100-Year) Floodplain
1% annual chance
(100-Year) Floodway
0.2% annual chance
(500-Year) Floodplain
APPROXIMATE SCALE IN FEET
500
0
500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS
PANEL 957 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
COLORADO SPRINGS, CITY OF 080060 0957 F
EL PASO COUNTY UNINCORPORATED AREAS 080059 0957 F
FOUNTAIN, CITY OF 080061 0957 F
REVISED TO
REFLECT LOMR
EFFECTIVE AUG 29 2007
MAP NUMBER
08041C0957 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency