Final Drainage Report
South Nevada Creekwalk Filing No. 1

Colorado Springs, Colorado

Prepared for:
Creekwalk, LLC
90 South Cascade Suite 1500
Colorado Springs, Colorado 80903
719-448-4034

Prepared by:

Kiowa
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Kiowa Project No. 18012
June 12, 2019
Revised June 27, 2019
Revised July 3, 2019

Signature Page
South Nevada Creekwalk Filing No. 1

Engineer's Statement

This report and plan for the drainage design of South Nevada Creekwalk Filing No. 1 was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Signature (Affix Seal): _____ 7/3/19

Richard N. Wray Colorado P.E. No. 19310 Date

Developer's Statement

Creekwalk, LLC hereby certifies that the drainage facilities for South Nevada Creekwalk Filing No. 1 shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of South Nevada Creekwalk Filing No. 1 guarantee that final drainage design review will absolve Creekwalk, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Name of Developer: Creekwalk LLC

_____ 7-3-19

Authorized Signature Date

Printed Name: Danny Mientka

Title: Managing Partner

Address: 90 South Cascade, Suite 1500, Colorado Springs, CO 80903

City of Colorado Springs Statement:

Filed in accordance with Section 7.7.906 of the code of the City of Colorado Springs, 2001, as amended.

Jonathan B. Schleer 07/08/2019

For City Engineer Date

Conditions:

I. General Location and Description

The purpose of the Final Drainage Report is to identify onsite and offsite drainage patterns, storm sewer, culvert and inlet locations, stormwater and water quality detention size and type, areas tributary to the site and to develop a stormwater management system that will function to safely route stormwater to an adequate outfall. This final drainage plan and report has been prepared to show design level storm water management measures. Final design plans for the permanent stormwater BMP's and for the Cheyenne Creek drainageway will be prepared and submitted to the City for approval prior to the commencement of any grading, infrastructure installation or drainageway work. The Final Drainage Report complies with the most current version of the City of Colorado Springs drainage criteria manual.

The proposed South Nevada Creekwalk Filing No. 1 commercial development is located within the South Nevada Avenue urban renewal area that is generally bounded by St. Elmo Avenue on the north, East Cheyenne Road to the south, Lot 1 Block 1 of Starsmore Subdivision and Lot 3 Block 4 Ivywild Subdivision, and generally Cheyenne Creek on the west, in Colorado Springs, El Paso County, Colorado. The site is located within the west half of Section 30, Township 14 South, Range 66 West of the 6th Principal Meridian. The site presently consists of a mix of platted and un-platted residential and commercial uses. The platting will cover approximately 7.5 acres and 5 commercial lots will be created. The redeveloped use will be commercial consisting of retail shops and restaurants. Water, wastewater, gas and electric utilities presently serve the site and are available to support the redevelopment of the property. A vicinity map showing the location of the project is depicted on Figure 1. St. Elmo Avenue will remain public and is not part of the Development Plan. Mount Washington Avenue will be vacated within the limits of the subdivision plat. The subdivision plat has been included within this report in Appendix C.

The site lies within the Southwest Area drainage basin. Cheyenne Creek is a major drainageway identified in the Southwest Area DBPS. A large portion of the site generally drains from north to south via sheet flow. Existing runoff is now conveyed to the St. Elmo Avenue street section where it then would flow north within the Mount Washington Avenue. There is an offsite storm sewer that enters the site at the southwest corner. This storm sewer conveys runoff collected from East Cheyenne Road right-of-way to Cheyenne Creek via a 24-inch storm sewer. The 24-inch storm sewer will be relocated as part of the proposed improvements to Cheyenne Creek. Within the boundary of the site there exists limited storm water collection systems that can convey runoff to Cheyenne Creek.

Existing slopes across the site of range from 1 to 2 percent. Existing cover is dominated by pavement and concrete surfaces associated with the existing residential and commercial uses with very limited areas of landscaping.

Cheyenne Creek passes along and within the west side of the Filing 1. Cheyenne Creek is a 25 square mile watershed at its outfall to Fountain Creek just upstream of South Nevada Avenue. The 100-year discharge of Cheyenne Creek is 8,840 cubic feet per second. Portions of the site lie within the 100-year floodway and floodplain of Cheyenne Creek. New

VICINITY MAP

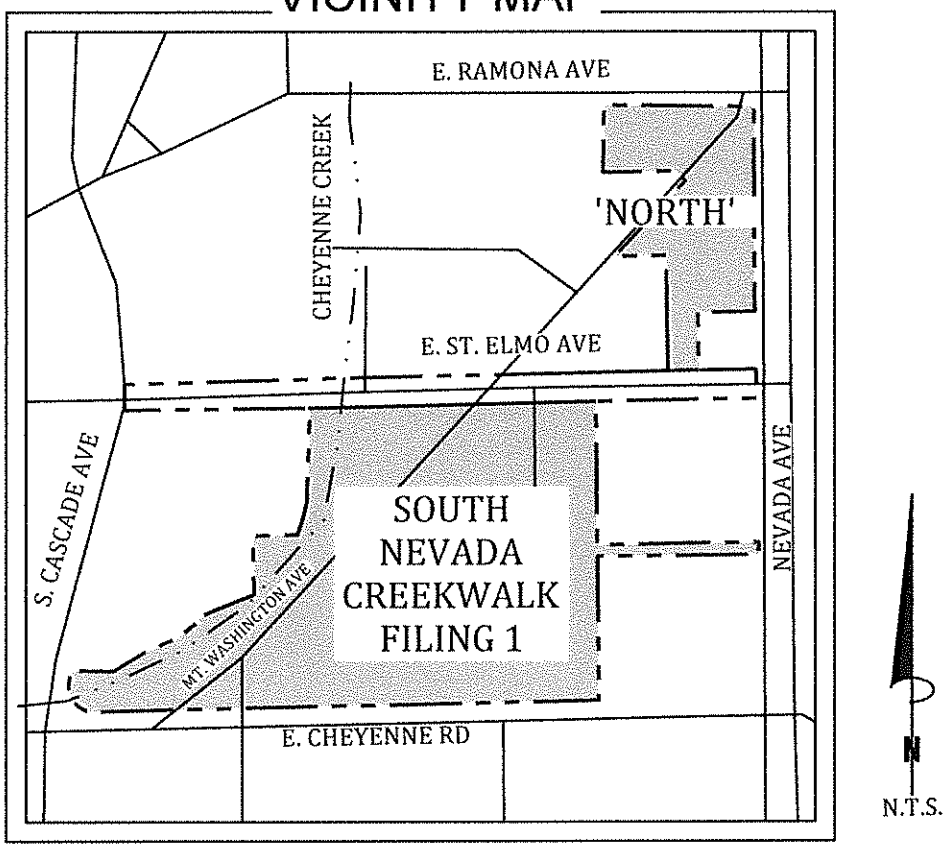


FIGURE 1
CREEKWALK MARKETPLACE

structures will be required to have their lowest finish floor elevated or floodproofed one foot above the base flood elevation adjacent to the structure. Structures and fill that will occur within the floodway will be regulated by a no net rise certification in accordance with Regional Building Department requirements. This will affect buildings A, B and C.

The low flow area of the Creek is in private ownership now except where the Creek crosses at St. Elmo Avenue and at South Cascade Avenue. Access to the creek for maintenance is limited by dense vegetation, retaining walls and fences. There is a constant base flow in the Creek and at some locations fish exist. The low flow area is partially armored and stable. Cheyenne Creek is considered waters of the United States and therefore stabilization efforts or modifications within the ordinary high-water line will be subject to USACOE review and permitting. Field meetings have been held with the USACOE and it is anticipated that the project may be able to be authorized under a Nationwide Permit #27 Aquatic Habitat Restoration, Establishment and Enhancement Activities in New Mexico and Texas within Corps of Engineers Albuquerque District. A copy of the nationwide permit has been included in Appendix D.

A portion subdivision is also within the City streamside zone that will impact various site planning aspects related to the redevelopment of the property(s).

II. Previous Reports and References

The following reports and plans were reviewed in the process of preparing this final drainage plan:

1. National Resource Conservation Service Soil Survey for El Paso County, Colorado, June 1981.
2. City of Colorado Springs Drainage Criteria Manuals Volumes I and II, April 2014.
3. Flood Insurance Studies for Colorado Springs, and El Paso County, Colorado", prepared by the Federal Emergency Management Agency (FEMA), dated December 2018.
4. Southwest Area Drainage Basin Drainage Basin Planning Study prepared by Lincoln-DeVore, Inc., May 1986.
5. Urban Drainage and Flood Control District Storm Drainage Criteria Manual, Volume III.
6. Preliminary Geotechnical Investigation, Creekwalk Project, South Nevada and East Cheyenne Road, Colorado Springs, Colorado, prepared by CTL-Thompson, Inc., Octrober23, 2017.
7. Upper Fountain Creek and Cheyenne Creek Restoration Master Plan, 2015.
8. Cheyenne Creek Hydrology Report, LOMR Case No. 15-08-0401P, prepared by Kiowa Engineering, 2008.
9. Hydrologic Engineering Center (HEC) Flood Frequency Analysis, Version 3.1.

Reference 4 was prepared by the City of Colorado Springs in order to identify major drainageway and storm sewer systems improvements for the Southwest Area watershed.

The project site lies within the Southwest Area basin. There were no major drainageway facilities shown in the Reference 4 for the site.

Review of Reference 7 revealed that there were no specific improvements immediately proposed for the reach of Cheyenne Creek through the South Nevada Creekwalk Filing 1 property. Reference 7 shows for the segment through the site small drop structures and toe protection. The stabilization measures proposed for Cheyenne Creek are consistent with the improvements called out in Reference 7.

Reference 8 lists the 10-, 50-, 100- and 500-year peak flood discharges for Cheyenne Creek within the project site. Reference 8 was prepared as part of a Letter of Map Revision for Cheyenne Creek that became effective in 2016. The LOMR was incorporated into the revised flood insurance rate maps for the City of Colorado Springs in that became effective in 2018 (Reference 3).

III. Drainage Design Criteria and Basin Characteristics

Hydrology for this site was estimated using the methods outlined in the *City of Colorado Springs Drainage Criteria Manual, Volumes I and II* (DCM). Topography for the site was compiled at a one-foot contour interval and is presented at a horizontal scale of 1-inch to 50-feet on Exhibits 1 and 2 at the rear of the report. Hydrologic calculations were made for both the existing and proposed site conditions.

The predominant soils within the property are classified to be within Hydrologic Soils Group A, C and D as shown in the El Paso County Soils Survey. The soil survey report is included within Appendix A. The predominant soil within the area to be developed (sub-basins 1 and 3), is identified as a Nunn series clay loam (HSG C). The drainageway soils are Chaseville gravelly sandy loam (HSG A) and the Razor Midway complex (HSG D). These soils are deep and well drained and have relatively low runoff curve numbers (i.e., 55 to 65) depending upon vegetative cover and condition. The cover within the project area is dominated by impervious surfaces such a pavements and roof tops. What vegetative cover is associated with the existing residences and businesses ranges from poor to fair quality. Due to the extent of paving and landscaping in the proposed condition hydrologic soil group B was assumed in the hydrology calculations.

To estimate the onsite and offsite peak rates of runoff the Rational Method was applied. The runoff coefficients for the existing and proposed site conditions were determined using Table 6-6 of the *City of Colorado Springs Drainage Criteria Manual.* A copy of Table 6-6 is included in Appendix A of this report. For sub-basins smaller than 5 acres a minimum time of concentration of 5-minutes was applied when determining the rainfall intensity for the 5- and 100-year recurrence intervals. Rainfall intensities for the 5- and 100-year recurrence intervals used in the application of the Rational Method formula were obtained from Figure 6-5 of Reference 2. The hydrology calculations are included in Appendix A of this report.

IV. Existing Drainage Basin Characteristics

Presented on Exhibit 1 (contained in map pocket) are the existing site conditions sub-basins and existing drainage facilities for the project site and immediately adjacent properties. Also shown is the proposed concept plan boundary and the regulatory floodplains from Reference 3. A description of each existing sub-basin follows.

Sub-basin A: This sub-basin covers 2.43 acres and is drained by sheet flow towards the northeast within the parking and drive areas of the existing Wells Fargo Bank and Diamond Shamrock. This sub-basin abuts a portion of the east property line of the concept plan. Runoff from this sub-basin is conveyed north into the west flowline of South Nevada Avenue and eventually enters the existing South Nevada Avenue storm sewer. The ground slope of the sub-basin ranges from 1 to 1.5 percent. The sub-basin is mostly paved with landscape islands typical of commercial sites. There are no public or private storm sewer systems within this sub-basin. Peak discharges for sub-basin A for the 5-year and 100-year recurrence intervals are 10.2 and 18.8 cubic feet per second, respectively. Runoff from this sub-basin does not impact the South Nevada Creekwalk Filing No. 1 site.

Sub-basin B: The basin covers 2.58 acres and is drained by sheet flow towards the northeast within the parking and drive areas of the existing McDonalds Drive-in restaurant. At the northeast corner runoff is conveyed via area drains to the South Nevada Avenue storm sewer. This sub-basin abuts a portion of the east property line of the concept plan. The ground slope of the sub-basin ranges from 1 to 1.5 percent. The sub-basin is mostly paved with landscape islands typical of commercial sites. The is a private curb inlet and 18-inch storm sewer that outfalls to the South Nevada storm sewer within this sub-basin. Sub- basin B peak discharges for the 5-year and 100-year recurrence intervals are 10.9 and 20.0 cubic feet per second, respectively. Runoff from this sub-basin does not impact the South Nevada Creekwalk Filing No. 1 site.

Sub-basin C: This sub-basin covers 4.16 acres and is drained by sheet flow towards the northeast within the Mt. Washington street section. There are no existing storm sewer collection systems within this sub-basin. Runoff from this sub-basin sheet flows northeast into the intersection of Mt. Washington Avenue and St. Elmo Avenue. From the intersection the runoff moves northeast in Mount Washington Avenue street section the its intersection with Ramona Avenue. Sub-basin C covers a good portion of South Nevada Creekwalk Filing 1. The ground slope of the sub-basin ranges from 1 to 1.5 percent. The imperviousness of the sub-basin is estimated at 70 percent due to large areas of paved parking associated with the residential and commercial uses, and the street right-of-way. There are no public or private storm sewer systems within this sub-basin. Peak discharges for the 5-year and 100-year recurrence intervals are 6.5 and 18.3 cubic feet per second, respectively.

Sub-basin D: This sub-basin covers 1.12 acres and is drained by sheet flow towards the northeast within the Mt. Washington Avenue street section. Existing storm sewer and inlets are located along Mt. Washington Avenue at the outfall point of this sub-basin. Runoff collected by this system outfalls to Cheyenne Creek. Sub-basin D lies within a portion of South Nevada Creekwalk Filing 1. The ground slope of the sub-basin ranges from 2 to 3

percent. The imperviousness of the sub-basin is estimated at 90 percent due to large area of paved parking associated with the commercial uses and the Mt. Washington Avenue right-of-way. There are two existing grated inlets that collect runoff from each flow line of Mount Washington Avenue. The existing grated inlets discharge to a 24-inch CMP storm sewer that then outfalls to Cheyenne Creek. The inlet and storm sewer will be removed with the development of the Filing 1. Peak discharges for the 5-year and 100-year recurrence intervals are 4.7 and 8.7 cubic feet per second, respectively.

Sub-basin E: This sub-basin covers .81 acres and is drained by sheet flow towards the northeast within the Mt. Washington Avenue street section. An existing storm sewer crosses through this sub-basin from north to south and carries runoff from East Cheyenne Road into Cheyenne Creek. Sub-basin E lies within South Nevada Creekwalk Filing 1. The ground slope of the sub-basin ranges from 2 to 3 percent. The imperviousness of the sub-basin is estimated at 75 percent due to large area of paved parking associated with the residences and the Mt. Washington Avenue street right-of-way. There is an existing 24-inch public storm sewer that enters this sub-basin from East Cheyenne Road. This storm sewer conveys runoff from the East Cheyenne Road street section and outfalls to Cheyenne Creek. The existing storm sewer will be rerouted to a different outfall point located approximately 100 feet upstream from its present outfall location at Cheyenne Creek. Peak discharges for the 5-year and 100-year recurrence intervals are 1.1 and 3.4 cubic feet per second, respectively.

Sub-basin F: This sub-basin covers .27 acres and is the area encompassed by Cheyenne Creek that borders the west property line of the South Nevada Creekwalk Filing 1 subdivision. This segment of Cheyenne Creek is confined between concrete retaining walls for most of its length within the site. Sub-basin F lies within a portion of the South Nevada Creekwalk site. The ground slope of the sub-basin ranges from 0.5 to 1.0 percent. The imperviousness of the sub-basin is estimated at 15 percent. Other than the drainageway structures associated with Cheyenne Creek, there are no other storm sewer facilities within this sub-basin. Peak discharges (excluding the major drainageway flood flow), for the 5-year and 100-year recurrence intervals are 0.5 and 1.2 cubic feet per second, respectively.

V. Proposed Drainage Basin Characteristics

Presented on Exhibit 2 (contained in map pocket) is the proposed drainage plan. Exclusive of the areas that will drain to the Cheyenne Creek drainageway Filing 1 will sheet flow north through parking and drive areas and will be collected by an inlet and storm sewer system. The storm sewer system will outfall to proposed underground water quality storage basins that will store the water quality capture volume (WQCV) for release over a 40-hour period and the excess urban runoff volume (EURV), before discharging to a proposed the Cheyenne Creek drainageway. The are no areas of offsite runoff that flows into the site other than what is conveyed via a 24-inch storm that enters the site at the southwest corner from the East Cheyenne Road right-of-way. The Filing 1 storm sewer collection systems would consist of sheet flow through parking areas and drive aisles. Runoff from the buildings will be collected in a storm sewer system and piped to the underground storage basins. Runoff

from the parking areas will be collected by inlets and conveyed to underground storm storage systems. The two underground storage systems will outfall to Cheyenne Creek. Also shown on Exhibit 2 is the subdivision boundary and the regulatory floodplains from Reference 3. A description of each of the proposed sub-basin follows

Sub-basin 1: The basin covers 5.29 acres and is drained by sheet flow towards a sump area within east central portion for the main parking area of the development. Runoff from this sub-basin will flow to a proposed 2-foot by 6-foot grated inlet located within the parking lot south of Building A. Runoff collected by the inlet will discharge to twin 24-RCPs that will in turn outfall to a proposed junction structure. At the junction structure the twin 24-inch RCPs will join with an 18-inch RCP that collects roof leader(s) for Buildings D and E as well as a curb inlet in the parking are north of Building E. From the junction structure a 36-inch CMP storm sewer will convey the runoff collected by the inlets to a proposed underground detention basin. Runoff stored in the underground detention basin will discharge to a flow control structure that will release the WQCV over a 40-hour period. The slope of the sub-basin ranges from 1.5 to 2 percent. Vegetative cover will be limited to the landscaping for the proposed commercial businesses. Otherwise the predominant cover will be pavement. Peak discharges for the 5-year and 100-year recurrence intervals are 23.7 and 42.8 cubic feet per second, respectively. The 100-year discharge will pass through the underground system and discharge to the Cheyenne Creek drainageway. The discharge pipe has been sized to be able to carry the full 100-year flow to its outfall point. All inlets used to collect runoff from the parking area have been sized to pick up the 100-year rate of runoff. The overflow route for the curb opening inlet discussed above will be into the parking area and then to the proposed grated inlet. All storm drainage facilities within this sub-basin will be privately owned and maintained.

Sub-basin 1A: The basin covers .075 acres and is drained by sheet flow towards a proposed curb opening inlet located at the northwest corner of the parking area. Runoff from this sub-basin is part of the overall runoff from sub-basin 1 and eventually is stored within the proposed underground detention basin. Runoff collected by the curb inlet will be conveyed to an 18-inch RCP. Overflow from the inlet would be conveyed north along the trail located at the west side of Building B and eventually into the St. Elmo Avenue street section. Peak discharges for the 5-year and 100-year recurrence intervals are 0.3 and 0.6 cubic feet per second, respectively. The proposed inlet used to collect runoff from the parking area has been sized to pick up the 100-year rate of runoff. All storm drainage facilities within this sub-basin will be privately owned and maintained.

Sub-basin 2: This sub-basin covers 1.29 acres and is the Cheyenne Creek open space corridor proposed at the west side of the Filing 1. It is proposed to stabilize the low flow thread of the Creek using rock vanes and boulder linings. This type of channel treatment is consistent with the recommendations is summarized in Reference 7. A variance has been requested for the implementation of the channel treatment proposed for Filing 1. The variance request is included within Appendix d. The overbanks within the proposed channel section will have Type L buried soil and riprap and will be revegetated with native grasses and shrubs to create the open space shown on the development plan. The slope of the sub-

basin ranges from .5 to 1 percent. Vegetative cover is limited now but will be enhanced as the corridor is opened-up and the retaining walls that presently confine the Creek are removed. Peak discharges for the 5-year and 100-year recurrence intervals are 0.6 and 4.1 cubic feet per second, respectively, not including the 100-year runoff for the Cheyenne Creek watershed. All storm drainage facilities within this sub-basin will be privately owned and maintained. The drainageway facilities within this sub-basin will be privately owned and maintained.

Sub-basin 3: This sub-basin covers .64 acres and is drained by sheet flow towards the north within the proposed parking area west of Building C. Roof drainage from Building C is included within this sub-basin. Vegetative cover will be limited to the landscaped islands. The existing 24-inch storm sewer that passes through this sub-basin from East Cheyenne Avenue will be rerouted from its present alignment to Cheyenne Creek. A permanent drainage easement will be provided for the 24-inch public storm sewer where it will pass through the site. It is proposed to collect the 100-year runoff from this sub-basin in a 5-foot inlet located along the north flow line of the proposed parking area. Runoff collected by the 5-foot inlet will be conveyed to a proposed underground detention facility. Runoff from Building C will be conveyed directly to the underground detention basin. The underground storage facility will discharge to and 18-inch RCP. The 18-inch RCP will combine with the relocated 24-inch public storm sewer in a Type 1 manhole. Overflow from the from the curb inlet would be conveyed over the grassed bench of the drainageway and into the low flow channel of Cheyenne Creek. Peak discharges for the 5-year and 100-year recurrence intervals are 3.0 and 5.4 cubic feet per second, respectively. All storm drainage facilities within this sub-basin will be privately owned and maintained.

VI. Hydraulics

Peak discharges for the existing and developed site conditions were determined in accordance with the DCM. Summarized on Exhibit 1 is the existing condition hydrology map that includes the peaks discharges for each of the sub-basins delineated as part of the analysis. Presented on Exhibit 2 is the proposed condition grading and drainage plan. Peak discharges for the 5- and 100-year recurrence intervals were estimated for all the sub-basins shown on Exhibits 1 and 2. Generally the Filing 1 will be drained by surface flow that is directed at curb opening or grated inlets that will collect surface drainage. Filing 1 will have two underground detention storage basins. The runoff from roofs will be collected in their own storm drainage system and piped to the underground basins. The roof collection system is shown on Exhibit 2. The sizes of the proposed storm sewers presented on Exhibit 2 were determined using Manning's equation at flowing full conditions, and as culverts due to their discharge into the underground storage cells. The size of the inlets shown on Exhibit 2 were determined using UD-INLET in conformance with Reference 2. Calculations support the design are contained in Appendix B. Preliminary layout of the proposed stormwater collection system is shown on Exhibit 2. The final design calculations for the underground detention basin and HGL's for all storm sewers will be provided in an addendum to this Final Drainage Report prior to approval of the Permanent BMP and Storm Sewer plan and profile

construction drawings. Preliminary and in progress design plans are provided in Appendix E.

VII. Four Step Process for Managing Adverse Impacts of Urbanization

Presented in Reference 2, Volume 2 is a process chart to be followed when determining the best management practices for minimizing adverse impacts to stormwater runoff related to site development. The South Nevada Creekwalk Filing 1 project involves the redevelopment of 7 acres from what is now a mix of residential and commercial into a strictly commercial use. The existing development has little in the way of stormwater quantity or quality control. Large gravel and paved parking areas dominate the land use now. Many of the parking areas are degraded and poorly maintained. Runoff from these areas carry large amounts of gravel and fine sediment to the drainageway via surface flows and storm sewers. The South Nevada Creekwalk project offers an opportunity to implement stormwater management techniques that can reduce the rate of runoff sent to downstream segments of Cheyenne Creek and to reduce the amount of sediment and debris that now negatively impact Cheyenne Creek and the Fountain Creek watershed in general. The four-step process for the South Nevada Creekwalk projects are summarized below.

Employ runoff reduction practices: Overall the entire site there would a be modest reduction in impervious surface in the redeveloped condition and thus a modest reduction in the volume of the developed runoff. Specifically, for proposed sub-basin 2, the measures to be taken along the drainageway as shown on the development plan will stabilize the low flow section and enable the corridor to trail and creek access. The existing percent imperviousness value for sub-basin 2 is estimated at 53 percent. Once the work on the drainageway is completed and the overbanks of the creek revegetated, the percent imperviousness value will drop to 17 percent. Redevelopment of the drainageway corridor will reduce the amount of runoff contributed by sub-basin 2 over the existing conditions. All the landscaping to be carried out within the drainageway the corridor will use A and B soil types which will promote infiltration.

Peak rates of stormwater runoff will be reduced by the promotion of attenuation because of sheet flow through the parking areas. In South Nevada Creewalk Filing 1 sheet flow will be directly to curb and gutters to increase the distance of travel. This results in a longer time of concentration and corresponding reduction in peak discharges compared to the present conditions. In the existing condition, numerous direct flow areas and concentrated discharge points exist that transport large amounts of sediment and pollutants to the drainageway that then negatively impacts the quality of the runoff entering Cheyenne Creek. Implementation of underground storage will cause reductions in peak rates of runoff to at or below historic levels for the 2- and 5-year storms, and a reduction of the un-detained 100-year peak flow is anticipated as well.

Water quality BMPs with slow release: The primary water quality measure to be employed within the South Nevada Creekwalk Filing 1 will be underground storage of the excess urban runoff volume (EURV). The underground basins will store the WQCV and release it over a 40-hour period. The EURV will be released in 68 to 72 hours. Outlets works

will be designed similarly to conventional extended detention basins with a trash rack and perforated discharge plate. This BMP will allow for sediments transported to the basins via sheet flow and storm water collection systems to fallout. The storage of the EURV will also produce peak flow reduction compared to existing conditions for the 5- and 10-year runoff events. The peak discharge for the 100-year event would also be reduced.

Underground storage facilities that have been sized to collect and release the EURV in less than a 40-hour period are proposed within sub-basins 1 and 3. These facilities will be constructed using corrugated metal storm sewer conduit. The footprints of these facilities are shown on Exhibit 2 along with the storm sewer collections system that delivers the site runoff to the underground basins. The outlet control structures will be sized to release the stored runoff per the criteria put forth in Reference 2 using perforated plates. Storm events that produce runoff in excess of the EURV will be passed through the control structures and into Cheyenne Creek via storm sewers. The underground facilities will attenuate the peak flows for a 100-year storm event as well. The outfall storm sewers from each flow control structure will be stabilized at the discharge point to the Creek with outlet control with a headwall and a flap gate to prevent floodwater from Cheyenne Creek from back flowing into the underground detention basins.

Stabilize drainageways: While the underground storage basins will provide for peak flow reduction for the 5- and 100-year events it is proposed to discharge the 100-year rates of runoff for the un-detained condition. South Nevada Creekwalk Filing 1 un-detained peak 100-year discharge of 42.8 cubic feet per second from sub-basin 1 will be discharged from the underground storage to Cheyenne Creek via a storm sewer out of the proposed flow control structure. The un-detained 100-year peak flow of 5.4 cubic feet per second from sub-basin 3 will be discharged from the underground storage to the relocated 24-inch public storm sewer. The public storm sewer will outfall to Cheyenne Creek approximately 100 feet upstream of its present outfall point.

The capacity of the Cheyenne Creek drainageway is limited by the bridges that now cross the Creek. However even the smallest bridge over Cheyenne Creek downstream of the South Nevada Creekwalk Filing 1 project can carry well over 2,000 cubic feet per second. Discharges the magnitude that are proposed as a result of the Creekwalk project will not cause downstream segments of Cheyenne or Fountain Creek to become over capacity or hydraulically unstable. Even though the Cheyenne Creek drainageway cannot convey the 100-year discharge within its banks anywhere within the City's limits, the low flow area of the creek is stable and there is little evidence of ongoing head-cutting. Longitudinal slope through the Creekwalk South site is 0.2% which promotes low and non-erosive velocities. There are some locations of bank instability due to the lack of channel lining. Contained in Appendix B is a normal depth analysis of the existing channel section downstream of St. Elmo Avenue. This analysis shows that the bank-full capacity is approximately 1,330 cubic feet per second, which is roughly equal to the 5-year flood based upon the Flood Insurance Study. Direct discharge of the 100-year from sub-basin 1 represents 3 percent of the bank-full capacity for the section analyzed.

Additionally, it highly unlikely that a 100-year storm events would occur at the site and within the Cheyenne Creek watershed at the same time, and particularly storm events that have the peaks of the flood hydrographs coincide. Contained in Appendix A is a comparison of 100-year hydrographs for Cheyenne Creek at St. Elmo Street and for sub-basin 1. The comparison shows that if the peaks from a 100-year event on Cheyenne Creek and sub-basin 1 were to coincide, a .5 percent increase in peak discharge could be realized. This of course assumes that the peaks from two very different hydrologic events were to coincide (a 6-hour 100-year storm on Cheyenne Creek and a one-hour 100-year storm over sub-basin 1).

The sensitivity of the runoff from the site was also analyzed. The HEC-HMS model that supports the hydraulic analysis of Cheyenne Creek that is presented in the effective Flood Insurance Rate Map was duplicated. A modified HEC-HMS model was compiled without the sub-basin represented by the Creekwalk North and South parcels included in the overall watershed. The Creekwalk North and South parcels lie within sub-basin III-C of the HEC-HMS model. The 6-hour design storm was used in the HEC-HMS model. Results at design point J20 (i/e., at the confluence with Fountain Creek), are listed below.

100-year peak flow @ DP J20 with Creekwalk parcels	8,844 cfs
100-year peak flow @ DP J20 without Creekwalk parcels	8,839 cfs

As described above, the results reflect the fact that the 100-year peak rate of runoff from the site (e.g., 42.8 cfs for South Nevada Creekwalk Filing 1), has passed through the watershed long before the peak for the overall Cheyenne Creek watershed has passed though.

Per Reference 2, Volume 1, for redevelopment projects if it can be shown by hydrologic and hydraulic analysis that the downstream facilities have adequate capacity to convey the un-detained 100-year runoff from the site, 100-year detention is not required to be provided. The analyses conducted as part of preparing the preliminary design and final drainage reports shows the insignificant impact upon peak discharges that releasing the un-detained 100-year discharge from sub-basins 1 and 3, would have on the flood hydrology for Cheyenne Creek.

Cheyenne Creek through the project site is presently confined between two retaining walls from St. Elmo Avenue to South Cascade Avenue. The width of the drainageway varies between 15 to 20 feet. The private ownerships and narrowness of the corridor has made access to Creek very limited. As a result, trash and vegetative debris accumulates along the low flow banks of the Creek. As mentioned in Reference 7, stabilization of the low flow area of the Creek is warranted in this reach. Stabilization as proposed in the South Nevada Creekwalk Filing 1 project will consist of native ungrouted boulder linings and rock vanes that will create small riffle drops and pools. The east overbank bench above the low flow channel will be lined with an 18-inch thick layer of Type L soil riprap and then revegetated using native grasses and shrubs. The corridor will also be opened-up visually and

hydraulically along the east overbank. This is made possible by the removal of the existing vertical retaining wall that now forms the east bank of the Creek. Access to the Creek for maintenance will be greatly enhanced within the South Nevada Creekwalk project. Debris and trash removal will be routinely carried out. The stabilization the drainageway will limit further erosion of the low flow banks thereby reducing sediment transport to downstream drainageways,

Implement source controls: As part of its development, the South Nevada Creekwalk Filing No. 1 Marketplace project will create a business improvement district (BID). The district will be responsible for maintenance activities throughout the property. These activities would include:

1. Routine sweeping of the parking areas,
2. Snowplowing and removal of snow stockpiles,
3. Cutting and pruning of vegetation along the Creek corridor,
4. Removal of trash and debris from Creek corridor,
5. Cleaning of underground storage basins and manholes.
6. Maintenance of trash handling and spill prevention and containment measures.

Each of the above activities will be implemented upon development of the South Nevada Creekwalk Filing 1 project. The significance of having a BID is that the BID will be capable of routinely providing these maintenance activities. The result will be that stormwater generated from the site will be managed both structurally and non-structurally, and thereby help to mitigate the effects of urbanization upon stormwater runoff. This is currently not achievable within the property as it now exists.

VIII. Water Quality

As shown on Exhibit 2 underground storage basins will be constructed that will be able to store and release the WQCV and EURV generated by the South Nevada Creekwalk Filing 1. The calculation of the WQCV and EURV was carried using the UD-Detention spreadsheet from Reference 5. One-hour rainfall data from Reference 2 was applied in the determination of the WQCV and EURV. Percent imperviousness assumed for the facilities in sub-basins 1 and 3 were 93.6 and 95 percent, respectively. Preliminary layouts and calculations for the proposed stormwater collection systems are contained in Appendix D. The final design of the underground storage systems and onsite storm sewer collection system will be shown on the Permanent BMP and Storm Sewer Plan and Profiles design plans to be submitted separately to the City. All final calculations will be submitted in a separate addendum to this Final Drainage Report prior to approval of the construction drawings.

Runoff from the parking areas and driveways will be graded to drain to an area inlet proposed in the main parking area as shown in sub-basin 1. The grated inlet will collect the 100-year runoff and convey it to a storm sewer that will outfall to the underground storage

basin. The schematic design of the facility is presented Appendix B. For sub-basin 1, sixteen 42-inch CMP culverts are proposed that will store the WQCV and EURV and release through a flow control structure. For sub-basin 3, six 42-inch CMP culverts are proposed that will store the WQCV and EURV and release through a flow control structure. The flow control structures will outfall to the Cheyenne Creek drainageway. Storm sewers that will convey roof drainage from buildings A, B, D and E will discharge directly to the underground system. A broad crested weir will be incorporated into the flow control; structure sized to convey the 100-year inflow discharge.

Runoff from Building C, parking areas and driveways within South Nevada Creekwalk Filing 1, sub-basin 3 will be graded to drain to an inlet proposed at the north side of the proposed parking area. The inlet will collect the 100-year runoff and convey it to a storm sewer that will outfall to the underground storage basin. Six 42-inch CMP culverts are proposed that will store the WQCV and EURV and release through a flow control structure. The flow control structure will outfall to the Cheyenne Creek drainageway

The WQCV for sub-basins 1 and 3 are estimated at .191 and .024 acre-feet, respectively. The EURV for sub-basins 1 and 3 are estimated at .493 and .061 acre-feet, respectively. Maintenance access will be provided at each end of the CMP's.

The implementation of underground storage will be subject to review and approval by the City of Colorado Springs. A **variance** from the storage guidelines put forth in Reference 2 is hereby requested. The variance request is included within Appendix D of this report.

IX. Floodplains

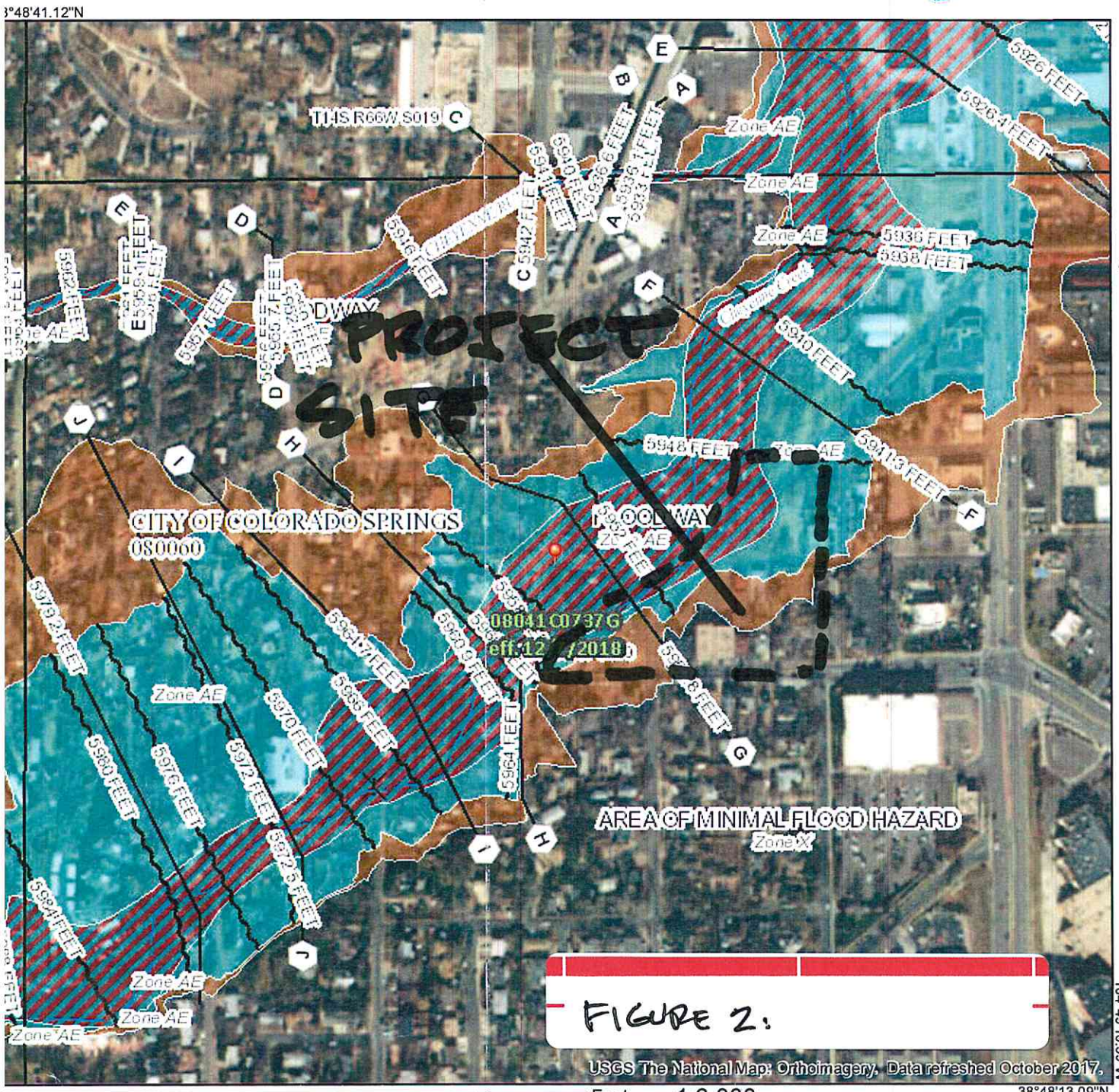
As shown on Exhibits 1 and 2 the 100-year floodplain and floodway pass over the Creekwalk Marketplace development. According to the Federal Emergency Management Agency (FEMA), the site does lie within a designated floodplain. The Floodplain Insurance Rate Map (FIRM) for El Paso County panel 737G effective December 7, 2018 was reviewed to determine any potential floodplain delineation. A copy of the relevant portion of the FIRM panel is shown on Figure 2. Proposed structures on the site will have to be elevated or floodproofed to at least one foot above the base flood elevation adjacent to the proposed buildings. A floodplain development permit will be required for buildings A, B and C and for the site grading and drainageway construction.

X. Major Drainageway Facilities

It is proposed to provide stream stabilization for the low flow area of Cheyenne Creek from St. Elmo Avenue to South Cascade Avenue. The Creek is presently confined between concrete walls for most of this segment. The low flow area of the Creek is heavily vegetated with both native and non-native trees that block visual access to the corridor, promote debris buildup and reduce the flood carrying capacity of the drainageway. It is proposed to remove the existing walls that line the east bank of the Creek to provide for a wider stream corridor, sufficiently wide to install a trail and other stream side amenities. The drainageway through

National Flood Hazard Layer FIRMette

FEMA



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) Zone A, V, A99
- With BFE or Depth Zone AE, AO, AH, VE, AR
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile Zone
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee. See Notes. Zone X
- Area with Flood Risk due to Levee Zone D

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard Zone X
- Effective LOMRs
- Area of Undetermined Flood Hazard Zone

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represe an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/5/2019 at 3:30:48 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

the South Nevada Creekwalk Filing 1will be privately owned and maintained. The bridge at St. Elmo Avenue will remain. The stream stabilization will consist of boulder low flow linings and a series of rock vanes. The east overbank of the drainageway will be lined with an 18-inch thick layer of Type L soil/riprap and then revegetated using native shrubs and trees. Presented on Figure 3 are typical drainageway and rock vane sections. The geometry of crest of the rock vanes has been developed using the 2-year discharge as determine by a flood frequency analysis for the Cheyenne Creek stream gage at Evans Avenue. Bank-full capacity is generally coincident with the 2-year flood recurrence interval. For the Evans Avenue stream gauge the 2-year flow is estimated at 93 cubic feet per second. The flood frequency analysis is contained within Appendix A. The 2-year discharge from sub-basin 1 (17.5 cubic feet per second), will be less than 1 cubic foot per second since 2-year runoff from the sub-basin 1 will be fully stored in the underground storage basin and released over a 40-hour period.

It is anticipated that the work to stabilize Cheyenne Creek will be authorized under a U.S. Army Corps of Engineers nationwide stream restoration permit. Based upon the nature of the proposed stabilization design for Cheyenne Creek, a **variance** from the drainageway design guidelines put forth in Reference 2 has been requested form the City as part of the approval process. The variance request is included within Appendix D of this report. The final design of the stabilization measures proposed for Cheyenne Creek will be shown on the Cheyenne Creek channel design plans to be submitted separately to the City. Preliminary design plans are provided in Appendix E.

XI. Grading and Erosion Control

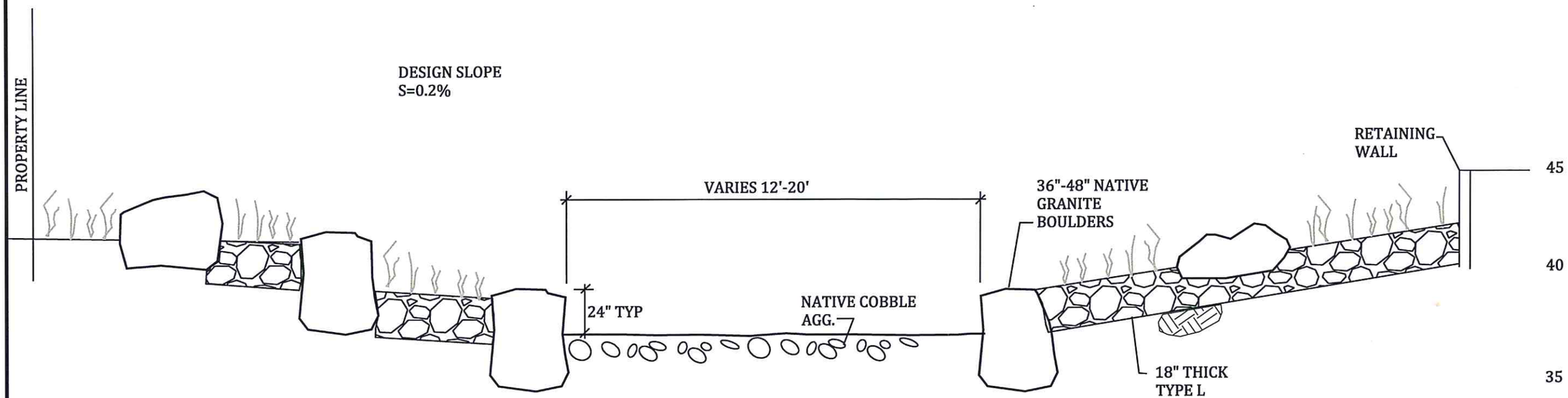
A detailed Grading and Erosion Control Plan (GECP) will be prepared and submitted to the City for review. The GECP will be part of the overall final design plan submittal for the project. An overlot GECP may also be prepared in advance of the final site drainage and grading plan for the project. A stormwater management plan (SWMP), and narrative will be prepared. An in-progress grading plan has been provided within the preliminary design plans for the drainageway and included in Appendix E. The GECP and SWMP will have to be approved by the City prior to the commencing with construction.

XII. Drainage and Bridge Fees

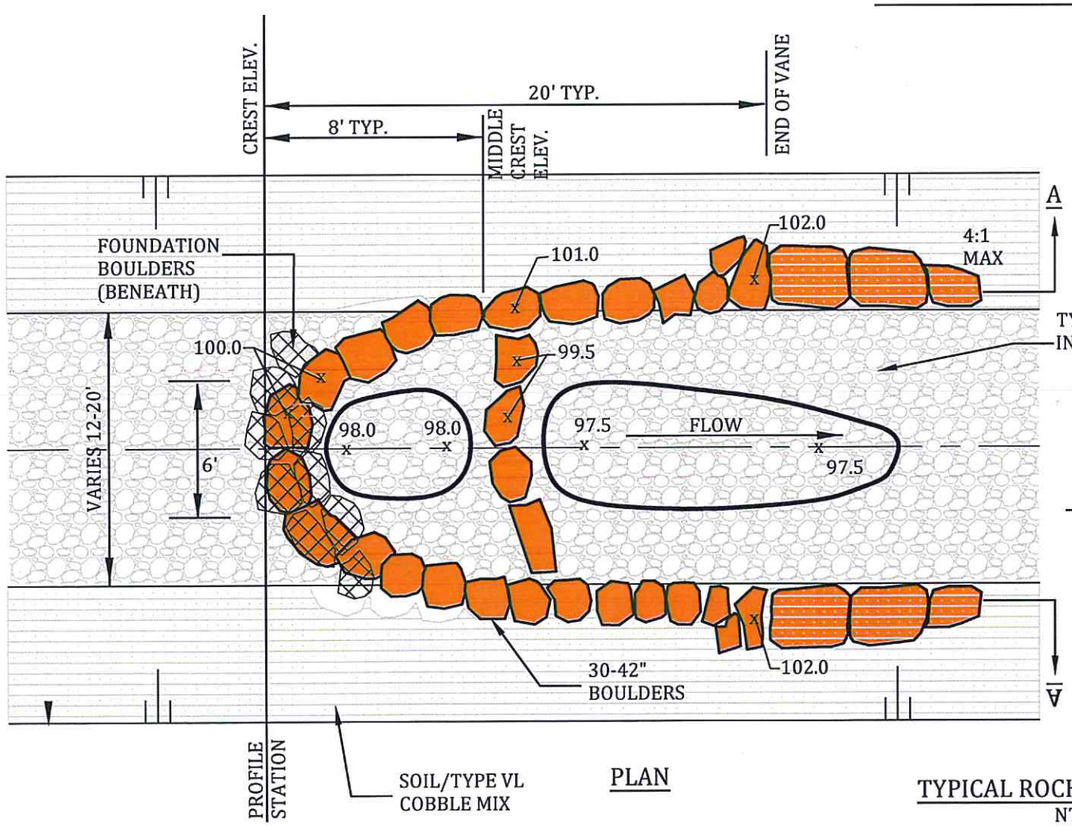
The site lies within the Southwest Area drainage basin. As the site has already been platted and developed drainage fees or bridge fees will not be required for the South Nevada Creekwalk Filing 1 redevelopment project. There will be no reimbursement for the construction of onsite storm sewer collection systems, stream stabilization work or the underground storage facility.

XIII. Construction Cost Estimate

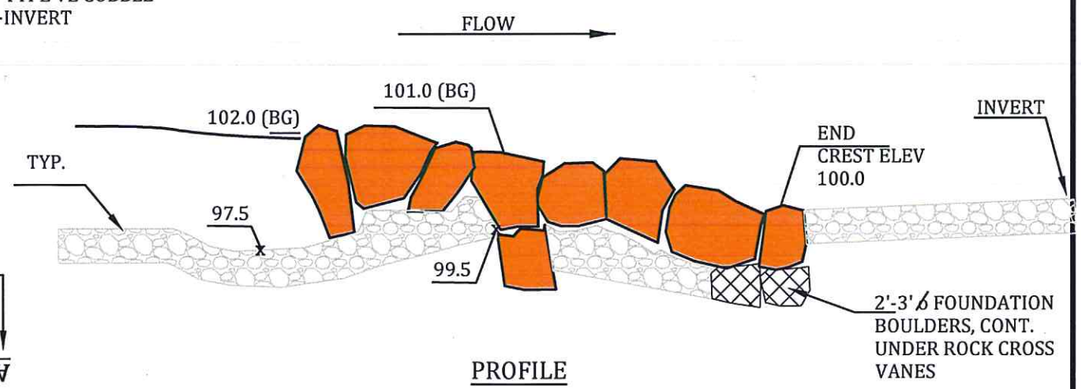
Provided on Table 1 is an estimate of the construction cost for the South Nevada Creekwalk Filing 1 project. All facilities will be private except for the relocated 24-inch storm



TYPICAL SECTION



PLAN



PROFILE

TYPICAL ROCK CROSS VANE
NTS

Kiowa
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

CREEKSIDE MARKETPLACE NORTH AND SOUTH
FINAL DRAINAGE PLAN
TYPICAL SECTIONS AND DETAILS
COLORADO SPRING, COLORADO

Project No.:	18012
Date:	6/18/19
Design:	RNW
Drawn:	EAK
Check:	RNW
Revisions:	

Fig. 3

18012 Fig 4.dwg/Jun 18, 2019

TABLE 1: SOUTH NEVADA CREEKWALK FILING NO. 1
PRIVATE DRAINAGE IMPROVEMENT COST ESTIMATE
KIOWA PROJECT NUMBER 18012 **SOUTHWEST AREA DRAINAGE BASIN**

ITEM	UNIT COST	UNIT	QUANTITY	TOTAL
PRIVATE DRAINAGE FACILITIES				
UG DETENTION SB 1	$14	CF	21475	$300,650
UG DETENTION SB 3	$14	CF	2658	$37,212
FLOW CONTROL STRUCTURE	$15,000	EA	2	$30,000
JUNCTION STRUCTURE	$12,500	EA	1	$12,500
2 X 6 GRATED INLET	$6,500	EA	1	$6,500
5-FOOT D10R CURB INLET	$5,000	EA	2	$10,000
TYPE 1 MANHOLES	$4,500	EA	7	$31,500
15-INCH NRCP	$59	LF	305	$17,995
18-INCH RCP CL III	$79	LF	386	$30,494
18-INCH RCP FES	$750	EA	1	$750
24-INCH RCP CL III	$94	LF	116	$10,904
30-INCH RCP CL III	$130	LF	74	$9,620
30-INCH OUTLET STRUCTURE AND FLAP GATE	$5,500	EA	1	$5,500
18-INCH CMP GAUGE 16	$66	LF	44	$2,904
36-INCH CMP GAUGE 16	$135	LF	54	$7,290
PRIVATE MAJOR DRAINAGEWAY				
ROCK VANES	$25,000	EA	6	$150,000
BOULDER LOW FLOW	$150	LF	735	$110,250
GROUTED 24-36-INCH BOUDLERS	$125	CY	125	$15,625
TYPE L SOIL RIPRAP	$90	CY	820	$73,800
RETAINING WALL DEMO AND REBUILD S. CASCADE	$25,000	EA	1	$25,000
SUBTOTAL				$888,494
CONTINGENCY (5 %)				$44,425
ENGINEERING (10 %)				$88,849
TOTAL				**$1,021,768**

sewer from East Cheyenne Road. Presented on Table 2 is the cost estimate for the public drainage improvements. No reimbursement of the proposed public or private facilities through the City's Stormwater Drainage Basin Fee system would be anticipated.

XIV. Summary

The development of the South Nevada Creekwalk Filing 1 project will involve the construction of commercial buildings within a redevelopment area of approximately 7 acres. The main portions of the development will receive water quality treatment and stormwater detention by means of underground storage basins. The proposed Creekwalk Marketplace BID will be responsible for maintaining the underground storage basins. The project will also involve the stabilization of Cheyenne Creek. The stabilization of Cheyenne Creek will promote access to the corridor for a streamside trail and allow for maintenance of the improvements and the streamside vegetation. Discharge of the100-year developed flow from the site will not adversely impact downstream sections of Cheyenne Creek or Fountain Creek as both drainageways have adequate hydraulic capacity to pass the anticipated discharges from the South Nevada Creekwalk site. If the construction of the site runoff and storm drainage facilities and appurtenances associated with this development is carried out as detailed and described in this report, adjacent and downstream properties will not be adversely impacted. This Final Drainage Report is in general conformance with the Creekwalk North and South Preliminary Drainage Report and other approved drainage studies and reports which include this site.

TABLE 2: SOUTH NEVADA CREEKWALK FILING NO. 1
PUBLIC DRAINAGE IMPROVEMENT COST ESTIMATE
KIOWA PROJECT NUMBER 18012 **SOUTHWEST AREA DRAINAGE BASIN**

ITEM	UNIT COST	UNIT	QUANTITY	TOTAL
TYPE 1 MANHOLES	$4,500	EA	1	$4,500
24-INCH RCP CL III	$94	LF	108	$10,152
24-INCH OUTLET STRUCTURE AND FLAP GATE	$5,000	EA	1	$5,000
SUBTOTAL				$19,652
CONTINGENCY (5 %)				$983
ENGINEERING (10 %)				$1,965
TOTAL				**$22,600**

Appendix A

Hydrologic Calculations

Existing and Proposed Runoff Calculations
NRCS Soil Survey Report
Flood Frequency Analysis

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

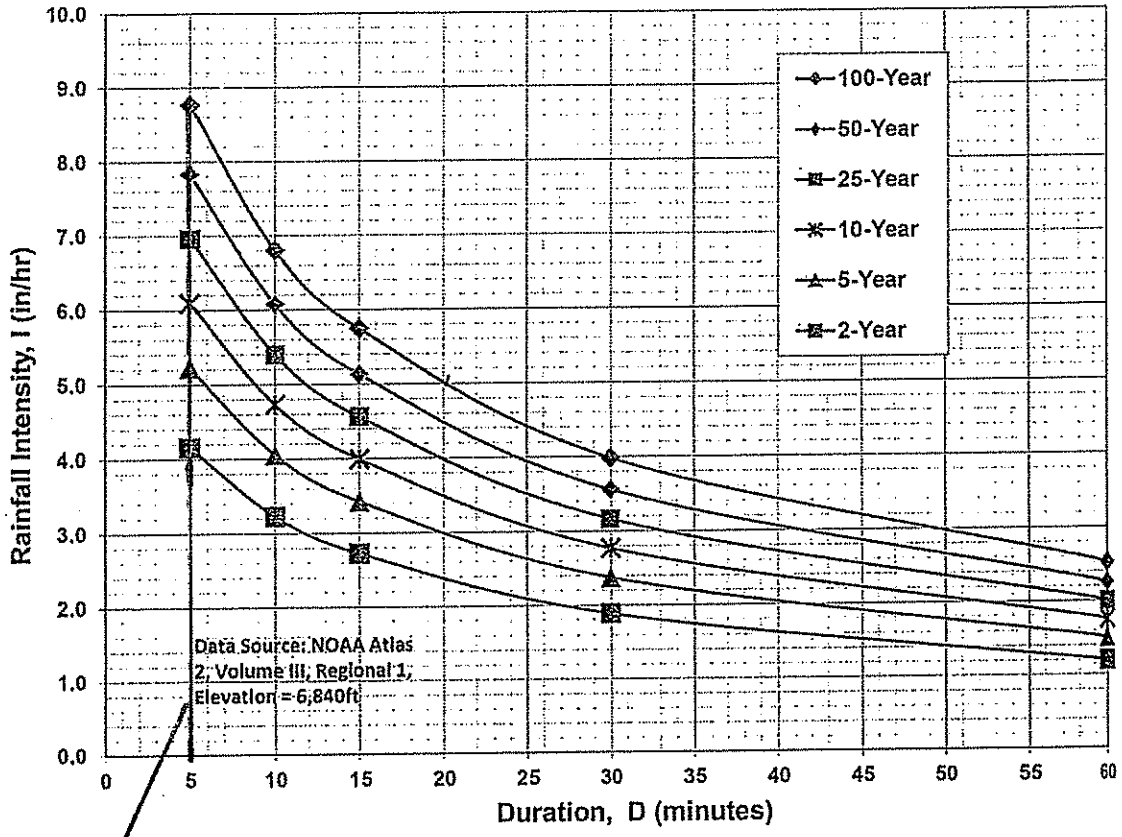
Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency



DUE TO SB SIZE, 5 MIN Tc ASSUMED FOR ALL SB'S

IDF Equations

$I_{100} = -2.52 \ln(D) + 12.735$

$I_{50} = -2.25 \ln(D) + 11.375$

$I_{25} = -2.00 \ln(D) + 10.111$

$I_{10} = -1.75 \ln(D) + 8.847$

$I_{5} = -1.50 \ln(D) + 7.583$

$I_{2} = -1.19 \ln(D) + 6.035$

Note: Values calculated by equations may not precisely duplicate values read from figure.

SUB-WATERSHED RUNOFF CALCULATIONS EXISTING CONDITIONS
PROJECT: South Nevada Creekwalk Filing No. 1
PROJECT NO: 18012
RATIONAL METHOD FORMULA: Q=CIA

SUB-BASIN NO.	AREA (AC)	RUNOFF COEFFICIENTS C5	C100	RAINFALL INTENSITY I5	I100	RUNOFF (CFS) Q5	Q100
				(INCHES/HR)			
A	2.43	0.81	0.88	5.2	8.8	10.2	18.8
B	2.58	0.81	0.88	5.2	8.8	10.9	20.0
C	4.16	0.30	0.50	5.2	8.8	6.5	18.3
D	1.12	0.81	0.88	5.2	8.8	4.7	8.7
E	0.81	0.25	0.47	5.2	8.8	1.1	3.4
F	0.27	0.36	0.51	5.2	8.8	0.5	1.2

KIOWA ENGINEERING CORPORATION

JOB Santa Maria Cocktail #1

SHEET NO. _____ OF 5-20-19

CALCULATED BY _____ DATE FAJCO

CHECKED BY _____ DATE _____

SCALE Hydrology - Existing

EXISTING Hydrology

Table 6-6

Basin #	Area	C_5	C_{100}	I_5 *	I_{100}
A (3)	2.43	.81	.88	5.2	8.8
B (3)	2.58	.81	.88		
C (1)	4.16	.30	.50		
D (3)	1.12	.81	.88		
E (2)	.81	.25	.47		
F	.27	.36	.51		

* BASED ON minimum Tc of 5 min

(1) 1/4 acre density

(2) 1/3 Acre density

Kiowa Engineering Corporation

CLIENT Gateway LLC | JOB NO. | PAGE
PROJECT | DATE CHECKED | DATE 5/21/19
DETAIL ~~Proposed Hydrology~~ Filing #1 | CHECKED BY | COMPUTED BY RDW

Proposed Hydrology

Basin #	AREA (ac)	% Imp	Runoff C 5yr	Runoff C 100yr	I_5 * (in/hr)	I_{100}
1	5.29	93.6	.86	.92	5.2	8.8
2	1.29	10	.09	.36		
3	.64	95	.90	.95		
1A	.25	95	.84	.88		

Wtd C: Subbasin #1

$$C_5 = \frac{1.12(.73) + 4.18(.90)}{5.29} = .86$$

$$C_{100} = \frac{1.12(.81) + 4.18(.95)}{5.29} = .92$$

* All rainfall intensities based on 5 minute Tc.

SUB-WATERSHED RUNOFF CALCULATIONS PROPOSED CONDITIONS
PROJECT: South Nevada Creekwalk Filing 1
PROJECT NO: 18012
RATIONAL METHOD FORMULA: Q=CIA

SUB-BASIN NO.	AREA (AC)	RUNOFF COEFFICIENTS C5	C100	RAINFALL INTENSITY I5	I100 (INCHES/HR)	RUNOFF (CFS) Q5	Q100
1	5.29	0.86	0.92	5.2	8.8	23.7	42.8
1A	0.075	0.81	0.88	5.2	8.8	0.3	0.6
2	1.29	0.09	0.36	5.2	8.8	0.6	4.1
3	0.64	0.9	0.95	5.2	8.8	3.0	5.4

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: RNW
Company: Kiowa Engineering
Date: June 27, 2019
Project: South Nevada Creek Walk Filing No. 1
Location: Sub-basin 1

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.75	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	SB 1
Receiving Pervious Area Soil Type	Clay Loam
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	5.290
Directly Connected Impervious Area (DCIA, acres)	4.950
Unconnected Impervious Area (UIA, acres)	0.000
Receiving Pervious Area (RPA, acres)	0.000
Separate Pervious Area (SPA, acres)	0.340
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	5.290
Directly Connected Impervious Area (DCIA, %)	93.6%
Unconnected Impervious Area (UIA, %)	0.0%
Receiving Pervious Area (RPA, %)	0.0%
Separate Pervious Area (SPA, %)	6.4%
A_R (RPA / UIA)	0.000
i, Check	1.000
f / i for WQCV Event:	0.4
f / i for 10-Year Event:	0.2
f / i for 100-Year Event:	0.1
f / i for Optional User Defined Storm CUHP:	
IRF for WQCV Event:	1.00
IRF for 10-Year Event:	1.00
IRF for 100-Year Event:	1.00
IRF for Optional User Defined Storm CUHP:	
Total Site Imperviousness: i_{total}	93.6%
Effective Imperviousness for WQCV Event,	93.6%
Effective Imperviousness for 10-Year Event:	93.6%
Effective Imperviousness for 100-Year Event:	93.6%
Effective Imperviousness for Optional User Defined Storm CUHP.	

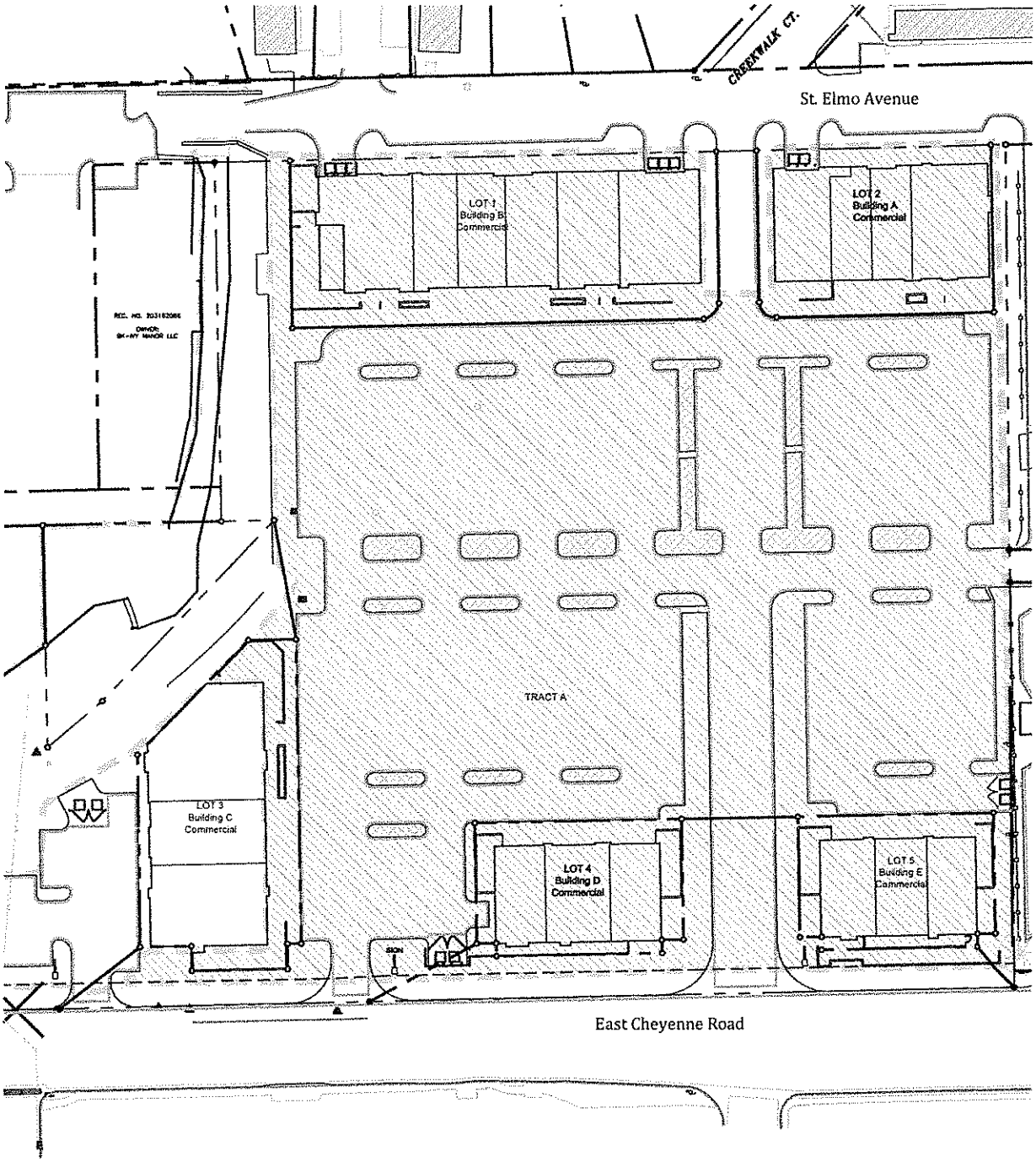
LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	93.6%
Total Site Effective Imperviousness for WQCV Event:	93.6%
Total Site Effective Imperviousness for 10-Year Event:	93.6%
Total Site Effective Imperviousness for 100-Year Event:	93.6%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed



DIRECTLY CONNECTED IMPERVIOUS AREA

SEPARATE PERVIOUS AREA

N

0 100'

SCALE: 1"=100'

BASIN 1: IMPERVIOUS REDUCTION FACTOR (IRF) COMPONENTS

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

				Designer:	RNW
				Company:	Klowa Engineering
***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches	Date:	June 27, 2019
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.75	inches	Project:	South Nevada Creek Walk Filing No. 1
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches	Location:	Sub-basin 3
Optional User Defined Storm	CUHP				
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event				
Max Intensity for Optional User Defined Storm	0				

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	SB 1													
Receiving Pervious Area Soil Type	Clay Loam													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.640													
Directly Connected Impervious Area (DCIA, acres)	0.608													
Unconnected Impervious Area (UIA, acres)	0.000													
Receiving Pervious Area (RPA, acres)	0.000													
Separate Pervious Area (SPA, acres)	0.032													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.640													
Directly Connected Impervious Area (DCIA, %)	95.0%													
Unconnected Impervious Area (UIA, %)	0.0%													
Receiving Pervious Area (RPA, %)	0.0%													
Separate Pervious Area (SPA, %)	5.0%													
A_R (RPA / UIA)	0.000													
i_a Check	1.000													
f / I for WQCV Event:	0.4													
f / I for 10-Year Event:	0.2													
f / I for 100-Year Event:	0.1													
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	1.00													
IRF for 10-Year Event:	1.00													
IRF for 100-Year Event:	1.00													
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	95.0%													
Effective Imperviousness for WQCV Event:	95.0%													
Effective Imperviousness for 10-Year Event:	95.0%													
Effective Imperviousness for 100-Year Event:	95.0%													
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

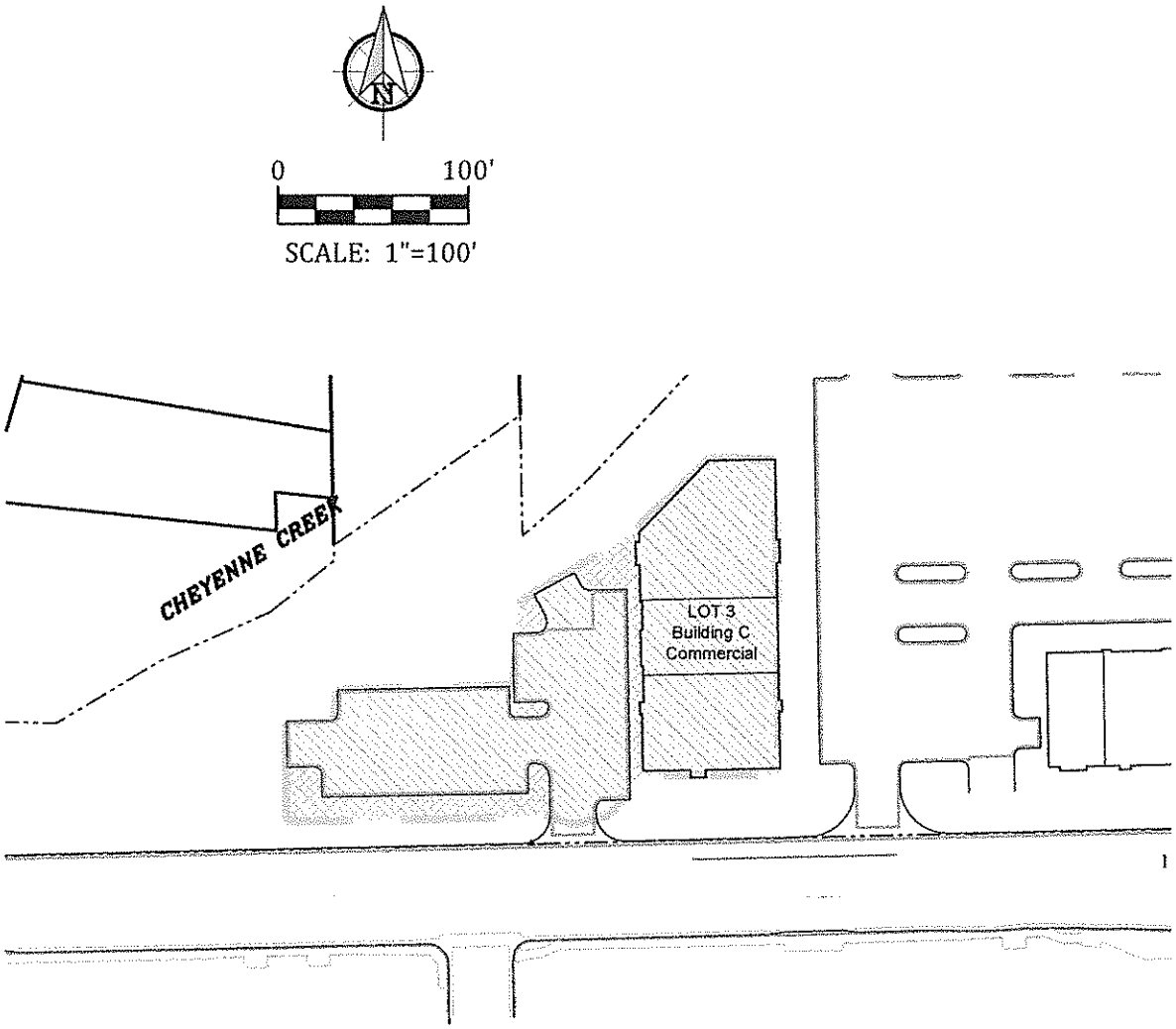
Total Site Imperviousness:	95.0%
Total Site Effective Imperviousness for WQCV Event:	95.0%
Total Site Effective Imperviousness for 10-Year Event:	95.0%
Total Site Effective Imperviousness for 100-Year Event:	95.0%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed



BASIN 3: IMPERVIOUS REDUCTION FACTOR (IRF) COMPONENTS

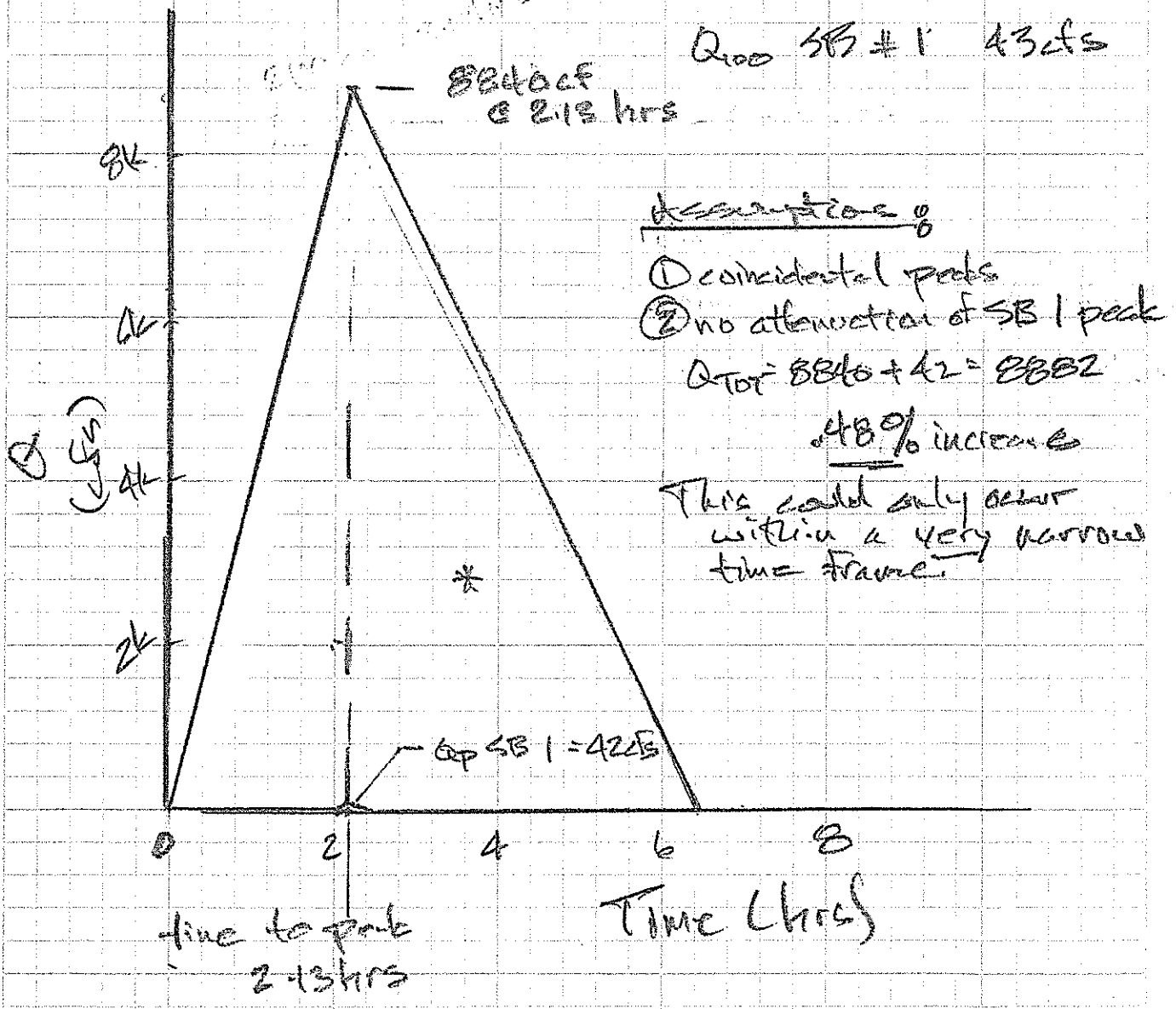
Hydrograph OF J14

Cheyenne Creek Hydrology Study

Ref: 8-

Q_{100} = 8840cfs Vol = 681 AF near St. Elmo

6hr. Storm Time to peak = 2.13 hrs



Assumptions:

1. coincidental peaks
2. no attenuation of SB 1 peak

Q_{TOT} = 8840 + 42 = 8882

48% increase

This could only occur within a very narrow time frame.

*Hydrograph does not represent actual shape.

```
************************************
************************************

 *              FFA                 *      *
*
 *     FLOOD FREQUENCY ANALYSIS     *      *   U.S. ARMY CORPS OF ENGINEERS
*
 *     PROGRAM DATE:  FEB 1995      *      * THE HYDROLOGIC ENGINEERING
CENTER *
 *          VERSION:  3.1           *      *         609 SECOND STREET
*
 *     RUN  DATE   AND   TIME:      *      *      DAVIS, CALIFORNIA 95616
*
 *        18 MAR 19    12:07:59     *      *          (916) 756-1104
*
 *                                  *      *
*
 ************************************
************************************


  INPUT FILE NAME: CCFFA.DAT
 OUTPUT FILE NAME: CCFFA.OUT
    DSS FILE NAME: CCFFA.DSS


    -----DSS---ZOPEN:  Existing File Opened,  File: CCFFA.DSS
                       Unit:  71;  DSS Version: 6-JB

 **TITLE RECORD(S)**
 TT   FLOOD FLOW FREQUENCY ANALYSIS PROGRAM
 TT   USGS GAGE 07105490  FN:  CCFFA.DAT
 TT   CHEYENNE  CREEK AT EVANS AVE  1992 THROUGH 2017
```

```
**STATION IDENTIFICATION**
ID   DA=21.7 SQ MI

**GENERALIZED SKEW**
     ISTN    GGMSE     SKEW
GS 105900     .000      .11

**DSS WRITE PATHNAME**
ZW   /TEST NO. 1/CHEYENNE CREEK FREQ-FLOW//1992-2017  ANNUAL PEAKS/

**SYSTEMATIC EVENTS**
     26 EVENTS TO BE ANALYZED

**END OF INPUT DATA**
ED ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

**********************************************************
ERROR IN SUBROUTINE DSSPNP

**** ILLEGAL PATHNAME FOUND BY ZUFPN; ISTAT =  -1
   /TEST NO. 1/CHEYENNE CREEK FREQ-FLOW//1992-2017  ANNUAL PEAKS/



ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ   FINAL RESULTS    ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

-PLOTTING POSITIONS- DA=21.7 SQ MI
É͹»
º      EVENTS ANALYZED     ³           ORDERED EVENTS          º
º                   FLOW   ³        WATER      FLOW   WEIBULL  º
```

MON	DAY	YEAR	CFS	RANK	YEAR	CFS	PLOT POS
5	11	1922	41.	1	2013	1470.	3.70
7	18	1993	54.	2	1997	595.	7.41
6	3	1994	203.	3	1999	565.	11.11
6	3	1995	185.	4	2015	246.	14.81
8	15	1996	112.	5	2002	225.	18.52
6	14	1997	595.	6	2004	208.	22.22
8	11	1998	55.	7	1994	203.	25.93
7	31	1999	565.	8	1995	185.	29.63
8	29	2000	36.	9	2009	149.	33.33
6	8	2001	21.	10	2012	127.	37.04
4	8	2002	225.	11	1996	112.	40.74
6	20	2003	57.	12	2006	100.	44.44
8	5	2004	208.	13	2010	90.	48.15
7	15	2005	50.	14	2011	75.	51.85
8	12	2006	100.	15	2017	71.	55.56
5	15	2007	60.	16	2014	70.	59.26
8	18	2008	18.	17	2007	60.	62.96
5	22	2009	149.	18	2003	57.	66.67
9	6	2010	90.	19	1998	55.	70.37
9	14	2011	75.	20	1993	54.	74.07
0	73	2012	127.	21	2005	50.	77.78
9	12	2013	1470.	22	1922	41.	81.48
9	26	2014	70.	23	2000	36.	85.19
5	19	2015	246.	24	2016	22.	88.89
5	6	2016	22.	25	2001	21.	92.59
8	17	2017	71.	26	2008	18.	96.30

-OUTLIER TESTS -

ÄÄÄ

HIGH OUTLIER TEST

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

BASED ON 26 EVENTS, 10 PERCENT OUTLIER TEST VALUE K(N) = 2.502

1 HIGH OUTLIER(S) IDENTIFIED ABOVE TEST VALUE OF 1420.

NOTE - COLLECTION OF HISTORICAL INFORMATION AND COMPARISONS
WITH SIMILAR DATA SETS SHOULD BE EXPLORED IF NOT
INCORPORATED IN THIS ANALYSIS.

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

LOW OUTLIER TEST

ÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ

BASED ON 26 EVENTS, 10 PERCENT OUTLIER TEST VALUE K(N) = 2.502

0 LOW OUTLIER(S) IDENTIFIED BELOW TEST VALUE OF 7.0

ÄÄÄ

-SKEW WEIGHTING -

ÄÄÄ

BASED ON 26 EVENTS, MEAN-SQUARE ERROR OF STATION SKEW = .251

DEFAULT OR INPUT MEAN-SQUARE ERROR OF GENERALIZED SKEW = .302

ÄÄÄ

FINAL RESULTS

-FREQUENCY CURVE- DA=21.7 SQ MI

COMPUTED CURVE FLOW IN CFS	EXPECTED PROBABILITY FLOW IN CFS	PERCENT CHANCE EXCEEDANCE	CONFIDENCE LIMITS .05 FLOW IN CFS	.95
3550.	6060.	.2	11200.	1690.
2280.	3360.	.5	6360.	1170.
1600.	2150.	1.0	4050.	871.
1100.	1360.	2.0	2510.	635.
640.	725.	5.0	1270.	400.
404.	435.	10.0	715.	267.
237.	246.	20.0	376.	165.
93.	93.	50.0	132.	65.
40.	39.	80.0	58.	25.
27.	26.	90.0	40.	16.
20.	18.	95.0	31.	11.
12.	10.	99.0	19.	5.

SYSTEMATIC STATISTICS

LOG TRANSFORM: FLOW, CFS		NUMBER OF EVENTS	
MEAN	1.9991	HISTORIC EVENTS	0
STANDARD DEV	.4609	HIGH OUTLIERS	0
COMPUTED SKEW	.6341	LOW OUTLIERS	0
REGIONAL SKEW	.1100	ZERO OR MISSING	0
ADOPTED SKEW	.4000	SYSTEMATIC EVENTS	26

++++++++++++++++++++++++

+ END OF RUN +

+ NORMAL STOP IN FFA +

Click to hideNews Bulletins

- Introducing The Next Generation of USGS Water Data for the Nation
- Full News

Peak Streamflow for Colorado

Click to hide state-specific text

USGS 07105490 CHEYENNE CREEK AT EVANS AVE AT COLORADO SPRINGS,CO

Surface-water: Peak streamflow GO

El Paso County, Colorado
Hydrologic Unit Code 11020003
Latitude 38°47'26", Longitude 104°51'49" NAD27
Drainage area 21.7 square miles
Gage datum 6,280 feet above NGVD29

Output formats

Table
Graph
Tab-separated file
peakfq (watstore) format
Reselect output format

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1992	May 13, 1992	1.05	41.0

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
1993	Jun. 17, 1993	1.19	54.0
1994	May 09, 1994	2.03	203
1995	May 30, 1995	1.94	185
1996	Aug. 29, 1996	1.80	112
1997	Jun. 10, 1997	3.51	595
1998	May 14, 1998	1.50	55
1999	Apr. 30, 1999	3.35	565
2000	Aug. 06, 2000	2.03[6]	36
2001	May 30, 2001	1.80	21
2002	Jul. 02, 2002	3.03	225
2003	Jul. 15, 2003	2.14	57
2004	Jul. 16, 2004	2.95	208
2005	May 26, 2005	2.09	50
2006	Jul. 05, 2006	2.51	100
2007	May 15, 2007	2.22[2]	60.0
2008	Aug. 18, 2008	1.74	18.0
2009	May 22, 2009	2.73	149
2010	Aug. 06, 2010	2.40	90.0
2011	Sep. 14, 2011	2.29	75.0
2012	Jul. 30, 2012	2.63	127
2013	Sep. 12, 2013	5.97	1,470
2014	Aug. 26, 2014	2.56	70.0
2015	May 19, 2015	3.48	246
2016	May 06, 2016	2.08	22.0
2017	Aug. 08, 2017	2.81	71.3

?

Peak Gage-Height Qualification Codes.

- 2 -- Gage height not the maximum for the year
- 6 -- Gage datum changed during this year

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
Subscribe for system changes
News

Accessibility | Plug-Ins | FOIA | Privacy | Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey

USA.gov

Title: Surface Water for Colorado: Peak Streamflow
URL: https://nwis.waterdata.usgs.gov/co/nwis/peak?

Page Contact Information: Colorado Water Data Maintainer
Page Last Modified: 2019-03-18 13:15:12 EDT
0.87 0.36 nadww01

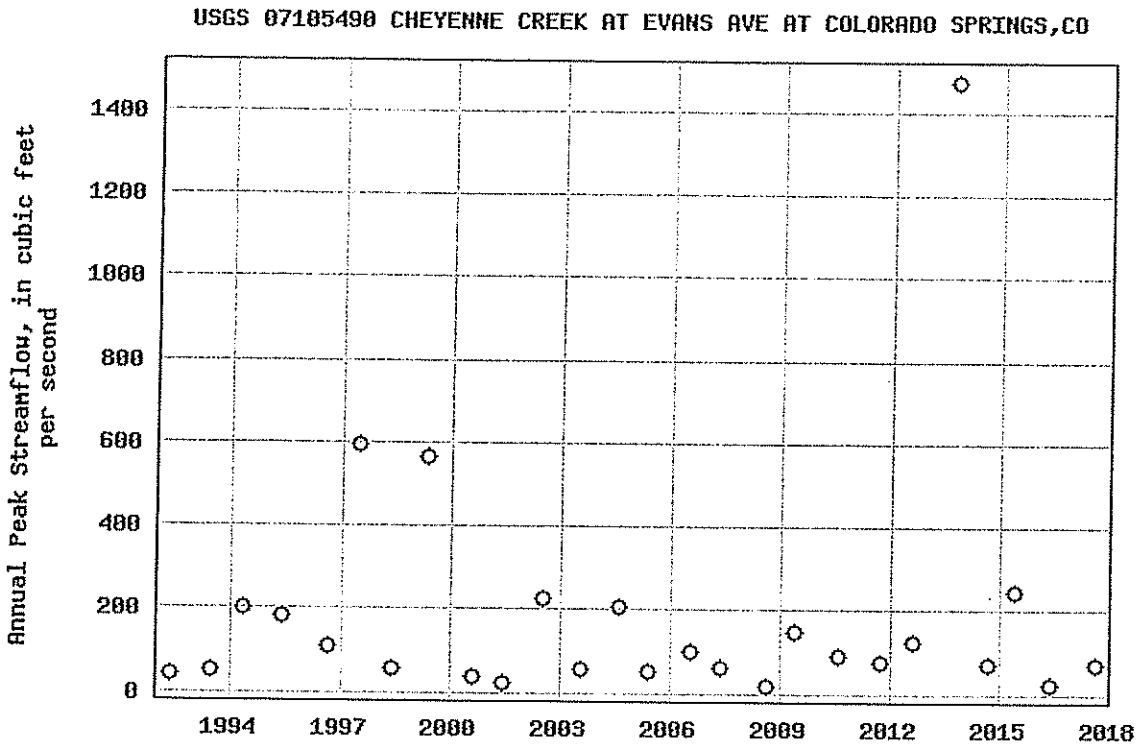
USGS 07105490 CHEYENNE CREEK AT EVANS AVE AT COLORADO SPRINGS,CO

Surface-water: Peak streamflow | GO

El Paso County, Colorado
Hydrologic Unit Code 11020003
Latitude 38°47'26", Longitude 104°51'49" NAD27
Drainage area 21.7 square miles
Gage datum 6,280 feet above NGVD29

Output formats

Table
Graph
Tab-separated file
peakfq (watstore) format
Reselect output format



Download a presentation-quality graph

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
Subscribe for system changes
News

Title: Surface Water for Colorado: Peak Streamflow
URL: https://nwis.waterdata.usgs.gov/co/nwis/peak?

Page Contact Information: Colorado Water Data Maintainer
Page Last Modified: 2019-03-18 13:14:27 EDT
0.95 0.49 nadww01

KIOWA ENGINEERING CORPORATION

JOB Cedarwood Headquarters
SHEET NO. _____ OF 1 of 2
CALCULATED BY _____ DATE 8-12-19
CHECKED BY _____ DATE _____
SCALE Runoff Reduction Calcs

Predevelopment % Impervious

Proposed SB # 2: Present Wtd % Imp

A = 1.29 ac
.45 Ac - 95%
.84 Ac - 30%

$$\text{Wtd \% Imp} = \frac{.45(.95) + .3(.84)}{1.29} = 53\%$$

Proposed SB # 2: w/ Proposed % Imp.

Area = 1.29 Ac.
- trail = 4800 sf.
- Seating area: 617 sf.
- Decks = 1260 sf.
- Pipep outlet Cascade Box = 1500 sf

Total = 8175 sf. = .188 ac

A_1 = 8175 sf @ 95%
A_2 = 1.10 Ac @ 20%

$$\text{Wtd \%} = \frac{.95(.188) + .2(1.10)}{1.29} = 17.2\%$$

67% Reduction in imp. area.

SB Boundary Prop.
SBS #2

Total Existing Imp Surfaces .145 ac
Total basin Size 1.29 ac

HDPE
900
144
Asphalt
2040
Asphalt
F
0.27
1575
648
Mount Washington Avenue
EX. 30" ST
EX. INLETS
270
Asphalt
Asphalt
South Cascade Avenue
(Public R.O.W. Varies)
240
CHEYENNE CREEK
360
325
Asphalt
Asphalt
307.5
D
1.12
E
0.8
240
309
EX. 24" STM
Asphalt

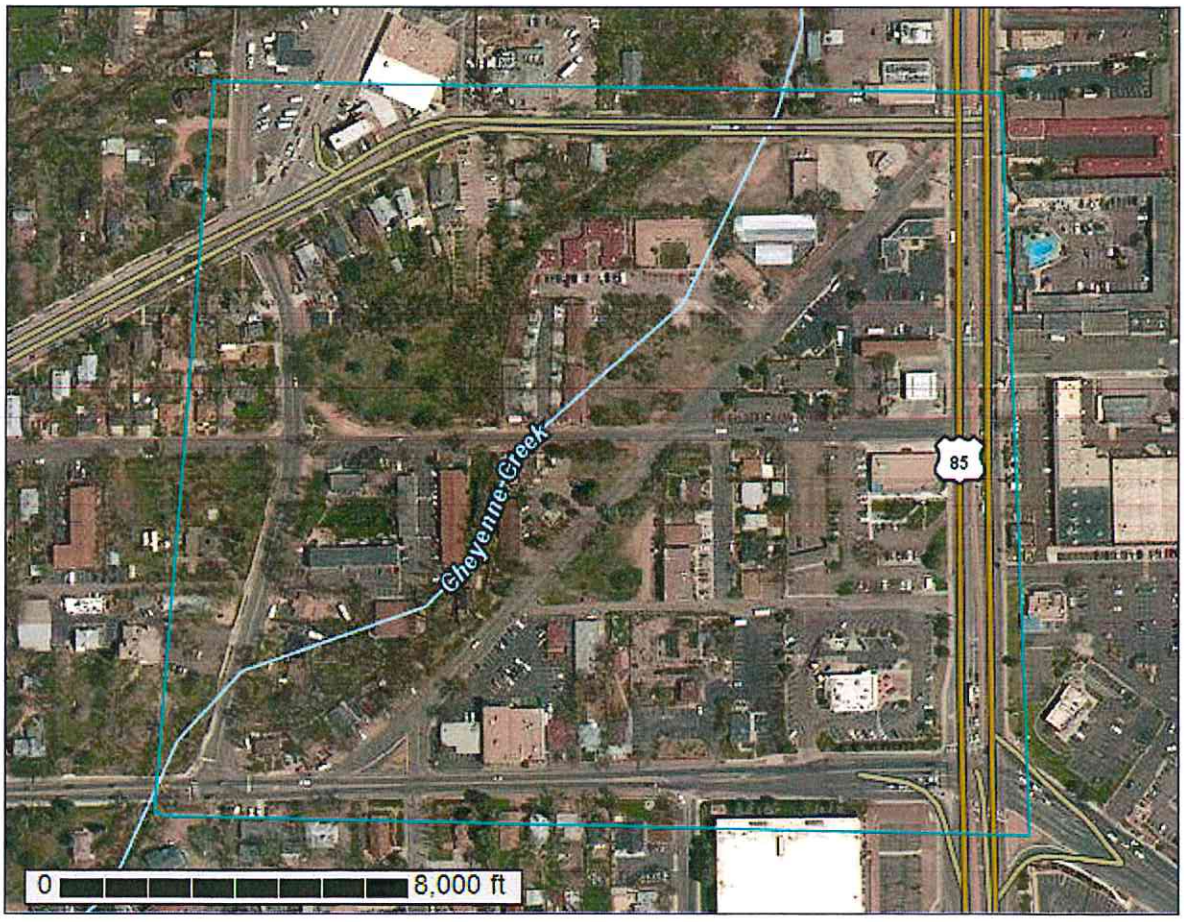
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado



November 5, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

PROJECT SITE

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2014—Jun 17, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
16	Chaseville gravelly sandy loam, 1 to 8 percent slopes	15.0	37.4%
59	Nunn clay loam, 0 to 3 percent slopes	14.0	35.0%
75	Razor-Midway complex	11.0	27.5%
Totals for Area of Interest		**40.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

16—Chaseville gravelly sandy loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367l
Elevation: 6,100 to 7,000 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Chaseville and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chaseville

Setting

Landform: Terraces, alluvial fans, hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A1 - 0 to 6 inches: gravelly sandy loam
A2 - 6 to 19 inches: very gravelly sandy loam
C1 - 19 to 40 inches: extremely gravelly loamy coarse sand
C2 - 40 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

59—Nunn clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3693
Elevation: 5,400 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Nunn and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nunn

Setting

Landform: Fans, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 12 inches: clay loam
Bt - 12 to 26 inches: clay loam
BC - 26 to 30 inches: clay loam
Bk - 30 to 58 inches: sandy clay loam
C - 58 to 72 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: C
Ecological site: Clayey Plains LRU's A & B (R069XY042CO)
Other vegetative classification: CLAYEY PLAINS (069AY042CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

75—Razor-Midway complex

Map Unit Setting

National map unit symbol: 369p
Elevation: 5,300 to 6,100 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Razor and similar soils: 50 percent
Midway and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Razor

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Clayey slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 4 inches: stony clay loam
Bw - 4 to 22 inches: cobbly clay loam
Bk - 22 to 29 inches: cobbly clay
Cr - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 3 to 15 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Moderately saline to strongly saline (8.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 15.0
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Alkaline Plains LRU's A & B (R069XY047CO)
Other vegetative classification: ALKALINE PLAINS (069AY047CO)
Hydric soil rating: No

Description of Midway

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium over residuum weathered from shale

Typical profile

A - 0 to 4 inches: clay loam
C - 4 to 13 inches: clay
Cr - 13 to 17 inches: weathered bedrock

Properties and qualities

Slope: 3 to 25 percent
Depth to restrictive feature: 6 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 15 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 15.0
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D
Ecological site: Shaly Plains LRU's A & B (R069XY046CO)
Other vegetative classification: SHALY PLAINS (069AY045CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

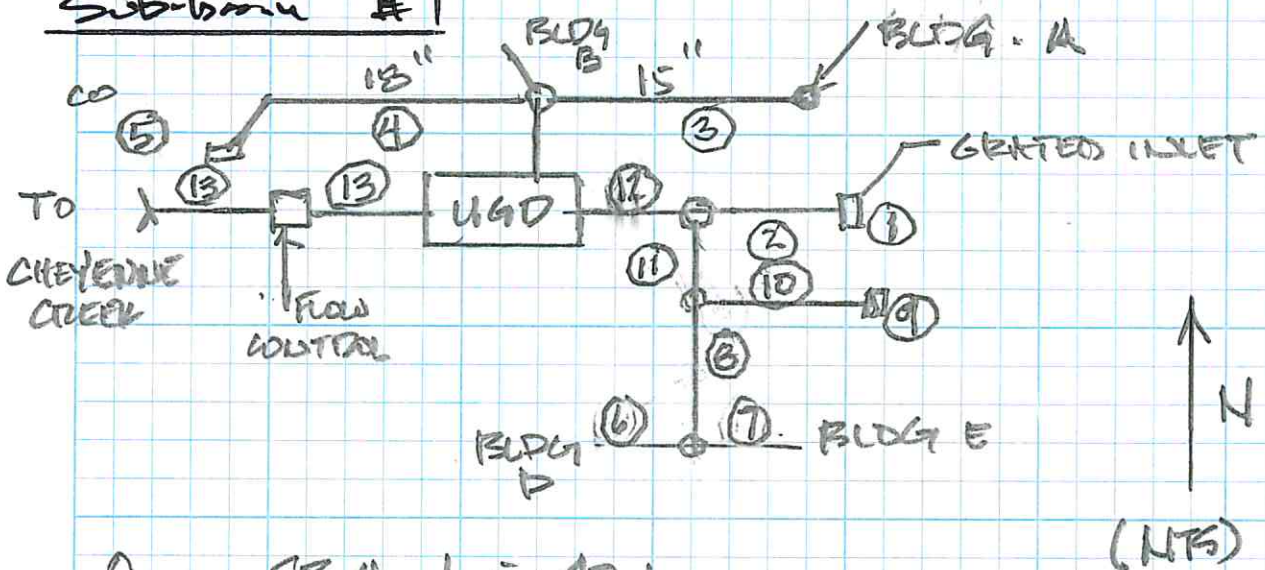
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix B
Hydraulic Calculations
Water Capture and Excess Urban Volume Calculations
Underground Detention

Stormwater Collection System Schematic layout

Sub-basin #1



Q_{100} SB# 1 = 42.6

① Total Flow to Grated Inlet = SB1 − BLDG A, B, D & E

Area SB # 1 5.29 Ac

Bldg area : 38,110 sf = .87 Ac

Net = 4.42 Ac

Assume 12" depth over grate.

$Q_{100} = 4.42(.95)(8.8 in/hr) = 37.0$ cfs

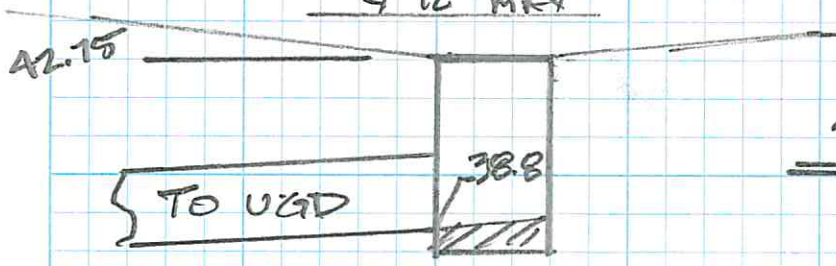
Assume Orifice w/ 25% Blockage

$Q = CA\sqrt{2gh}$ w/ $C = .63(.75) = .47$, $H = 1'$

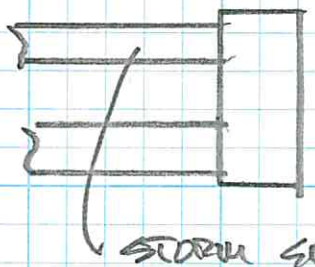
$Q = .47A\sqrt{2g(1)} = 3.77A$ for $Q = 37.0$

$A = 37/3.77 = 9.81$ sf

Grate Inlet SB #1 cont'd



Reqd A = 9.81 sf
use 12 sf
2' x 6' GI



(2) Storm Sewer out from GI

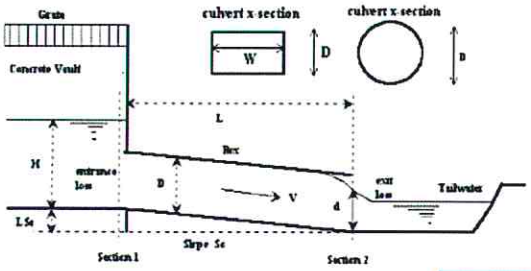
Analyze as culvert; UGD empty but filling

For UD culvert:

@ Max HW 43.75 Q = 49.0 cfs ∴ ok

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: SOUTH NEVADA CREEKWALK FILING 1
Basin ID: TWIN STORM SEWER FROM GRATED INLET
Status:



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	24	inches
	Inlet Edge Type (choose from pull-down list)		Square End with Headwall	
OR:				
Box Culvert:	Barrel Height (Rise) in Feet	Height (Rise) =		ft.
	Barrel Width (Span) in Feet	Width (Span) =		ft.
	Inlet Edge Type (choose from pull-down list)		Square Edge w/ 90-15 Deg. Headwall	
	Number of Barrels	No =	2	
	Inlet Elevation at Culvert Invert	Inlet Elev =	38.8	ft. elev.
	Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)	Outlet Elev =	38.6	ft. elev.
	Culvert Length in Feet	L =	36	ft.
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.50
Friction Loss Coefficient	K_f =	0.38
Sum of All Loss Coefficients	K_s =	1.88
Orifice Inlet Condition Coefficient	C_d =	0.86
Minimum Energy Condition Coefficient	KE_{low} =	0.0121

Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
38.80	38.60	0.00	0.00	**0.00**	No Flow (WS < inlet)	N/A
39.00	38.70	0.40	4.93	**0.40**	Min. Energy. Eqn.	INLET
39.20	38.80	1.20	7.49	**1.20**	Min. Energy. Eqn.	INLET
39.40	38.90	3.40	9.86	**3.40**	Min. Energy. Eqn.	INLET
39.60	39.00	5.80	12.24	**5.80**	Min. Energy. Eqn.	INLET
39.80	39.10	8.80	14.25	**8.80**	Min. Energy. Eqn.	INLET
40.00	39.20	11.40	15.89	**11.40**	Regression Eqn.	INLET
40.20	39.30	14.60	16.08	**14.60**	Regression Eqn.	INLET
40.40	39.40	18.20	16.62	**16.62**	Regression Eqn.	OUTLET
40.60	39.50	22.00	17.17	**17.17**	Regression Eqn.	OUTLET
40.80	39.60	25.60	18.27	**18.27**	Regression Eqn.	OUTLET
41.00	39.70	29.20	20.46	**20.46**	Regression Eqn.	OUTLET
41.20	39.80	32.40	23.20	**23.20**	Regression Eqn.	OUTLET
41.40	39.90	35.60	26.67	**26.67**	Regression Eqn.	OUTLET
41.60	40.00	38.20	29.78	**29.78**	Regression Eqn.	OUTLET
41.80	40.10	40.80	32.70	**32.70**	Regression Eqn.	OUTLET
42.00	40.20	43.40	35.26	**35.26**	Regression Eqn.	OUTLET
42.20	40.30	45.60	37.63	**37.63**	Regression Eqn.	OUTLET
42.40	40.40	47.80	40.00	**40.00**	Regression Eqn.	OUTLET
42.60	40.50	49.80	42.20	**42.20**	Regression Eqn.	OUTLET
42.80	40.60	51.80	44.21	**44.21**	Regression Eqn.	OUTLET
43.00	40.70	53.60	45.12	**45.12**	Regression Eqn.	OUTLET
43.20	40.80	55.40	46.22	**46.22**	Regression Eqn.	OUTLET
43.40	40.90	57.20	47.13	**47.13**	Regression Eqn.	OUTLET
43.60	41.00	58.80	48.04	**48.04**	Regression Eqn.	OUTLET
43.80	41.10	60.60	48.96	**48.96**	Regression Eqn.	OUTLET
44.00		62.20	54.80	**54.80**	Regression Eqn.	OUTLET
44.20		63.60	56.44	**56.44**	Regression Eqn.	OUTLET
44.40		65.20	58.09	**58.09**	Regression Eqn.	OUTLET
44.60		66.80	59.55	**59.55**	Regression Eqn.	OUTLET

Processing Time: 00.23 Seconds

(3) Storm Sewer: Bldg & roof drains

$Q_{100} = CIA$ $C = .81$ For HSG A/B

$Q = .81(8.8)(.22)$ $A = 9450\,sf = .22\,ac$

$= 1.57$ cfs

NSC 15" RCP : @ 1.0% Min. = 6.5 cfs

∴ ok

(4) Storm Sewer: Bldg 'B' & inlet

$A = 16450\,sf = .38\,Ac$ (roof)

Area to Type 'D102' = $\frac{1/2(120)(52)}{43560} = .07\,Ac$

Total to (4) = $.38 + .07 = .45\,Ac$

$Q_{100} = .93(8.8)(.45) = 3.7$ cfs

18" RCP @ 1.0% = 11 cfs ∴ ok

⑤ Inlet @ NW corner Parking lot SB 1A

$Q_{100} = .95(8.8)(.07 ac) = .59$ cfs

Per UD inlet : 5' DIDR : cap = 5.4 cfs ∴ ok

⑥ Storm Sewer From Bldg 'D'

Area = 6120 sf = .14 ac

$Q_{100} = .81(8.8)(.14 ac) = 1.0$ cfs

15" RCP @ 1.0% = 6.5 cfs ∴ ok

⑦ Storm Sewer Bldg 'E'

Area = 5880 sf = .13 Ac

$Q_{100} = .81(8.8)(.13) = .96$ cfs

15" RCP @ 1.0% = 6.5 ∴ ok

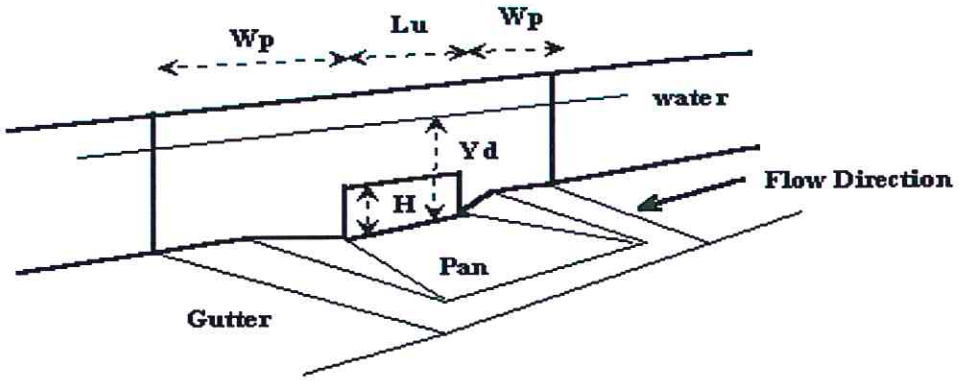
⑧ Outfall from Bldgs D+E

$Q_{100} = 1.0 + .96 = 2.0$ cfs

18" RCP @ 1.0% = 11 cfs ∴ ok

CURB OPENING INLET IN A SUMP

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at NW corner parking lot sb 1



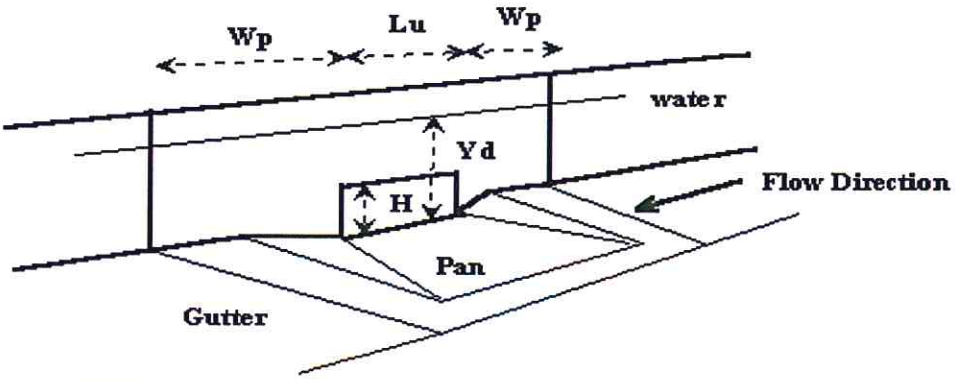
Design Information (Input)			
Length of a Unit Inlet	L_u =	5.00	ft
Local Depression, if any (not part of upstream Composite Gutter)	a_{local} =	2.00	inches
Height of Curb Opening in Inches	H =	8.00	inches
Side Width for Depression Pan	W_p =	3.00	ft
Clogging Factor for a Single Unit (typical value = 0.1)	C_o =	0.10	
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	degrees
Orifice Coefficient (see USDCM Table ST-7)	C_d =	0.67	
Weir Coefficient (see USDCM Table ST-7)	C_w =	3.00	
Total Number of Units in the Curb Opening Inlet	No =	1	

Curb Opening Inlet Capacity in a Sump			
As a Weir			
Design Discharge on the Street (from *Street Hy*)	**Q_o =**	**0.6**	**cfs**
Water Depth for the Design Condition	Y_d =	4.91	inches
Total Length of Curb Opening Inlet	L =	5.00	ft
Capacity as a Weir without Clogging	Q_{wi} =	8.2	cfs
Clogging Coefficient for Multiple Units	Coef =	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	
Capacity as a Weir with Clogging	Q_{wa} =	7.8	cfs
As an Orifice			
Capacity as an Orifice without Clogging	Q_{oi} =	6.0	cfs
Capacity as an Orifice with Clogging	Q_{oa} =	5.4	cfs
Capacity for Design with Clogging	**Q_a =**	**5.4**	**cfs**
Capture Percentage for this Inlet = Q_a / Q_o =	**C% =**	**100.00**	**%**

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

CURB OPENING INLET IN A SUMP

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at NW corner parking lot sb 1



Design Information (Input)			
Length of a Unit Inlet	L_u =	5.00	ft
Local Depression, if any (not part of upstream Composite Gutter)	a_{local} =	2.00	inches
Height of Curb Opening in Inches	H =	8.00	inches
Side Width for Depression Pan	W_p =	3.00	ft
Clogging Factor for a Single Unit (typical value = 0.1)	C_o =	0.10	
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4	degrees
Orifice Coefficient (see USDCM Table ST-7)	C_d =	0.67	
Weir Coefficient (see USDCM Table ST-7)	C_w =	3.00	
Total Number of Units in the Curb Opening Inlet	No =	1	

Curb Opening Inlet Capacity in a Sump			
As a Weir			
Design Discharge on the Street (from *Street Hy*)	**Q_o =**	**0.6**	**cfs**
Water Depth for the Design Condition	Y_d =	4.91	inches
Total Length of Curb Opening Inlet	L =	5.00	ft
Capacity as a Weir without Clogging	Q_{wi} =	8.2	cfs
Clogging Coefficient for Multiple Units	Coef =	1.00	
Clogging Factor for Multiple Units	Clog =	0.10	
Capacity as a Weir with Clogging	Q_{wa} =	7.8	cfs
As an Orifice			
Capacity as an Orifice without Clogging	Q_{oi} =	6.0	cfs
Capacity as an Orifice with Clogging	Q_{oa} =	5.4	cfs
Capacity for Design with Clogging	**Q_a =**	**5.4**	**cfs**
Capture Percentage for this Inlet = Q_a / Q_o =	**C% =**	**100.00**	**%**

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

(9) Inlet SE Parking Lot

Area = 225 x 170 = 38250 = .88 Ac
less Bldg 'E' = .13 Ac
.75 Ac

Q_{100} = .95(8.8)(.75) = 6.27 cfs

Per UD Inlet 5' D102

(10) Storm Sewer From SE Inlet

Q_{100} = 6.27 cfs.
18" RCP @ 1.0% Min = 11 cfs. ∴ ok

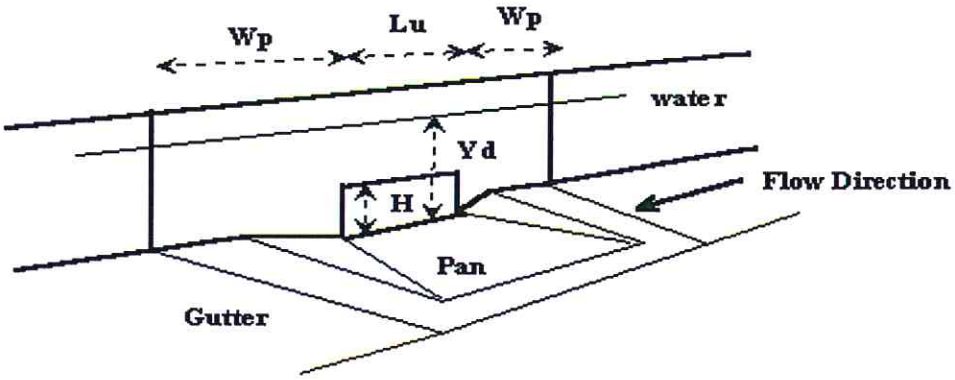
(11) Storm Sewer to Junc. Structure

Q = (8) + (10) ... (2)
= 2.0 + 6.3 = 8.3 cfs

18" RCP @ 1.6% Min = 11.5 cfs ∴ ok

CURB OPENING INLET IN A SUMP

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at SE parking lot sb 1



Design Information (Input)		
Length of a Unit Inlet	L_u =	5.00 ft
Local Depression, if any (not part of upstream Composite Gutter)	a_{local} =	2.00 inches
Height of Curb Opening in Inches	H =	8.00 inches
Side Width for Depression Pan	W_p =	3.00 ft
Clogging Factor for a Single Unit (typical value = 0.1)	C_o =	0.10
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4 degrees
Orifice Coefficient (see USDCM Table ST-7)	C_d =	0.67
Weir Coefficient (see USDCM Table ST-7)	C_w =	3.00
Total Number of Units in the Curb Opening Inlet	No =	1

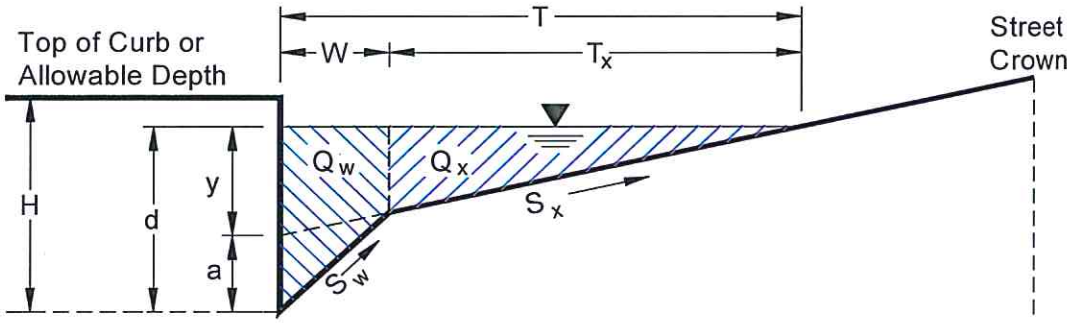
Curb Opening Inlet Capacity in a Sump		
As a Weir		
Design Discharge on the Street (from *Street Hy*)	**Q_o =**	**6.3 cfs**
Water Depth for the Design Condition	Y_d =	7.61 inches
Total Length of Curb Opening Inlet	L =	5.00 ft
Capacity as a Weir without Clogging	Q_{wi} =	15.8 cfs
Clogging Coefficient for Multiple Units	Coef =	1.00
Clogging Factor for Multiple Units	Clog =	0.10
Capacity as a Weir with Clogging	Q_{wa} =	15.0 cfs
As an Orifice		
Capacity as an Orifice without Clogging	Q_{oi} =	10.4 cfs
Capacity as an Orifice with Clogging	Q_{oa} =	9.4 cfs
Capacity for Design with Clogging	**Q_a =**	**9.4 cfs**
Capture Percentage for this Inlet = Q_a / Q_o =	**C% =**	**100.00 %**

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

EA

GUTTER CONVEYANCE CAPACITY

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at SE parking lot sb 1



Street Geometry (Input)			
Design Discharge in the Gutter	Q_o =	**6.3**	**cfs**
Gutter Width (Cannot Be Less Than Any Grate Width)	W =	2.00	ft
Gutter Depression, if Composite Gutter	a =	2.0	inches
Street Transverse Slope	S_x =	0.0200	ft/ft
Street Longitudinal Slope	S_o =	0.0050	ft/ft
Manning's Roughness	n =	0.015	
Gutter Conveyance Geometry			
Gutter Cross Slope	S_w =	0.1033	ft/ft
Water Spread Width	T =	15.0	ft
Water Depth without Gutter Depression	y =	3.6	inches
Water Depth with a Gutter Depression	d =	5.6	inches
Gutter Conveyance Calculations by HEC-22 Method			
Spread for Side Flow on the Street (T - W)	T_x =	13.0	ft
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	3.7	cfs
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_o =	0.42	
Discharge within the Gutter Section W	Q_w =	2.6	cfs
Total Flow Rate by HEC-22 Method	Q_T =	**6.3**	**cfs**
Equivalent Street Transverse Slope	S_e =	0.0550	ft/ft
Flow Area	A_s =	2.4	sq ft
Flow Velocity	V_s =	2.6	fps
V_s*d product	**V_s*d =**	**1.2**	**ft^2/s**

NOTE: V_s*d product should be less than 6.0 for minor event and less than 8.0 for major event.

(12) Storm Sewer to UGD.

Q_{100} = (11) + (2) = 8.3 + 37.0
= 45.3 cfs

Maximum Slope = 0.5%
Analyze as a culvert. Max HWD = 43.75 (@ GI)

Per UD-Culvert
Q @ Max HW = 45.4 cfs ∴ ok

(13) Outfall to Creek : From UGD #1

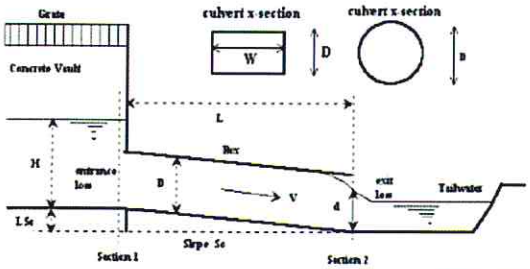
Qreq'd (100 yr inflow, undetained 45.3 cfs
Slope 0.5%
Analyze as culvert Max HWD = 43.75

For culvert from flow control to creek
Invert ≈ 36.87 HW depth = 43.85 - 36.87 - 6.98' ≈ 7'
Q = 49.2 cfs. ∴ ok

Flap gate @ outlet to creek to prevent backflow from Cheyenne Creek

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: SOUTH NEVADA CREEKWALK FILING 1
Basin ID: Outfall to UGD SB 1 (12)
Status:



Design Information (Input):

Circular Culvert: Barrel Diameter in Inches	D =	36	inches
Inlet Edge Type (choose from pull-down list)		Square End with Headwall	
OR:			
Box Culvert: Barrel Height (Rise) in Feet	Height (Rise) =		ft.
Barrel Width (Span) in Feet	Width (Span) =		ft.
Inlet Edge Type (choose from pull-down list)		Square Edge w/ 90-15 Deg. Headwall	
Number of Barrels	No =	1	
Inlet Elevation at Culvert Invert	Inlet Elev =	38.5	ft. elev.
Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)	Outlet Elev =	38.2	ft. elev.
Culvert Length in Feet	L =	54	ft.
Manning's Roughness	n =	0.025	
Bend Loss Coefficient	K_b =	0	
Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.50
Friction Loss Coefficient	K_f =	1.44
Sum of All Loss Coefficients	K_s =	2.94
Orifice Inlet Condition Coefficient	C_d =	0.85
Minimum Energy Condition Coefficient	KE_{low} =	0.0205

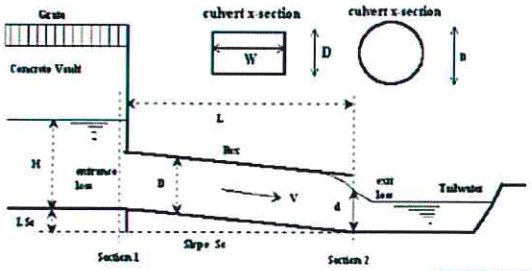
Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
38.50	38.20	0.00	0.00	**0.00**	No Flow (WS < inlet)	N/A
38.70	38.30	0.20	5.39	**0.20**	Min. Energy. Eqn.	INLET
38.90	38.40	0.80	7.48	**0.80**	Min. Energy. Eqn.	INLET
39.10	38.50	1.60	9.53	**1.60**	Min. Energy. Eqn.	INLET
39.30	38.60	3.60	11.49	**3.60**	Min. Energy. Eqn.	INLET
39.50	38.70	5.50	13.35	**5.50**	Min. Energy. Eqn.	INLET
39.70	38.80	7.80	15.11	**7.80**	Min. Energy. Eqn.	INLET
39.90	38.90	10.40	16.79	**10.40**	Min. Energy. Eqn.	INLET
40.10	39.00	13.00	18.38	**13.00**	Regression Eqn.	INLET
40.30	39.20	15.70	19.91	**15.70**	Regression Eqn.	INLET
40.50	39.40	18.60	21.35	**18.60**	Regression Eqn.	INLET
40.70	39.50	21.70	21.82	**21.70**	Regression Eqn.	INLET
40.90	39.60	25.00	22.01	**22.01**	Regression Eqn.	OUTLET
41.10	39.70	28.40	22.36	**22.36**	Regression Eqn.	OUTLET
41.30	39.80	31.90	22.84	**22.84**	Regression Eqn.	OUTLET
41.50	39.90	35.30	23.43	**23.43**	Regression Eqn.	OUTLET
41.70	40.00	38.60	24.97	**24.97**	Regression Eqn.	OUTLET
41.90	40.10	41.70	26.87	**26.87**	Regression Eqn.	OUTLET
42.10	40.20	44.70	29.01	**29.01**	Regression Eqn.	OUTLET
42.30	40.30	47.50	31.24	**31.24**	Regression Eqn.	OUTLET
42.50	40.40	50.10	33.46	**33.46**	Regression Eqn.	OUTLET
42.70	40.50	52.70	35.65	**35.65**	Regression Eqn.	OUTLET
42.90	40.60	55.10	37.74	**37.74**	Regression Eqn.	OUTLET
43.10	40.70	57.40	39.76	**39.76**	Regression Eqn.	OUTLET
43.30	40.80	59.60	41.71	**41.71**	Regression Eqn.	OUTLET
43.50	40.90	61.70	43.59	**43.59**	Regression Eqn.	OUTLET
43.70	41.00	63.70	45.39	**45.39**	Regression Eqn.	OUTLET
43.90		65.70	47.13	**47.13**	Regression Eqn.	OUTLET
44.10		67.60	48.81	**48.81**	Regression Eqn.	OUTLET
44.30		69.40	50.35	**50.35**	Regression Eqn.	OUTLET

Processing Time: 00.39 Seconds

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: SOUTH NEVADA CREEKWALK FILING 1
Basin ID: Outfall to UGD 1 sb 1 30-inch rcp
Status:



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	30	inches
	Inlet Edge Type (choose from pull-down list)		Square End with Headwall	
OR:				
Box Culvert:	Barrel Height (Rise) in Feet	Height (Rise) =		ft.
	Barrel Width (Span) in Feet	Width (Span) =		ft.
	Inlet Edge Type (choose from pull-down list)		Square Edge w/ 90-15 Deg. Headwall	
	Number of Barrels	No =	1	
	Inlet Elevation at Culvert Invert	Inlet Elev =	100	ft. elev.
	Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)	Outlet Elev =	99.33	ft. elev.
	Culvert Length in Feet	L =	74	ft.
	Manning's Roughness	n =	0.012	
	Bend Loss Coefficient	K_b =	0	
	Exit Loss Coefficient	K_x =	1	

Design Information (calculated):

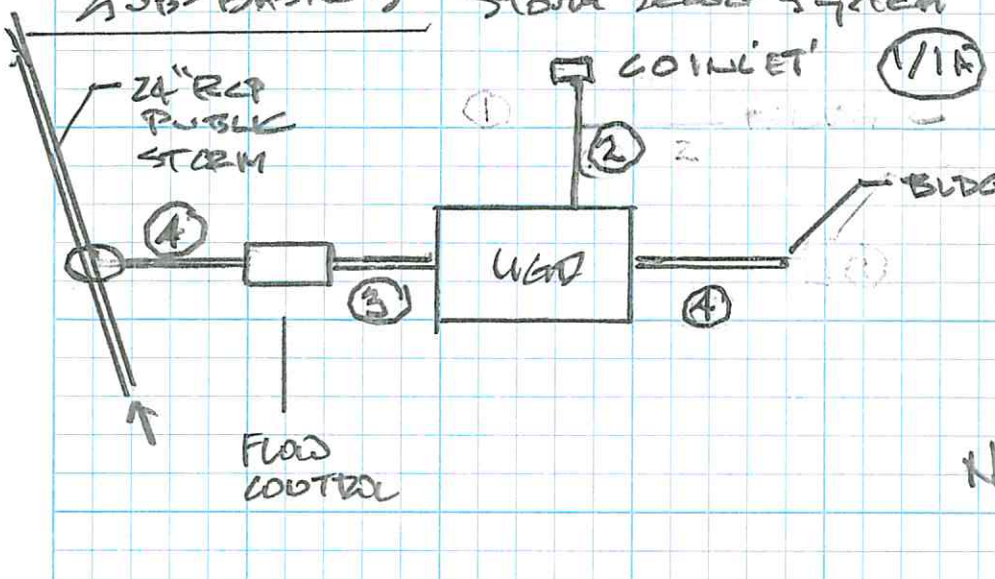
Entrance Loss Coefficient	K_e =	0.50
Friction Loss Coefficient	K_f =	0.58
Sum of All Loss Coefficients	K_s =	2.08
Orifice Inlet Condition Coefficient	C_d =	0.85
Minimum Energy Condition Coefficient	KE_{low} =	0.0152

Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
100.00	99.33	0.00	0.00	**0.00**	No Flow (WS < inlet)	N/A
100.50	99.60	1.10	12.73	**1.10**	Min. Energy. Eqn.	INLET
101.00	99.80	5.00	14.04	**5.00**	Min. Energy. Eqn.	INLET
101.50	100.00	10.00	15.09	**10.00**	Regression Eqn.	INLET
102.00	100.20	15.90	17.02	**15.90**	Regression Eqn.	INLET
102.50	100.40	22.40	19.51	**19.51**	Regression Eqn.	OUTLET
103.00	100.60	28.40	24.63	**24.63**	Regression Eqn.	OUTLET
103.50	100.80	33.50	29.15	**29.15**	Regression Eqn.	OUTLET
104.00	101.00	37.80	33.09	**33.09**	Regression Eqn.	OUTLET
104.50	101.20	41.70	36.70	**36.70**	Regression Eqn.	OUTLET
105.00	101.40	45.20	39.98	**39.98**	Regression Eqn.	OUTLET
105.50	101.60	48.40	43.02	**43.02**	Regression Eqn.	OUTLET
106.00	101.80	51.40	45.85	**45.85**	Regression Eqn.	OUTLET
106.50	102.00	54.20	47.63	**47.63**	Regression Eqn.	OUTLET
107.00	102.20	57.00	49.19	**49.19**	Regression Eqn.	OUTLET
107.50	102.40	59.50	50.72	**50.72**	Regression Eqn.	OUTLET
108.00	102.60	61.90	52.18	**52.18**	Orifice Eqn.	OUTLET
108.50		64.10	57.99	**57.99**	Orifice Eqn.	OUTLET
109.00		66.30	60.12	**60.12**	Orifice Eqn.	OUTLET
109.50		68.40	62.20	**62.20**	Orifice Eqn.	OUTLET
110.00		70.50	64.18	**64.18**	Orifice Eqn.	OUTLET
110.50		72.40	66.13	**66.13**	Orifice Eqn.	OUTLET
111.00		74.40	68.01	**68.01**	Orifice Eqn.	OUTLET
111.50		76.20	69.83	**69.83**	Orifice Eqn.	OUTLET
112.00		78.10	71.60	**71.60**	Orifice Eqn.	OUTLET
112.50		79.90	73.36	**73.36**	Orifice Eqn.	OUTLET
113.00		81.60	75.05	**75.05**	Orifice Eqn.	OUTLET
113.50		83.40	76.72	**76.72**	Orifice Eqn.	OUTLET
114.00		85.00	78.35	**78.35**	Orifice Eqn.	OUTLET
114.50		86.70	79.93	**79.93**	Orifice Eqn.	OUTLET

Processing Time: 00.17 Seconds

Sub-Basin 3 Storm Sewer System



N ↑ (NTS)

① Curb inlet

Area = .64 - Bldg C

Bldg C = 11,000 sf = .25 Ac

Area to inlet .64 - .25 = .39 Ac

$Q_{100} = .95(8.8)(.39) = 3.26$ cfs

② Storm Sewer From D10R

Analyze as culvert ∴ Max HW D = 3.0'

$Q_{100} = 3.26$ cfs

Per UD-Inlet Q_c HW = 3.0 = 6.2 cfs

∴ ok

(4) Storm Sewer "Bldg 'G'

$Q_5 = .25(5.7)(.81) = 1.1$
$Q_{100} = .25(8.8)(.88) = 1.94$ cfs

15" RCP @ 1.0% Q = 6.5 cfs ∴ ok

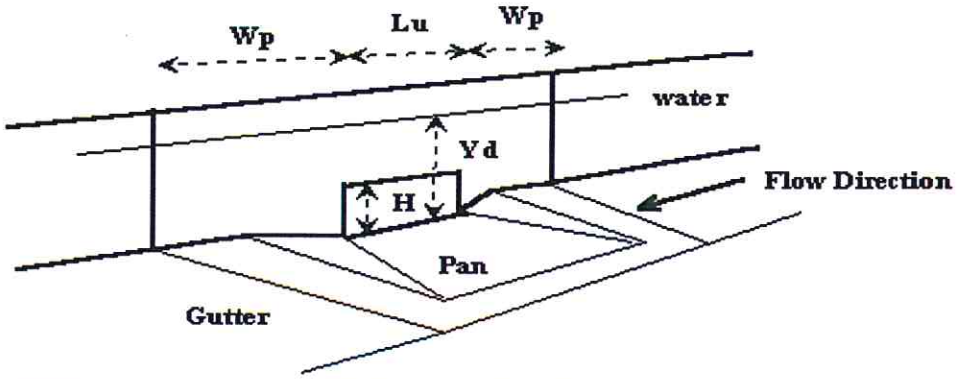
T_c = 5 min.

(3) Size for full 100 year flow 5.4 cfs

18" RCP @ 1.0% = 11 cfs ∴ ok

CURB OPENING INLET IN A SUMP

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at parking lot sb 3



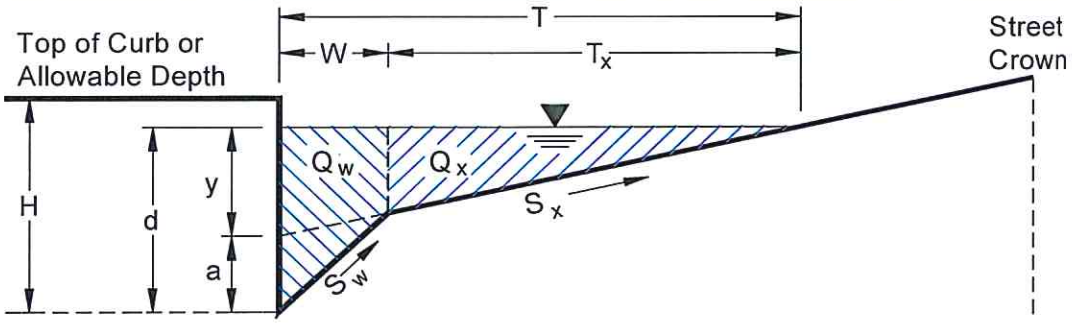
Design Information (Input)		
Length of a Unit Inlet	L_u =	5.00 ft
Local Depression, if any (not part of upstream Composite Gutter)	a_{local} =	2.00 inches
Height of Curb Opening in Inches	H =	8.00 inches
Side Width for Depression Pan	W_p =	3.00 ft
Clogging Factor for a Single Unit (typical value = 0.1)	C_o =	0.10
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.4 degrees
Orifice Coefficient (see USDCM Table ST-7)	C_d =	0.67
Weir Coefficient (see USDCM Table ST-7)	C_w =	3.00
Total Number of Units in the Curb Opening Inlet	No =	1

Curb Opening Inlet Capacity in a Sump		
As a Weir		
Design Discharge on the Street (from *Street Hy*)	**Q_o =**	**3.3 cfs**
Water Depth for the Design Condition	Y_d =	6.71 inches
Total Length of Curb Opening Inlet	L =	5.00 ft
Capacity as a Weir without Clogging	Q_{wi} =	13.0 cfs
Clogging Coefficient for Multiple Units	Coef =	1.00
Clogging Factor for Multiple Units	Clog =	0.10
Capacity as a Weir with Clogging	Q_{wa} =	12.4 cfs
As an Orifice		
Capacity as an Orifice without Clogging	Q_{oi} =	9.2 cfs
Capacity as an Orifice with Clogging	Q_{oa} =	8.2 cfs
Capacity for Design with Clogging	**Q_a =**	**8.2 cfs**
Capture Percentage for this Inlet = Q_a / Q_o =	**C% =**	**100.00 %**

Note: Unless additional ponding depth or spilling over the curb is acceptable, a capture percentage of less than 100% in a sump may indicate the need for additional inlet units.

GUTTER CONVEYANCE CAPACITY

Project = 18012 South Nevada Creekwalk Filing 1
Inlet ID = Inlet at parking lot sb 3



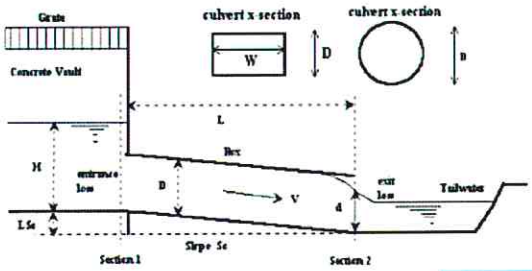
Street Geometry (Input)			
Design Discharge in the Gutter	Q_o =	3.3	**cfs**
Gutter Width (Cannot Be Less Than Any Grate Width)	W =	2.00	ft
Gutter Depression, if Composite Gutter	a =	2.0	inches
Street Transverse Slope	S_x =	0.0200	ft/ft
Street Longitudinal Slope	S_o =	0.0050	ft/ft
Manning's Roughness	n =	0.015	

Gutter Conveyance Geometry			
Gutter Cross Slope	S_w =	0.1033	ft/ft
Water Spread Width	T =	11.3	ft
Water Depth without Gutter Depression	y =	2.7	inches
Water Depth with a Gutter Depression	d =	4.7	inches
Gutter Conveyance Calculations by HEC-22 Method			
Spread for Side Flow on the Street (T - W)	T_x =	9.3	ft
Discharge outside the Gutter Section W, carried in Section T_x	Q_x =	1.5	cfs
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. ST-7)	E_o =	0.55	
Discharge within the Gutter Section W	Q_w =	1.8	cfs
Total Flow Rate by HEC-22 Method	Q_T =	3.3	**cfs**
Equivalent Street Transverse Slope	S_e =	0.0660	ft/ft
Flow Area	A_s =	1.4	sq ft
Flow Velocity	V_s =	2.3	fps
V_s*d product	V_s*d =	0.9	**ft^2/s**

NOTE: V_s*d product should be less than 6.0 for minor event and less than 8.0 for major event.

CULVERT STAGE-DISCHARGE SIZING (INLET vs. OUTLET CONTROL WITH TAILWATER EFFECTS)

Project: SOUTH NEVADA CREEKWALK FILING 1
Basin ID: Outfall to UGD SB 3
Status:



Design Information (Input):

Circular Culvert:	Barrel Diameter in Inches	D =	18 inches
	Inlet Edge Type (choose from pull-down list)		Square End with Headwall
OR:			
Box Culvert:	Barrel Height (Rise) in Feet	Height (Rise) =	ft.
	Barrel Width (Span) in Feet	Width (Span) =	ft.
	Inlet Edge Type (choose from pull-down list)		Square Edge w/ 90-15 Deg. Headwall
	Number of Barrels	No =	1
	Inlet Elevation at Culvert Invert	Inlet Elev =	100 ft. elev.
	Outlet Elevation at Culvert Invert OR Slope of Culvert (ft v./ft h.)	Outlet Elev =	99.5 ft. elev.
	Culvert Length in Feet	L =	40 ft.
	Manning's Roughness	n =	0.012
	Bend Loss Coefficient	K_b =	0
	Exit Loss Coefficient	K_x =	1

Design Information (calculated):

Entrance Loss Coefficient	K_e =	0.50
Friction Loss Coefficient	K_f =	0.62
Sum of All Loss Coefficients	K_s =	2.12
Orifice Inlet Condition Coefficient	C_d =	0.85
Minimum Energy Condition Coefficient	KE_{low} =	-0.0860

Calculations of Culvert Capacity (output):

Water Surface Elevation (ft., linked)	Tailwater Surface Elevation ft	Culvert Inlet-Control Flowrate cfs	Culvert Outlet-Control Flowrate cfs	Controlling Culvert Flowrate cfs (output)	Inlet Equation Used:	Flow Control Used
100.00	99.50	0.00	0.00	**0.00**	No Flow (WS < inlet)	N/A
100.20	99.60	0.20	3.88	**0.20**	Min. Energy. Eqn.	INLET
100.40	99.80	0.70	3.94	**0.70**	Min. Energy. Eqn.	INLET
100.60	100.00	1.50	4.07	**1.50**	Min. Energy. Eqn.	INLET
100.80	100.20	2.40	4.39	**2.40**	Regression Eqn.	INLET
101.00	100.40	3.40	4.77	**3.40**	Regression Eqn.	INLET
101.20	100.60	4.50	5.03	**4.50**	Regression Eqn.	INLET
101.40	100.80	5.70	5.41	**5.41**	Regression Eqn.	OUTLET
101.60	101.00	6.90	6.23	**6.23**	Regression Eqn.	OUTLET
101.80	101.20	8.00	6.23	**6.23**	Regression Eqn.	OUTLET
102.00	101.40	8.90	6.23	**6.23**	Regression Eqn.	OUTLET
102.20	101.60	9.80	6.23	**6.23**	Regression Eqn.	OUTLET
102.40	101.80	10.60	6.23	**6.23**	Regression Eqn.	OUTLET
102.60	102.00	11.30	6.23	**6.23**	Regression Eqn.	OUTLET
102.80	102.20	12.00	6.23	**6.23**	Regression Eqn.	OUTLET
103.00	102.40	12.60	6.23	**6.23**	Regression Eqn.	OUTLET
103.20	102.60	13.20	6.23	**6.23**	Regression Eqn.	OUTLET
103.40		13.80	12.47	**12.47**	Regression Eqn.	OUTLET
103.60		14.40	12.98	**12.98**	Regression Eqn.	OUTLET
103.80		14.90	13.49	**13.49**	Regression Eqn.	OUTLET
104.00		15.40	13.93	**13.93**	Regression Eqn.	OUTLET
104.20		15.90	14.38	**14.38**	Regression Eqn.	OUTLET
104.40		16.40	14.82	**14.82**	Regression Eqn.	OUTLET
104.60		16.90	15.27	**15.27**	Orifice Eqn.	OUTLET
104.80		17.30	15.71	**15.71**	Orifice Eqn.	OUTLET
105.00		17.70	16.09	**16.09**	Orifice Eqn.	OUTLET
105.20		18.10	16.48	**16.48**	Orifice Eqn.	OUTLET
105.40		18.50	16.86	**16.86**	Orifice Eqn.	OUTLET
105.60		18.90	17.24	**17.24**	Orifice Eqn.	OUTLET
105.80		19.30	17.62	**17.62**	Orifice Eqn.	OUTLET

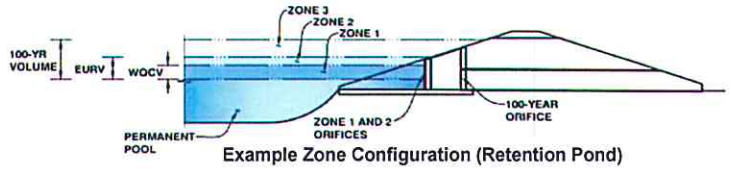
Processing Time: 00.34 Seconds

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: South Nevada Creekwalk Filing No. 1

Basin ID: Sub-basin 1



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	5.29	acres
Watershed Length =	650	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	93.60%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.191	acre-feet
Excess Urban Runoff Volume (EURV) =	0.493	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.479	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.633	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.744	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.872	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.987	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	1.126	acre-feet
500-yr Runoff Volume (P1 = 3.2 in.) =	1.456	acre-feet
Approximate 2-yr Detention Volume =	0.450	acre-feet
Approximate 5-yr Detention Volume =	0.596	acre-feet
Approximate 10-yr Detention Volume =	0.692	acre-feet
Approximate 25-yr Detention Volume =	0.732	acre-feet
Approximate 50-yr Detention Volume =	0.746	acre-feet
Approximate 100-yr Detention Volume =	0.769	acre-feet

Optional User Override 1-hr Precipitation	
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.20	inches

Depth Increment = ft

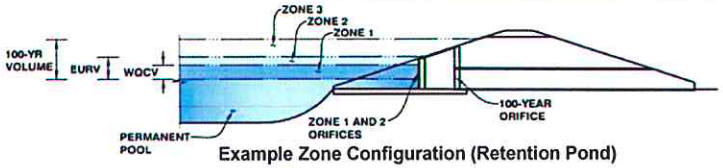
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	15	0.000		
	--	1.00	--	--	--	9,920	0.228	4,869	0.112
	--	2.00	--	--	--	33,140	0.761	26,167	0.601
	--	3.00	--	--	--	54,124	1.243	70,129	1.610
	--	4.00	--	--	--	58,500	1.343	126,441	2.903
	--	5.00	--	--	--	62,810	1.442	187,096	4.295
	--	6.00	--	--	--	67,218	1.543	252,110	5.788
	--	7.00	--	--	--	71,728	1.647	321,583	7.383
	--	8.00	--	--	--	76,338	1.752	395,616	9.082
	--	9.00	--	--	--	81,048	1.861	474,309	10.889
	--	10.00	--	--	--	85,859	1.971	557,763	12.804
	--	11.00	--	--	--	90,770	2.084	646,077	14.832
	--	12.00	--	--	--	95,782	2.199	739,353	16.973
	--	13.00	--	--	--	100,895	2.316	837,692	19.231
	--	14.00	--	--	--	106,108	2.436	941,193	21.607
	--	15.00	--	--	--	111,421	2.558	1,049,958	24.104
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: South Nevada Creekwalk Filing No.1

Basin ID: Sub-basins 3



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	0.64	acres
Watershed Length =	200	ft
Watershed Slope =	0.010	ft/ft
Watershed Imperviousness =	95.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	
Water Quality Capture Volume (WQCV) =	0.024	acre-feet
Excess Urban Runoff Volume (EURV) =	0.061	acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.059	acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.078	acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.091	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.106	acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.120	acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.137	acre-feet
500-yr Runoff Volume (P1 = 3.2 in.) =	0.177	acre-feet
Approximate 2-yr Detention Volume =	0.055	acre-feet
Approximate 5-yr Detention Volume =	0.073	acre-feet
Approximate 10-yr Detention Volume =	0.085	acre-feet
Approximate 25-yr Detention Volume =	0.090	acre-feet
Approximate 50-yr Detention Volume =	0.092	acre-feet
Approximate 100-yr Detention Volume =	0.094	acre-feet

Optional User Override 1-hr Precipitation	
1.19	inches
1.50	inches
1.75	inches
2.00	inches
2.25	inches
2.52	inches
3.20	inches

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	15	0.000		
	--	1.00	--	--	--	9,920	0.228	4,869	0.112
	--	2.00	--	--	--	33,140	0.761	26,167	0.601
	--	3.00	--	--	--	54,124	1.243	70,129	1.610
	--	4.00	--	--	--	58,500	1.343	126,441	2.903
	--	5.00	--	--	--	62,810	1.442	187,096	4.295
	--	6.00	--	--	--	67,218	1.543	252,110	5.788
	--	7.00	--	--	--	71,728	1.647	321,583	7.383
	--	8.00	--	--	--	76,338	1.752	395,616	9.082
	--	9.00	--	--	--	81,048	1.861	474,309	10.889
	--	10.00	--	--	--	85,859	1.971	557,763	12.804
	--	11.00	--	--	--	90,770	2.084	646,077	14.832
	--	12.00	--	--	--	95,782	2.199	739,353	16.973
	--	13.00	--	--	--	100,895	2.316	837,692	19.231
	--	14.00	--	--	--	106,108	2.436	941,193	21.607
	--	15.00	--	--	--	111,421	2.558	1,049,958	24.104
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				
	--		--	--	--				

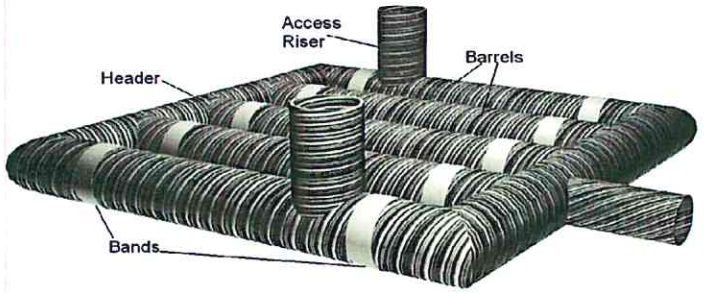
DYODS™

Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

For design assistance, drawings, and pricing send completed worksheet to:
dyods@contech-cpi.com

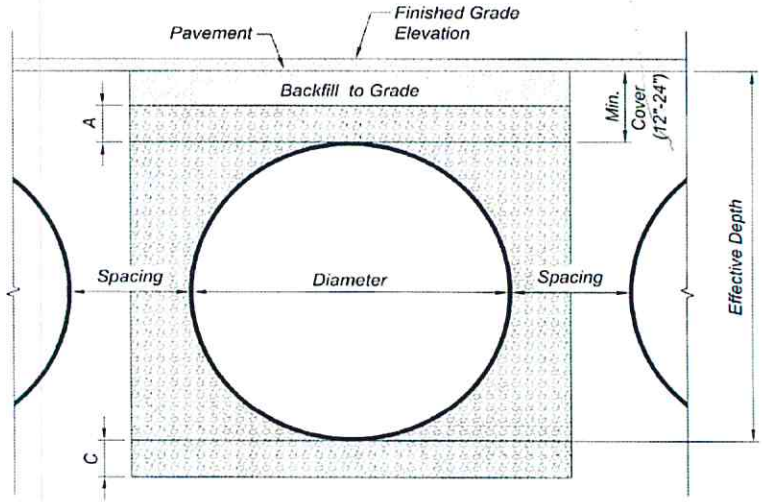


Project Summary

Date:		
Project Name:	South Nevada Creekwalk	
City / County:	Colorado Springs	
State:	CO	
Designed By:		
Company:		**Enter Information in Blue Cells**
Telephone:		

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	24,260	
Limiting Width (ft):	85.00	
Invert Depth Below Asphalt (ft):	10.00	
Solid or Perforated Pipe:	Solid	
Shape Or Diameter (in):	42	9.62 ft^2 Pipe Area
Number Of Headers:	2	
Spacing between Barrels (ft):	1.75	
Stone Width Around Perimeter of System (ft):	0	
Depth A: Porous Stone Above Pipe (in):	0	
Depth C: Porous Stone Below Pipe (in):	0	
Stone Porosity (0 to 40%):	40	



System Sizing

Pipe Storage:	24,366	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	24,366	cf	100.4% Of Required Storage
Number of Barrels:	16	barrels	
Length per Barrel:	148.0	ft	
Length Per Header:	82.3	ft	
Rectangular Footprint (W x L):	82.25 ft x 155.	ft	

CONTECH Materials

Total CMP Footage:	2,533	ft
Approximate Total Pieces:	120	pcs
Approximate Coupling Bands:	134	bands
Approximate Truckloads:	15	trucks

Construction Quantities**

Total Excavation:	4722	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	3820	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

Barrel 12
Barrel 11
Barrel 10
Barrel 9
Barrel 8
Barrel 7
Barrel 6
Barrel 5
Barrel 4
Barrel 3
Barrel 2
Barrel 1

Number Of Barrels Exceed Graph Limitations

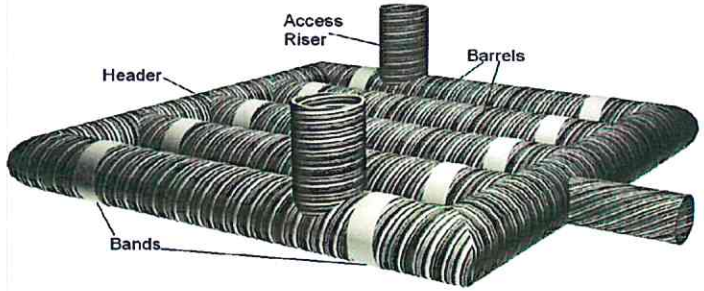
SBH 1 ' CASE 1

DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

For design assistance, drawings, and pricing send completed worksheet to:
dyods@contech-cpi.com



Project Summary

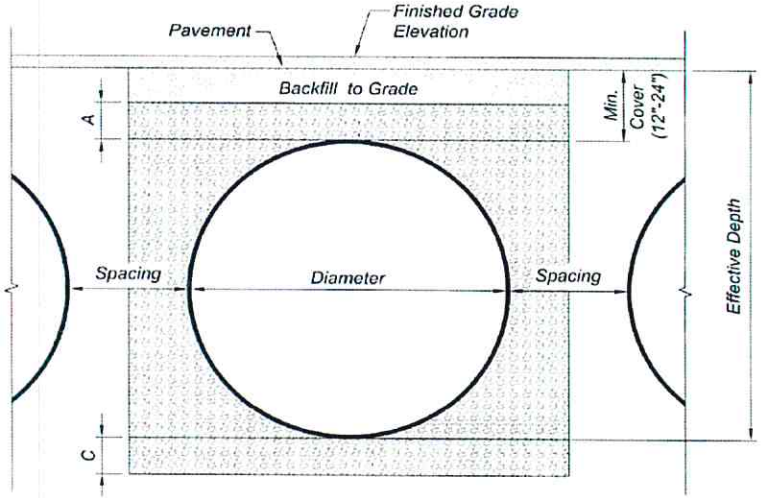
Date:	
Project Name:	South Nevada Creekwalk
City / County:	Colorado Springs
State:	CO
Designed By:	
Company:	
Telephone:	

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	2,963
Limiting Width (ft):	30.00
Invert Depth Below Asphalt (ft):	10.00
Solid or Perforated Pipe:	Solid
Shape Or Diameter (in):	42
Number Of Headers:	2
Spacing between Barrels (ft):	1.75
Stone Width Around Perimeter of System (ft):	0
Depth A: Porous Stone Above Pipe (in):	0
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

9.62 ft^2 Pipe Area



System Sizing

Pipe Storage:	2,997	cf	
Porous Stone Storage:	0	cf	
Total Storage Provided:	2,997	cf	101.1% Of Required Storage
Number of Barrels:	6	barrels	
Length per Barrel:	42.0	ft	
Length Per Header:	29.8	ft	
Rectangular Footprint (W x L):	29.75 ft x 49. ft		

CONTECH Materials

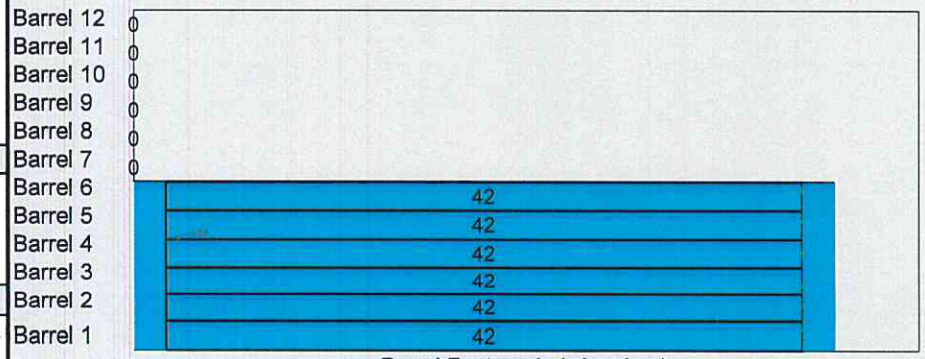
Total CMP Footage:	312	ft
Approximate Total Pieces:	16	pcs
Approximate Coupling Bands:	20	bands
Approximate Truckloads:	2	trucks

Construction Quantities**

Total Excavation:	540	cy
Porous Stone Backfill For Storage:	0	cy stone
Backfill to Grade Excluding Stone:	429	cy fill

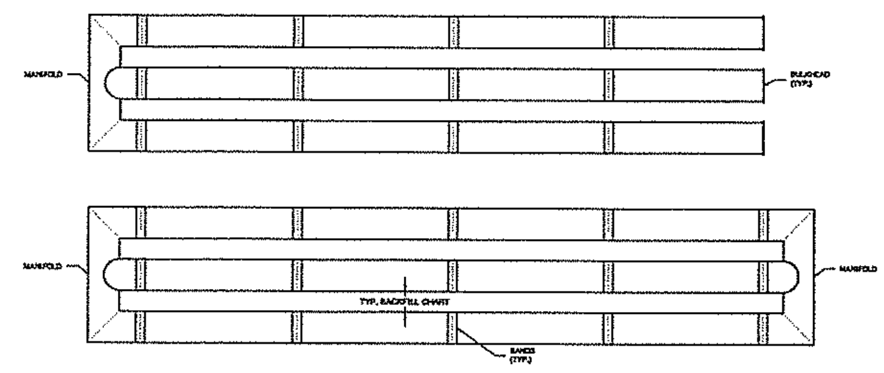
***Construction quantities are approximate and should be verified upon final design*

System Layout



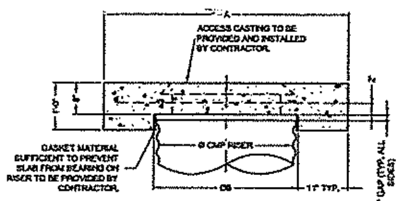
Barrel Footage (w/o headers)

SB # 3 West



NOTE:
THESE ARE EXAMPLES AND MANY OTHER CONFIGURATIONS CAN BE ACCOMPLISHED TO FIT A PARTICULAR FOOTPRINT. PLEASE ASK A CONTECH SALES ENGINEER FOR MORE INFO.

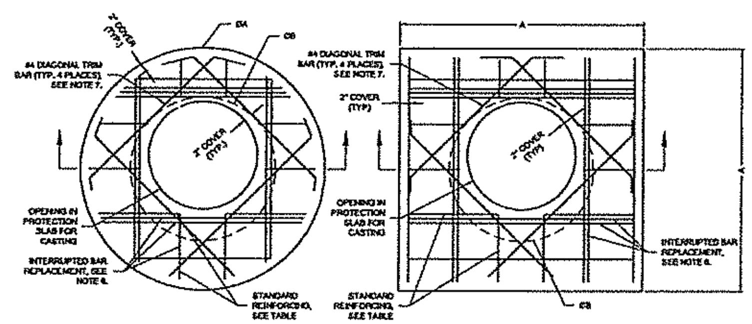
TYPICAL LAYOUTS



SECTION VIEW

REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,130 1,835
36"	Ø 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,850 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



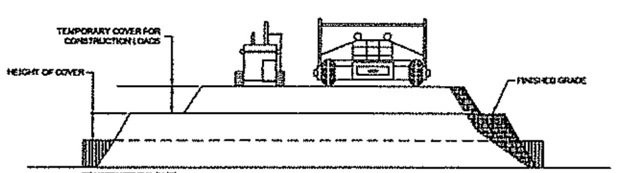
ROUND OPTION PLAN VIEW

SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

TYPICAL MANHOLE CAP



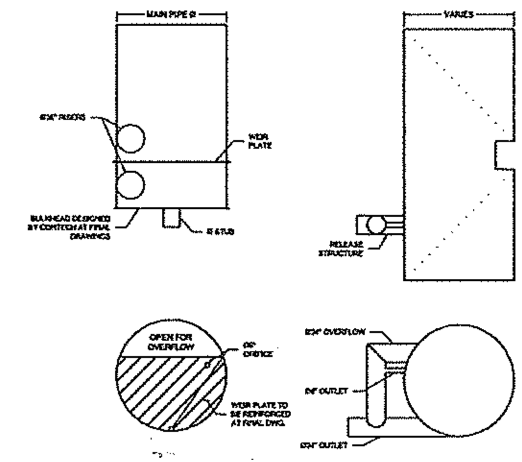
CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

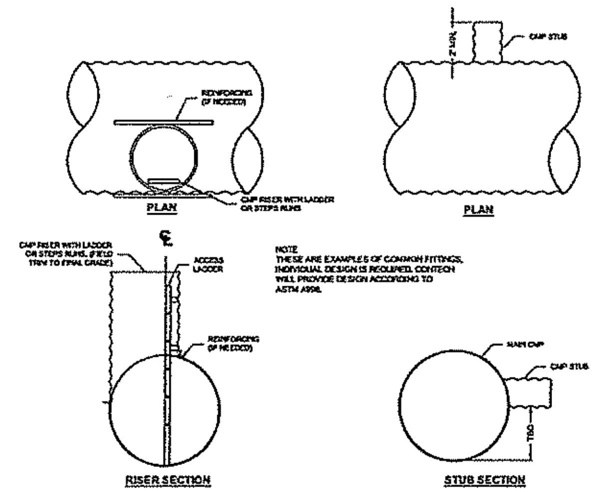
*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING



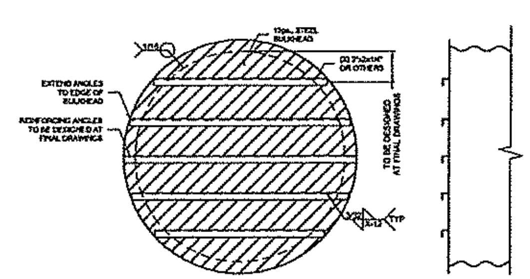
DRAWINGS ARE PROVIDED FOR CONCEPTUAL PURPOSES ONLY. RELEASE STRUCTURE WILL NEED TO BE VERIFIED BY PROJECT ENGINEER FOR HYDRAULIC EFFICIENCY. STRUCTURAL DESIGNS FOR RELEASE WEIR, BULKHEAD AND MANHOLE RISER WILL BE PROVIDED BY CONTECH.

TYPICAL STAGED OUTLETS



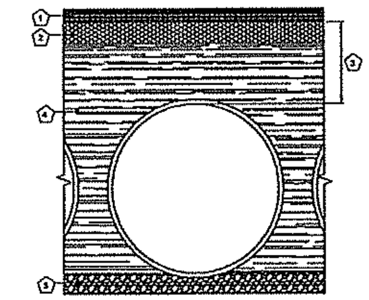
NOTE:
THESE ARE EXAMPLES OF COMMON FITTINGS, INDIVIDUAL DESIGN IS REQUIRED. CONTECH WILL PROVIDE DESIGN ACCORDING TO ASTM A998.

TYPICAL FITTINGS



NOTE:
THIS IS AN EXAMPLE OF A BULKHEAD, INDIVIDUAL BULKHEAD DESIGN IS REQUIRED AND WILL BE HANDLED BY CONTECH WHEN SITE CONDITIONS ARE PROVIDED.

TYPICAL BULKHEAD



KEY
1. RIGID OR FLEXIBLE PAVEMENT
2. GRANULAR ROAD BASE
3. 12" MIN. FOR DIAMETERS THROUGH 96" 18" MIN. FOR DIAMETERS FROM 102" AND LARGER MEASURED TO TOP OF RIGID OR BOTTOM OF FLEXIBLE PAVEMENT.
4. SELECT GRANULAR FILL PER AASHTO M145 A1, A2 OR A3, OR APPROVED EQUAL. PLACED IN 8" LIFTS (COMPACTED TO MIN. 90% STANDARD DENSITY PER AASHTO T99.)
5. GRANULAR BEDDING, ROUGHLY SHAPED TO FIT THE BOTTOM OF PIPE, 4" TO 6" IN DEPTH

FOUNDATION/BEDDING PREPARATION

PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, 4" - 6" OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

BACKFILL

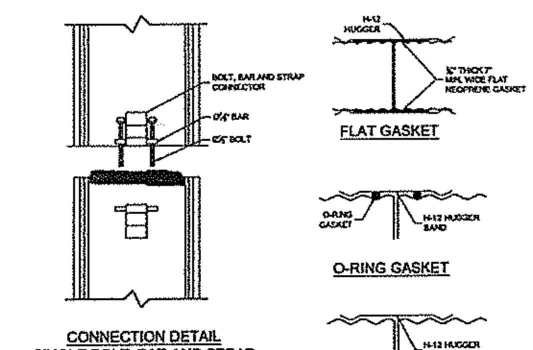
THE BACKFILL SHALL BE AN A1, A2 OR A3 GRANULAR FILL PER AASHTO M145, OR A WELL-GRADED GRANULAR FILL AS APPROVED BY THE SITE ENGINEER (SEE INSTALLATION GUIDELINES). THE MATERIAL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.

SPACING CHART PER AISI HANDBOOK PAGE 329	
DIAMETER	REQUIRED SPACING
UP TO 24"	12in.
24"-72"	1/2 PIPE DIA
72" AND UP	36in.

SPACINGS SHOWN PROVIDE ROOM FOR PROPER BACKFILL TO ENABLE THE STRUCTURE TO DEVELOP ADEQUATE SIDE SUPPORT. NARROWER SPACING CAN BE ENGINEERED. CONTACT ENGINEERING SERVICES.

TYPICAL BACKFILL



CONNECTION DETAIL
SINGLE BOLT, BAR AND STRAP

GENERAL NOTES

1. BANDS ARE NORMALLY FURNISHED AS FOLLOWS:
   12" THRU 48", 1-PIECE
   54" THRU 96", 2-PIECE
   102" THRU 144", 3-PIECES
2. BAND FASTENERS ARE ATTACHED WITH SPOT WELDS, RIVETS OR HAND WELDS
3. REROLLED ANNULAR END CORRUGATIONS ARE NORMALLY 2⅔" x ½". DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES

TYPICAL BAND

INSTALLATION SPECIFICATION

PRE-CONSTRUCTION MEETING

IT IS RECOMMENDED THAT PRIOR TO INSTALLATION OF THE DETENTION SYSTEM A PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED. THOSE REQUIRED TO ATTEND ARE THE SUPPLIER OF THE DETENTION SYSTEM, THE GENERAL CONTRACTOR, SUB CONTRACTORS AND THE ENGINEER.

FOUNDATION/BEDDING PREPARATION

PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, THE 4 INCHES OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

BACKFILL

IT IS RECOMMENDED THE BACKFILL SHALL BE AN A1, A2 OR A3 GRANULAR FILL PER AASHTO M-145 OR A WELL-GRADED GRANULAR FILL AS APPROVED BY THE ENGINEER (SEE INSTALLATION GUIDELINES). THE MATERIAL SHALL BE PLACED IN 8-INCH LOOSE LIFTS AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

MINIMUM COVER

BACKFILL SHALL BE PLACED TO THE PROPER ELEVATION OVER THE SYSTEM AS OUTLINED IN THE PLANS. MINIMUM COVER FOR CONSTRUCTION LOADING NEEDS TO BE DETERMINED BASED ON THE TYPE OF EQUIPMENT THAT IS PLANNED FOR CONSTRUCTION. PROPER COVER FOR CONSTRUCTION EQUIPMENT SHALL BE DETERMINED PRIOR TO THE PRE CONSTRUCTION MEETING BY THE ENGINEER.

INSTALLATION SPECIFICATION

CONTECH CONSTRUCTION PRODUCTS INC.

CONTECH CMP DETENTION SYSTEMS

TYPICAL UDS DETAILS

UNDERGROUND DETENTION SYSTEM
PROJECT NAME
SOMEWHERE, USA

KIOWA ENGINEERING CORPORATION

JOB Sw. Flow Dr. Corridor
SHEET NO. 18017 OF 1 of 2
CALCULATED BY DATE 6/12/19
CHECKED BY DATE
SCALE Tractive Force

Overbank Tractive Force

Ex. e Xsec 3768. FIS 'G'
T = Y4S

100yr depth @ Xsec 3768.57 = 49.3-40.5 = 8.8'-2' = 6.8
10yr depth @ " = 47.4-40.5 = 6.9-2' = 4.9

100yr Slope of EGL = .0074 ft/ft
10yr " " = .004 ft/ft

Low flow depth

$T_{100} = 62.4(.0074)(6.8) = 3.1$ psf

$T_{10} = 62.4(.004)(4.9) = 1.2$ psf

Tractive Force = permissable:

Class 'B' vegetation		2.1
Riprap	6" D_{50}	2.5
Riprap	12" D_{50}	5.0

Type 'L' specified on overbanks 9" D_{50}.
Type 3.5 psf +/-
∴ okay

Proposed tractive force

Low flow channel - Full 2.5' depth
design slope .0025

$T_{LF} = 62.4(.0025)(2.5) = .39$

rock/cobble invert stable flowing full

Required Tractive Force: 100-year

@ XSEC 1: $d_{100} = 8.8'$ $S = .0025$ ft/ft

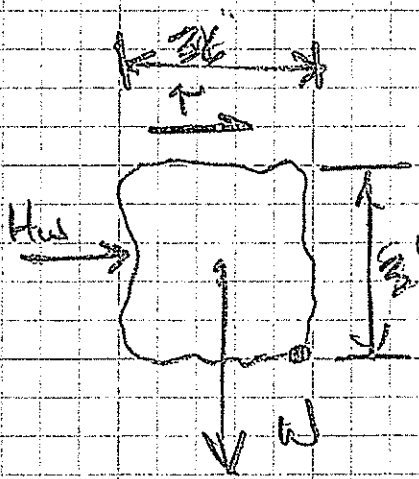
$\tau = 62.4(8.8)(.0025) = 1.37$ psf

Permissible shear stress 6" $D_{75} = 2.5$ psf

2" Gravel = .8 psf

Cobble in invert will be a native 3"-9" cobble. T at least 2.5 psf. w/ 3"-9"

Boulders



W: $\gamma = 130$ pcf

1 ft/ft ∴ W = 1170#

$\tau = 1.37$ psf @ full depth

Use 1.4 #/ft

$H_w = \gamma H$ $H = 8.8 - 1 = 7.8$

$H_w = 62.4$ #/cf $(7.8) = 486$ psf

Overturning: $486(1.5) + 1.4(5) = 736$ ft-#

Resisting: $1170(1.5) = 1755$ ft-#

2.37 FS

DESIGN OF ROADSIDE CHANNELS WITH FLEXIBLE LININGS

Hydraulic Engineering Circular No. 15

Prepared By

Simons, Li & Associates, Inc.
3555 Stanford Road
P.O. Box 1816
Fort Collins, Colorado 80522

For

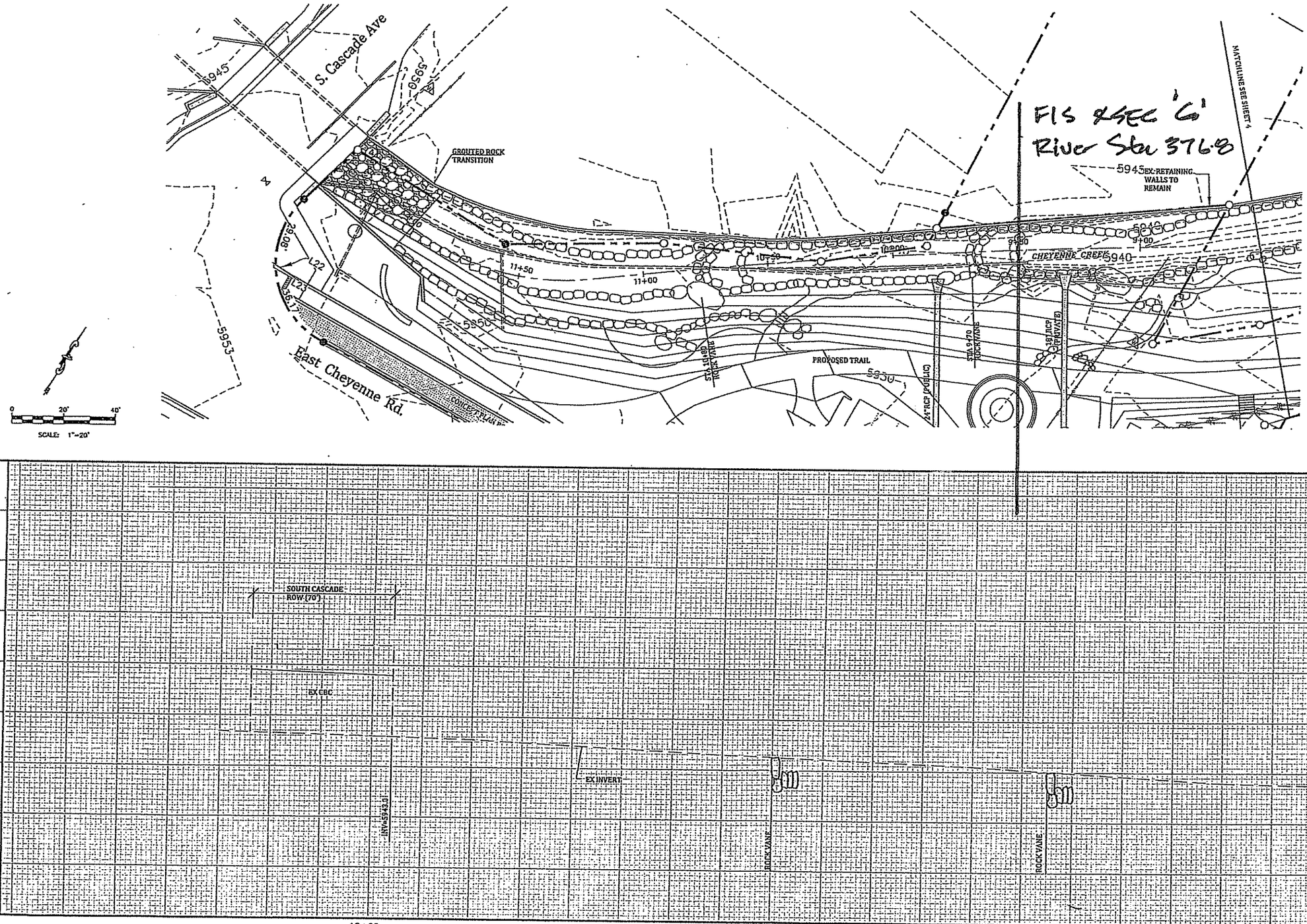
U.S. Department of Transportation
Federal Highway Administration

October 25, 1985

Table 4.1. Permissible Shear Stresses for Lining Materials.

Lining Category	Lining Type	Permissible Unit Shear Stress (lb/ft2)
Temporary	Woven Paper Net	0.15
	Jute Net	0.45
	Fiberglass Roving*	0.75
	Straw and Erosion Net	1.45
	Curled Wood Mat	1.55
	Nylon Mat	2.00
Vegetative	Class A	3.70
	Class B	2.10
	Class C	1.00
	Class D	0.60
	Class E	0.35
Gravel Riprap	1-inch	0.40
	2-inch	0.80
Rock Riprap	6-inch	2.50
	12-inch	5.00

* single and double applications



Computer File Information

Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 633-2868

Structure:	Designer: 6/19
Sheet Subset:	Cadd: 6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

PLAN AND PROFILE

DRAINAGE BASIN: CHEYENNE CREEK

CHEYENNE CREEK
LOWER
FIG XSEC'S G'

HEC-RAS Plan: Multi Profile River: RIVER-1 Reach: Reach-1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	4219.6	100-year	8836.00	5948.50	5958.98	5958.98	5960.36	0.005791	12.08	1793.41	584.43	0.76
Reach-1	4219.6	500-year	24334.00	5948.50	5961.93	5961.93	5963.82	0.007080	16.55	4119.43	1150.72	0.89
Reach-1	4173.32	10-year	2105.00	5948.20	5955.06	5955.06	5955.86	0.005548	8.60	499.03	355.23	0.66
Reach-1	4173.32	50-year	5851.00	5948.20	5956.67	5956.67	5957.65	0.006705	11.40	1254.20	562.07	0.78
Reach-1	4173.32	100-year	8836.00	5948.20	5957.37	5957.37	5958.48	0.007638	13.01	1661.21	606.40	0.85
Reach-1	4173.32	500-year	24334.00	5948.20	5959.83	5959.83	5961.31	0.009178	17.30	3607.31	950.48	0.98
Reach-1	4105.15	10-year	2105.00	5947.10	5953.30	5953.30	5953.91	0.005485	8.16	604.01	429.67	0.63
Reach-1	4105.15	50-year	5851.00	5947.10	5954.51	5954.46	5955.39	0.008374	11.57	1203.98	591.09	0.80
Reach-1	4105.15	100-year	8836.00	5947.10	5955.19	5955.19	5956.16	0.009184	12.94	1641.62	700.58	0.85
Reach-1	4105.15	500-year	24334.00	5947.10	5958.13		5958.98	0.007034	14.25	4373.64	1151.33	0.79
Reach-1	4100.15	10-year	2105.00	5947.10	5953.29	5953.29	5953.85	0.005296	7.95	625.99	441.90	0.61
Reach-1	4100.15	50-year	5851.00	5947.10	5954.51	5954.51	5955.31	0.008070	11.25	1248.17	628.61	0.78
Reach-1	4100.15	100-year	8836.00	5947.10	5955.08	5955.08	5956.05	0.009804	12.98	1628.98	707.45	0.86
Reach-1	4100.15	500-year	24334.00	5947.10	5958.13	5957.15	5958.91	0.006659	13.72	4465.58	1154.30	0.76
Reach-1	4072			Bridge								
Reach-1	4044.76	10-year	2105.00	5946.00	5952.23		5952.41	0.002501	4.82	891.36	495.06	0.43
Reach-1	4044.76	50-year	5851.00	5946.00	5953.87		5954.14	0.002854	6.50	1834.90	651.24	0.49
Reach-1	4044.76	100-year	8836.00	5946.00	5954.74		5955.07	0.002998	7.34	2444.05	714.15	0.51
Reach-1	4044.76	500-year	24334.00	5946.00	5957.79		5958.34	0.003467	10.24	5130.02	1094.60	0.59
Reach-1	4039.76	10-year	2105.00	5946.00	5951.62	5951.62	5952.26	0.004286	7.99	622.60	469.78	0.77
Reach-1	4039.76	50-year	5851.00	5946.00	5952.89	5952.89	5953.90	0.005885	11.55	1277.69	583.05	0.95
Reach-1	4039.76	100-year	8836.00	5946.00	5953.56	5953.56	5954.78	0.006537	13.32	1685.85	637.90	1.02
Reach-1	4039.76	500-year	24334.00	5946.00	5955.68	5955.68	5957.84	0.008929	19.52	3197.02	752.44	1.26
Reach-1	3768.57	10-year	2105.00	5942.30	5947.44	5947.44	5948.06	0.003937	9.08	699.30	453.64	0.75
Reach-1	3768.57	50-year	5851.00	5942.30	5948.64	5948.64	5949.66	0.006388	13.53	1271.17	502.07	1.00
Reach-1	3768.57	100-year	8836.00	5942.30	5949.33	5949.33	5950.57	0.007357	15.67	1627.15	528.93	1.09
Reach-1	3768.57	500-year	24334.00	5942.30	5951.52	5951.52	5953.77	0.010910	23.21	3028.73	706.02	1.39
Reach-1	3329.36	10-year	2105.00	5933.70	5942.42		5942.84	0.002220	5.86	888.44	537.42	0.56
Reach-1	3329.36	50-year	5851.00	5933.70	5943.46	5943.40	5944.45	0.004425	9.90	1297.05	633.59	0.83
Reach-1	3329.36	100-year	8836.00	5933.70	5944.24	5944.24	5945.40	0.004604	11.27	1835.32	742.64	0.87
Reach-1	3329.36	500-year	24334.00	5933.70	5947.10		5948.56	0.004164	14.38	4211.72	949.38	0.89
Reach-1	3324.36	10-year	2105.00	5933.70	5942.43	5941.90	5942.80	0.001988	5.62	759.62	552.72	0.53
Reach-1	3324.36	50-year	5851.00	5933.70	5943.51	5943.33	5944.35	0.003923	9.43	1405.17	650.52	0.78
Reach-1	3324.36	100-year	8836.00	5933.70	5944.14	5944.14	5945.28	0.004815	11.39	1844.87	743.57	0.88
Reach-1	3324.36	500-year	24334.00	5933.70	5947.15	5946.46	5948.46	0.003945	13.99	4352.09	951.52	0.86
Reach-1	3296			Bridge								
Reach-1	3266.63	10-year	2105.00	5933.40	5941.66	5940.66	5941.91	0.002000	4.65	769.94	384.70	0.37
Reach-1	3266.63	50-year	5851.00	5933.40	5942.00	5942.00	5943.34	0.010729	11.24	900.14	397.25	0.86
Reach-1	3266.63	100-year	8836.00	5933.40	5943.15	5943.15	5944.19	0.007808	10.93	1632.36	688.38	0.76
Reach-1	3266.63	500-year	24334.00	5933.40	5947.03	5945.27	5947.66	0.003568	10.12	4956.10	1013.07	0.56
Reach-1	3261.63	10-year	2105.00	5933.40	5940.07	5939.72	5941.52	0.013071	9.70	229.09	240.24	0.89
Reach-1	3261.63	50-year	5851.00	5933.40	5942.00	5942.00	5943.17	0.010690	10.56	924.94	400.45	0.85
Reach-1	3261.63	100-year	8836.00	5933.40	5943.04	5943.04	5944.08	0.008501	10.74	1593.33	695.57	0.78
Reach-1	3261.63	500-year	24334.00	5933.40	5944.37	5944.00	5947.02	0.019542	18.66	2594.12	829.73	1.23
Reach-1	2960.26	10-year	2105.00	5929.00	5935.10	5935.10	5936.46	0.022096	9.36	224.98	83.83	1.01
Reach-1	2960.26	50-year	5851.00	5929.00	5937.36	5937.36	5938.25	0.016118	8.50	919.95	493.48	0.88
Reach-1	2960.26	100-year	8836.00	5929.00	5937.83	5937.83	5939.07	0.019444	10.27	1150.44	500.12	0.98
Reach-1	2960.26	500-year	24334.00	5929.00	5940.11	5940.11	5941.83	0.016030	13.15	2807.53	843.75	0.97
Reach-1	2628.9	10-year	2105.00	5923.50	5931.09		5932.03	0.005798	7.76	270.68	536.44	0.54
Reach-1	2628.9	50-year	5851.00	5923.50	5934.21		5934.56	0.002880	6.68	1966.83	846.81	0.39
Reach-1	2628.9	100-year	8836.00	5923.50	5934.78		5935.22	0.003444	7.88	2460.77	875.41	0.44
Reach-1	2628.9	500-year	24334.00	5923.50	5936.77		5937.57	0.006136	11.89	4491.11	1197.14	0.61
Reach-1	2623.9	10-year	2105.00	5923.50	5931.06	5928.70	5931.99	0.006305	7.76	271.24	559.28	0.56
Reach-1	2623.9	50-year	5851.00	5923.50	5934.21	5933.48	5934.53	0.002569	6.37	2025.35	896.07	0.38
Reach-1	2623.9	100-year	8836.00	5923.50	5934.78	5934.09	5935.19	0.003373	7.62	2552.23	952.40	0.44
Reach-1	2623.9	500-year	24334.00	5923.50	5935.77	5935.72	5937.51	0.005688	11.29	4727.68	1273.70	0.60
Reach-1	2605			Bridge								
Reach-1	2585.85	10-year	2105.00	5922.80	5929.50		5930.72	0.009381	8.86	237.46	403.57	0.67
Reach-1	2585.85	50-year	5851.00	5922.80	5933.22	5933.22	5934.03	0.005573	8.82	1424.26	889.94	0.56
Reach-1	2585.85	100-year	8836.00	5922.80	5933.82	5933.82	5934.66	0.006327	9.86	1958.50	914.35	0.60
Reach-1	2585.85	500-year	24334.00	5922.80	5935.41	5935.41	5936.76	0.010595	14.36	3592.37	1055.00	0.80

E. Cheyenne

G

St. Elmo

Remove

Appendix C
Supporting Information
Subdivision Plat
Cheyenne Creek Conceptual Design, Upper Fountain Creek Watershed
Cheyenne Creek Hydrology Study, LOMR Case No. 15-08-0401P

SOUTH NEVADA CREEKWALK FILING NO. 1

A REPLAT OF A PORTION OF LOTS 6–12, BLOCK 4, TOWN OF IVYWILD;
ALONG WITH LOT 1, BLOCK 5, TOWN OF IVYWILD;
ALONG WITH A PORTION OF LOT 5, BLOCK 9, ADDITION NO. 1 TO IVYWILD
ALONG WITH A PORTION OF LOTS 1–10 OF THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, TOWN OF IVYWILD
ALONG WITH PORTIONS OF VACATED MT. WASHINGTON AVENUE, ST. ELMO COURT, AND ADJACENT ALLEYS
ALL BEING A PORTION OF THE NE1/4 OF THE NW1/4 OF SECTION 30, TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

KNOW ALL MEN BY THESE PRESENTS:

That Creekwalk, LLC, a Colorado Limited Liability Company, and BK-Ivy Manor LLC, a Colorado Limited Liability Company, being the owners of the following described tract of land to wit:

PARCEL A:
THAT PORTION OF LOT 5 IN BLOCK 9 IN ADDITION NO. 1 TO IVYWILD, DESCRIBED AS FOLLOWS:
BEGINNING AT A POINT ON THE WESTERLY LINE OF SAID LOT 5, A DISTANCE OF 47.4 FEET NORTHERLY FROM THE SOUTHWEST CORNER OF SAID LOT 5; THENCE NORTHERLY ALONG THE WESTERLY LINE OF SAID LOT 5, 28.8 FEET; THENCE ANGLE RIGHT 78 DEGREES 00 MINUTES AND RUN EASTERLY 70 FEET TO A POINT, WHICH POINT IS THE NORTHWESTERLY CORNER OF THAT CERTAIN TRACT CONVEYED TO STANLEY P. BALCOMB AND VERA MAE BALCOMB BY WARRANTY DEED RECORDED OCTOBER 7, 1947 IN BOOK 1144 AT PAGE 165 OF THE EL PASO COUNTY RECORDS; THENCE RUN SOUTHEASTERLY ALONG THE WESTERLY LINE OF SAID BALCOMB TRACT, 78.4 FEET, MORE OR LESS, TO THE SOUTHWESTERLY CORNER OF SAID BALCOMB TRACT, WHICH IS THE POINT OF INTERSECTION OF THE NORTHERLY LINE OF CHEYENNE ROAD AND THE NORTHWESTERLY LINE OF MT. WASHINGTON AVENUE; THENCE WESTERLY ALONG THE SOUTH LINE OF SAID LOT 5 TO A POINT 47.4 FEET EAST OF THE SOUTHWEST CORNER OF SAID LOT 5; THENCE NORTHWESTERLY ON A CURVED LINE HAVING A RADIUS OF 33 FEET, A DISTANCE OF 63.4 FEET TO THE POINT OF BEGINNING, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL B:
THAT PORTION OF LOT 8, (FORMERLY LOTS 7 & 8), BLOCK 4, TOWN OF IVYWILD, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO, DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID LOT 8, THENCE NORTH 90° WEST 110 FEET ALONG THE SOUTHERLY LINE OF SAID LOT 8, FOR THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 00° EAST FOR 68 FEET, THENCE NORTH 90° WEST 80.33 FEET, THENCE SOUTH 0° WEST 68 FEET, THENCE SOUTH 90° EAST 81.3 FEET TO THE POINT OF BEGINNING.

PARCEL C:
A PORTION OF LOTS 7 AND 8, BLOCK 4, TOWN OF IVYWILD, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO, NOW DESIGNATED AS LOT 8, BLOCK 4, TOWN OF IVYWILD BY RESOLUTION NO. 78-442, LAND USE-201 RECORDED NOVEMBER 28, 1978 IN BOOK 3113 AT PAGE 650 AND RESOLUTION NO. 78-457, LAND USE-207 RECORDED DECEMBER 8, 1978 IN BOOK 3116 AT PAGE 724 MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHEAST CORNER OF SAID LOT 8;
THENCE N 00 DEGREES 00 MINUTES 00 SECONDS W 110.0 FEET ALONG THE SOUTHERLY LINE OF SAID LOT 8; THENCE N 00 DEGREES 00 MINUTES 00 SECONDS E, 68.00 FEET; THENCE N 90 DEGREES 00 MINUTES 00 SECONDS W, 80.33 FEET; THENCE N 00 DEGREES 38 MINUTES 00 SECONDS E, 13.88 FEET TO A POINT ON THE NORTHWESTERLY LINE OF SAID LOT 8; THENCE N 52 DEGREES 04 MINUTES 33 SECONDS E, ALONG SAID NORTHWESTERLY LINE 72.74 FEET; THENCE N 44 DEGREES 27 MINUTES 00 SECONDS E ALONG THE NORTHWESTERLY LINE OF SAID LOT 8, 144.88 FEET; THENCE N 90 DEGREES 00 MINUTES 00 SECONDS E, ALONG THE NORTH LINE OF SAID LOT 8, 34.10 FEET; THENCE S 00 DEGREES 38 MINUTES 00 SECONDS W, ALONG THE EAST LINE OF SAID LOT 8, 250.00 FEET TO THE POINT OF BEGINNING.

PARCEL D:
THE EAST HALF OF LOT 9, EXCEPT THE NORTH 110 FEET THEREOF, BLOCK 4, TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL E:
LOTS 10 AND 11, BLOCK 4, TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL F:
LOT 12, BLOCK 4, TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL G:
THE NORTH 110 FEET OF THE EAST 30 FEET OF LOT 9, BLOCK 4, TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL H:
LOT 6, BLOCK 4, TOWN OF IVYWILD, ACCORDING TO THE PLAT RECORDED FEBRUARY 11, 1888 IN PLAT BOOK A AT PAGE 113, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL I:
THE SOUTH 150 FEET OF THE WEST 50 FEET OF LOT 9, BLOCK 4, IN THE TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL J:
THE NORTH 100 FEET OF THE WEST 50 FEET OF LOT 9, BLOCK 4, IN THE TOWN OF IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL K:
LOT 1, EXCEPT THE NORTH 60 FEET THEREOF AS MEASURED ON THE WEST LINE THEREOF, BLOCK 5, IVYWILD, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL L:
THE NORTH 80 FEET OF LOT 1, EXCEPT THE WEST 108 FEET THEREOF AS MEASURED ON THE WEST AND NORTH LINES THEREOF, BLOCK 5, IVYWILD, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL M:
THE WEST 108 FEET OF THE NORTH 80 FEET OF LOT 1 AS MEASURED ON THE NORTH AND WEST LINES THEREOF, BLOCK 5, IVYWILD, IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL N:
LOTS 9 AND 10, IN THE AMENDED PLAT OF THE W. H. TERRY'S RESUBDIVISION OF LOTS 4 AND 5, BLOCK 4, IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL O:
LOT 8 AND THE NORTH 10 FEET OF LOT 7, IN THE AMENDED PLAT OF THE W. H. TERRY'S RESUBDIVISION OF LOT 4 & 5, BLOCK 4, IVYWILD, NOW IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL P:
LOT 6, AND THE SOUTH 40 FEET OF LOT 7, IN THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4 IVYWILD, NOW IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL Q:
LOT 5, AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, IVYWILD, NOW IN THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL R:
LOT 4, IN THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, IVYWILD, NOW PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL S:
LOT 3, IN THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL T:
LOT 2, IN THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL U:
LOT 1, IN THE AMENDED PLAT OF W. H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, IVYWILD, NOW A PART OF THE CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

PARCEL V:
THAT PORTION OF LOT 3 IN BLOCK 9 IN ADDITION NO. 1 TO IVYWILD, COUNTY OF EL PASO, STATE OF COLORADO, DESCRIBED AS FOLLOWS:
BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 3; THENCE NORTHERLY ON THE WESTERLY LINE OF SAID LOT, 78 FEET; THENCE ANGLE RIGHT 78 DEGREES 00 MINUTES AND RUN EASTERLY 70 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE ANGLE LEFT 33 DEGREES 02 MINUTES AND RUN NORTHEASTERLY 63.3 FEET; THENCE ANGLE RIGHT AND RUN SOUTHEASTERLY 68.8 FEET, MORE OR LESS, TO A POINT ON THE SOUTHEASTERLY LINE OF SAID LOT 3 WHICH IS 87 FEET NORTHEASTERLY FROM THE POINT OF INTERSECTION OF THE NORTHERLY LINE OF CHEYENNE ROAD AND THE NORTHWESTERLY LINE OF MT. WASHINGTON A VENUE; THENCE SOUTHWESTERLY ALONG THE SOUTHEASTERLY LINE OF SAID LOT 3 A DISTANCE OF 67 FEET TO SAID POINT OF INTERSECTION; THENCE NORTHWESTERLY ON A STRAIGHT LINE 79.4 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

PARCEL Z:
THAT PORTION OF LOT 3 IN BLOCK 9 IN ADDITION NO. 1 TO IVYWILD, DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHWEST CORNER OF SAID LOT 3; THENCE NORTHERLY ON THE WESTERLY LINE OF SAID LOT 78 FEET; THENCE ANGLE RIGHT 78° AND RUN EASTERLY 70 FEET; THENCE ANGLE LEFT 33°02' AND RUN NORTHEASTERLY 63.3 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; SAID POINT BEING THE NORTHEAST CORNER OF THAT CERTAIN TRACT CONVEYED TO STANLEY P. BALCOMB AND VERA MAE BALCOMB BY WARRANTY DEED RECORDED OCTOBER 7, 1947 IN BOOK 1144 AT PAGE 165 OF THE RECORDS OF EL PASO COUNTY, COLORADO; THENCE CONTINUE NORTHEASTERLY ON THE SAME COURSE 63.3 FEET TO THE NORTHWEST CORNER OF THAT CERTAIN TRACT CONVEYED TO KERMIT C. BRUBAKER AND LORENE W. BRUBAKER BY WARRANTY DEED RECORDED IN BOOK 1084 AT PAGE 3 OF SAID RECORDS; THENCE SOUTHEASTERLY ON THE WESTERLY LINE OF SAID BRUBAKER TRACT 52.8 FEET, MORE OR LESS, TO A POINT ON THE NORTHWESTERLY LINE OF MT. WASHINGTON AVENUE, BEING THE SOUTHEASTERLY LINE OF SAID LOT 3; THENCE SOUTHWESTERLY ON THE SOUTHEASTERLY LINE OF SAID LOT 68.31 FEET, MORE OR LESS, TO THE SOUTHEAST CORNER OF SAID BALCOMB TRACT; THENCE NORTHWESTERLY ON THE NORTHEASTERLY LINE OF SAID BALCOMB TRACT 69.8 FEET, MORE OR LESS, TO THE POINT OF BEGINNING, COUNTY OF EL PASO, STATE OF COLORADO.

PARCEL AA:
THAT PORTION OF LOT 5 IN BLOCK 9 IN ADDITION NO. 1 TO IVYWILD, ACCORDING TO THE PLAT THEREOF RECORDED IN PLAT BOOK E AT PAGE 23, DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE NORTH LINE OF SAID LOT 5, 142.5 FEET WEST OF THE NORTHEAST CORNER THEREOF, THENCE SOUTH AT RIGHT ANGLES TO THE NORTH LINE OF SAID LOT, 101.42 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREBY; THENCE CONTINUING SOUTH ON SAID LINE 35 FEET TO THE NORTHERLY LINE OF MT. WASHINGTON AVENUE; THENCE SOUTHWESTERLY ALONG THE NORTHERLY LINE OF MT. WASHINGTON AVENUE 127.1 FEET; THENCE NORTH ON A LINE PARALLEL WITH AND 99 FEET WEST FROM THE FIRST COURSE 76.81 FEET; THENCE ANGLE RIGHT 68 DEGREES 38 MINUTES NORTHEASTERLY 104.2 FEET TO THE PLACE OF BEGINNING; EXCEPT THAT PORTION LYING EAST OF A LINE PARALLEL WITH AND 28 FEET WEST FROM THE EAST LINE THEREOF, ALSO THAT PORTION OF SAID LOT 5 DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE NORTHERLY LINE OF MT. WASHINGTON AVENUE 105.31 FEET NORTHEASTERLY FROM ITS INTERSECTION WITH THE NORTH LINE OF CHEYENNE ROAD, SAID POINT BEING THE SOUTHEASTERLY CORNER OF THAT PORTION OF SAID LOT 5 CONVEYED TO FRANK COTTON BY WARRANTY DEED RECORDED JANUARY 25, 1937 IN BOOK 803 PAGE 470, EL PASO COUNTY RECORDS, AND RUNNING THENCE NORTHWESTERLY AT RIGHT ANGLES TO THE NORTHWESTERLY LINE OF MT. WASHINGTON AVENUE 32.8 FEET, MORE OR LESS, TO THE CENTER OF CHEYENNE CREEK, THENCE NORTHEASTERLY ALONG THE CENTER OF CHEYENNE CREEK 41.25 FEET TO A POINT ON THE EAST LINE OF SAID FRANK COTTON TRACT; THENCE SOUTHERLY ALONG THE EAST LINE OF SAID FRANK COTTON TRACT 87 FEET TO THE PLACE OF BEGINNING, IN THE CITY OF COLORADO SPRINGS, EL PASO COUNTY, COLORADO.

PARCEL AB:
THAT PART OF LOT 3 IN BLOCK 9 IN ADDITION NO. 1 TO IVYWILD, ACCORDING TO THE PLAT THEREOF RECORDED IN PLAT BOOK E AT PAGE 23, IN EL PASO COUNTY, COLORADO, DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE NORTH LINE OF SAID LOT, 142 FEET AND 8 INCHES WEST OF THE NORTHEAST CORNER THEREOF; THENCE WEST ALONG SAID NORTH LINE 98 FEET; THENCE SOUTH AT RIGHT ANGLES 215.66 FEET TO A POINT ON THE NORTHWESTERLY LINE OF MT. WASHINGTON AVENUE; THENCE IN A NORTHEASTERLY DIRECTION ALONG SAID NORTHWESTERLY LINE OF MT. WASHINGTON AVENUE TO A POINT 99 FEET DISTANT AT RIGHTS ANGLES FROM SECOND COURSE; THENCE NORTH TO PLACE OF BEGINNING, EXCEPT THAT PORTION THEREOF CONVEYED TO KERMIT C. BRUBAKER AND LORENE W. BRUBAKER BY WARRANTY DEED RECORDED IN BOOK 1011 AT PAGE 414.

Containing a calculated area of 327,101 square feet or 7.509 acres, more or less.

DEDICATION:

The above owner has caused said tract of land to be surveyed and platted into one (1) tract and six (6) lots, and easements, as shown on the accompanying plat. This tract of land as herein platted shall be known as "SOUTH NEVADA CREEKWALK FILING NO. 1" in the City of Colorado Springs, El Paso County, State of Colorado.

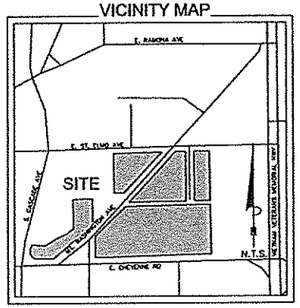
The undersigned does hereby dedicate, grant and convey to the City of Colorado Springs those Public Easements as shown on the plat; and further restricts the use of all Public Easement to the City of Colorado Springs and/or its assigns, provided however, that the sole right and authority to vacate, release or quitclaim all or any such Public Easements shall remain exclusively vested in the City of Colorado Springs.

NOTICE IS HEREBY GIVEN:

That the area included in the plat described herein is subject to the code of the City of Colorado Springs, 2001, as amended.

No building permits shall be issued for building sites within this plat until all required fees have been paid and all required public and private improvements have been installed as specified by the City of Colorado Springs, or alternatively, until acceptable assurances, including but limited to, letters of credit, cash, subdivision bonds or combinations there of guaranteeing the completion of all required public improvements including, but not limited to, drainage, street and erosion control have been placed on file with the City of Colorado Springs.

VICINITY MAP



EASEMENTS:

All easements that are dedicated hereon for public utility purposes shall be subject to those terms and conditions as specified in the instrument recorded at Reception Number 212112548 of the records of El Paso County, Colorado. All other easements or interests of record affecting any of the platted property depicted hereon shall not be effected and shall remain in full force and effect.

All lots and tracts are hereby platted with 5' Public Utility & Drainage Easements, along all side property lines, and 7' Public Utility & Drainage Easements, along all rear property lines, as shown hereon, with the sole responsibility for maintenance is hereby vested with the lot owners.

CITY APPROVAL:

On behalf of the City of Colorado Springs, the undersigned hereby approve for filing the accompanying plat of SOUTH NEVADA CREEKWALK FILING NO. 1.

City Engineer _____ Date

Manager of City Planning _____ Date

City Clerk _____ Date

FEES:

Drainage Fee: _____ School Fee: _____

Bridge Fee: _____ Park Fee: _____

IN WITNESS WHEREOF:

The aforementioned, Creekwalk, LLC, a Colorado Limited Liability Company, has executed this instrument this _____ day of _____, 2019.

By:_____

Name:_____

Title:_____

NOTARIAL:

STATE OF _____ }
COUNTY OF _____ } ss

The foregoing instrument was acknowledged before me this _____ day of _____, 2019 A.D. by _____ as_____, of Creekwalk, LLC, a Colorado Limited Liability Company.

Witness my hand and seal_____

Address _____

_____

My Commission expires _____

IN WITNESS WHEREOF:

The aforementioned, BK-Ivy Manor, a Colorado Limited Liability Company, has executed this instrument this _____ day of _____, 2019.

By:_____

Name:_____

Title:_____

NOTARIAL:

STATE OF _____ }
COUNTY OF _____ } ss

The foregoing instrument was acknowledged before me this _____ day of _____, 2019 A.D. by _____ as_____, of BK-Ivy Manor LLC, a Colorado Limited Liability Company.

Witness my hand and seal_____

Address _____

_____

My Commission expires _____

LIEN HOLDER STATEMENT:

_____ has executed this instrument this ___ day of _____, 20____, A.D., by_____ as _____ of _____, a Colorado, limited liability corporation, for the purpose of joining and consenting to the dedication.

By:_____

Name:_____

Title:_____

NOTARIAL:

STATE OF _____ }
COUNTY OF _____ } ss

The foregoing instrument was acknowledged before me this _____ day of _____, 2019 A.D. by _____ as_____, of Creekwalk, LLC, a Colorado Limited Liability Company.

Witness my hand and seal_____

Address _____

_____

My Commission expires _____

SURVEYOR'S CERTIFICATION:

The undersigned Colorado Registered Professional Land Surveyor does hereby certify that the accompanying plat was surveyed and drawn under his direct responsibility and supervision and to the normal standard of practice by surveyors in the State of Colorado and accurately shows the described tract of land thereof, and that the requirements of Title 38 of the Colorado Revised Statutes, 1973, as amended, have been met to the best of his professional knowledge, belief and opinion.

This statement is neither a warranty nor guarantee, either expressed or implied.

Stewart L. Hopes, Jr.
Colorado Professional Land Surveyor No. 38243
For and on behalf of Clark Land Surveying, Inc.

RECORDING:

STATE OF COLORADO }
COUNTY OF EL PASO } ss

I hereby certify that this instrument was filed for record in my office at _____ o'clock ____M., this _____ day of _____, 2019, A.D., and is duly recorded under Reception No._____ of the records of El Paso County, Colorado.

SURCHARGE: _____ CHUCK BROERMAN, RECORDER

FEE: _____ By: _____ Deputy

AR FP 18-00833

Clark Land Surveying, Inc.
172 S. Tiffany Dr., Unit 1 ● Pueblo West, CO 81007 ● 719.582.1270
www.clarkls.com

Revisions			
No.	Description	By	Date
6	Addressed comments	NSB	3/21/2019
5	Added public improvement easement	NSB	2/21/2019
4	Addressed comments	NSB	01/28/2019
8	Addressed comments	LMS	05/30/2019
7	Addressed comments	NSB	04/24/2019

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

SOUTH NEVADA CREEKWALK FILING NO. 1
A PORTION OF THE NE 1/4 OF THE NW 1/4 OF SECTION 30
TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, EL PASO COUNTY, COLORADO

Project No.	180185	Drawn By: NSB	Date: 03/16/2018
		Checked By: SLH	Sheet 1 of 4

SOUTH NEVADA CREEKWALK FILING NO. 1

A REPLAT OF A PORTION OF LOTS 6–12, BLOCK 4, TOWN OF IVYWILD;
ALONG WITH LOT 1, BLOCK 5, TOWN OF IVYWILD;
ALONG WITH A PORTION OF LOT 5, BLOCK 9, ADDITION NO. 1 TO IVYWILD
ALONG WITH A PORTION OF LOTS 1–10 OF THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, TOWN OF IVYWILD
ALONG WITH PORTIONS OF VACATED MT. WASHINGTON AVENUE, ST. ELMO COURT, AND ADJACENT ALLEYS
ALL BEING A PORTION OF THE NE1/4 OF THE NW1/4 OF SECTION 30, TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

AS–SURVEYED LEGAL DESCRIPTION:

A portion of those parcels conveyed by deed under Reception Numbers: 218048819, 218048820, 218048821, 218078741, 218094906, 218048936, 218094914, 203162086, 218048950, 218048958, and 218048942 of the Official Records of El Paso County, State of Colorado, along with vacated portions of Mt. Washington Avenue, St. Elmo Court and two (2) alleys being 20 feet in width as shown upon the plat of Ivywild recorded at Book A, Page 115 of said Official Records; all lying within the Northwest quarter or Section 30, Township 14 South, Range 66 West of the 6th P.M., County of El Paso, State of Colorado, being more particularly described as follows:

BEGINNING at the Southeast corner of Lot 12, Block 4, as shown upon said Ivywild plat; thence along the North right–of–way line of East Cheyenne Road, S88°50'23"W (Bearings are relative to the South line of Lots 9–12, Block 4, of said Ivywild plat, being monumented at the Southwest corner of Lot 9 by a found No. 4 rebar with a 1–1/4" yellow plastic cap being illegible and at the Southeast corner of Lot 12 by a found No. 5 rebar with 1–1/4" yellow plastic cap stamped "ALESSI PLS 30130", and measured to bear N88°50'23"E, a distance of 400.00 feet), a distance of 400.00 feet to the Southeast corner of Parcel I as described in the Quit Claim Deed recorded under Reception Number 218048820 of said Official Records; thence continuing along said North right–of–way line, S88°43'45"W, a distance of 191.25 feet to the Southwest corner of that parcel as described in the Quit Claim Deed recorded under Reception Number 218048935 of said Official Records; thence continuing along said North right–of–way line, S88°43'08"W, a distance of 211.10 feet to the Southeast corner of Parcel A as described in the Quit Claim Deed recorded under Reception Number 218048819 of said Official Records; thence continuing along said North right–of–line, S88°44'01"W, a distance of 84.16 feet to the Southwest corner of said Parcel A; thence transitioning to the East right–of–way line of South Cascade Avenue along the arc of a curve to the right having a radius of 35.00 feet, a central angle of 108°49'10", an arc length of 65.25 feet, and a radial bearing at N00°55'24"W; thence along said East right–of–way line, N16°05'29"E, a distance of 28.85 feet to the Southwest corner of that parcel described in the Warranty Deed recorded under Reception Number 215113548 of said Official Records; thence along the Southerly boundary of said parcel, S88°25'27"E, a distance of 70.00 feet to the Southeast corner of said parcel; thence continuing along the Southeasterly boundary of said parcel the following three (3) courses;

1. N59°02'40"E, a distance of 63.30 feet;
2. N65°57'56"E, a distance of 63.30 feet;
3. N51°06'27"E, a distance of 42.74 feet,

to the most Easterly corner of said parcel; thence continuing along the Easterly boundary of said parcel N01°17'40"W, a distance of 147.51 feet to the Northwest corner of Parcel B as described in the Warranty Deed recorded under Reception Number 203162086 of said Official Records; thence along the South right–of–way line of a twenty (20') foot alley as shown upon said plat of Ivywild, N88°43'28"W, a distance of 98.00 feet, to the Northwest corner of that parcel described in the Warranty Deed recorded under Reception Number 217026808 of said Official Records; thence along the West line of said parcel, S01°18'45"E, a distance of 136.87 feet to the Southwest corner of said parcel; thence along the Southeasterly line of said parcel, N49°45'19"E, a distance of 43.99 feet; thence N43°31'29"E, a distance of 133.67 feet, to the Northeast corner of said parcel; thence along the North line of said parcel, S88°47'35"W, a distance of 32.58 feet; thence leaving said North line, N01°10'21"W, a distance of 221.12 feet to the Northeast corner of Parcel B as described in the Warranty Deed recorded under Reception Number 203162086 of said Official Records; thence along the South right–of–way line of East St. Elmo Avenue, as shown upon said Ivywild plat, N88°49'28"E, a distance of 491.03 feet, to the Northwest corner of that parcel as described in the Warranty Deed recorded under Reception Number 1870137 of said Official Records; thence along the West line of said parcel, S00°34'35"E, a distance of 248.58 feet, to the Southwest corner of said parcel; thence S01°11'22"E, a distance of 20.00 feet, to the Northwest corner of Lot 1, Block 1, as shown upon the plat of Starsmore Subdivision of said Official Records; thence along the West line of said Lot 1, S00°32'54"E, a distance of 250.01 feet, to the Southeast corner of Lot 12, Block 4, as shown upon said plat of Ivywild, and the POINT OF BEGINNING.

Containing 327,101 square feet or 7.509 acres, more or less.

NOTES:

1. This survey does not constitute a title search by Clark Land Surveying, Inc. to determine ownership or easements of record. For all information regarding easements, rights–of–way and title of record, Clark Land Surveying, Inc. relied upon a Title Insurance Policy, prepared by Old Republic National Title Insurance Company, Commitment No. SC55065457–3, effective date March 13, 2018 at 5:00 PM.
2. Bearings are relative to the South line of Lots 9–12, Block 4, as shown upon the "Plat of Ivywild", recorded at Book A, Page 115 of the El Paso County Official Records, being monumented at the West end by a found No. 4 rebar with an illegible 1–1/4" yellow plastic cap, and at the East end by a found No. 5 rebar with 1–1/4" yellow plastic cap, stamped "ALESSI PLS 30130", and measured to bear N88°50'23"E, a distance of 400.00 feet.
3. This property is located within the Regulatory Floodway and Zone AE (special flood hazard area inundated by 100–year flood, base flood elevations determined), as established by FEMA per FIRM panel 08041C0737G, effective date December 7, 2018.
4. Easements and other record documents shown or noted on this survey were examined as to location and purpose and were not examined as to restrictions, exclusions, conditions, obligations, terms, or as to the right to grant the same.
5. The linear units used in this drawing are U.S. Survey Feet.
6. Number of parcels in this subdivision: 1 Tracts and 8 Lots
7. Property is subject to existing leases and tenancies not shown by the public records, if any.
8. Field work for this survey was completed on February 23, 2018.
9. This replat vacates all prior plats of the parcels shown hereon.
10. Tract A will be used for parking, trail access, circulation and landscaping, and will be owned and maintained by the Creekwalk Marketplace Business Improvement District (Rec. No. 216021273), and will be conveyed by a separate instrument. Cheyenne Creek will be privately owned and maintained by the Creekwalk Business Improvement District.
11. This property is exempt from a Geological Hazard Investigation per the exemption letter completed by CTL Thompson, Inc. dated October 23, 2017.
12. The City of Colorado Springs Ordinance No. 18–130 reserves public access easements, public utility easements, and public improvement easements over all vacated rights–of–way shown upon this plat.
13. Properties are subject to the South Nevada Avenue Area Urban Renewal Plan as evidenced by Resolution No. 120–15, recorded December 08, 2015 under Reception No. 215131841. (Located on subject property, and is shown hereon.)
14. Properties are subject to easements, conditions, covenants, restrictions, reservations and notes on the plat of Ivywild recorded February 11, 1888 in Book A at Page 115. (Blanket in nature.)
15. Properties are subject to rights of upper and lower riparian owners in and to the free and unobstructed flow of the water of Cheyenne Creek as the same courses through the subject property, without diminution. (Blanket in nature.)
16. Properties are subject to easements, conditions, covenants, restrictions, reservations and notes on the plat of Addition No. 1 to Ivywild recorded June 21, 1890 in Book E at Page 23. (Blanket in nature.)
17. Parcel A is subject to terms, conditions, provisions, burdens, obligations and easements as set forth and granted in right of way for sewage purposes recorded October 02, 1948 in Book 1168 at Pages 605 and 606.
18. Parcel A is subject to terms, conditions, provisions, burdens, obligations and easements as set forth and granted in grant of easement to the City of Colorado Springs recorded June 30, 1987 in Book 5388 at Page 332.
19. Parcel B is subject to terms, conditions and provisions of resolution recorded September 12, 1872 in Book 2522 at Page 321. (Blanket in nature.)
20. Parcel C is subject to terms, conditions and provisions of Resolution No. 78–642, land use 201 recorded November 28, 1978 in Book 3113 at Page 650 and Resolution No. 78–437, land use 207 recorded December 6, 1978 in Book 3116 at Page 724.
21. Parcels A, B, and C are subject to terms, conditions, provisions, burdens and obligations of agreement recorded October 07, 2009 at Reception No. 209118143.
22. Parcel C is subject to terms, conditions, easements, and provisions contained in agreement recorded October 07, 2009, under Reception No. 209118143.
23. Parcel E is subject to an easement for sewer line, as set forth in various deeds of record, the most recent of which is recorded August 28, 1872 in Book 2518 at Page 275.
24. Parcel F is subject to a right of way easement as granted to the City of Colorado Springs in instrument recorded June 08, 1994, in Book 6461 at Page 783.
25. Parcel H is subject to the effect of parking and access easement deed extinguishing parking easement, recorded June 28, 2004, under Reception No. 204106288.
26. Parcel H is subject to the effect of parking and access easement deed extinguishing parking easement, recorded June 28, 2004, under Reception No. 204106287.
27. Parcel I is subject to the terms, conditions and provisions of time delay for installation of public improvements agreement recorded June 26, 1991 in Book 5853 at Page 734.
28. Parcels K, L, and M are subject to liquor restrictions of record, which contain a forfeiture or reverter clause, which provide that intoxicating liquors shall never be manufactured, sold, or otherwise disposed of as a beverage in any place of public resort in or upon the premises or any part thereof as contained in deeds recorded July 18, 1883 in Book 98 at Page 334, April 8, 1912 in Book 505 at Page 155, September 10, 1938 in Book 949 at Page 181 and March 19, 1947 in Book 1135 at Page 90.
29. Parcels K, L, and M are subject to lease with Ace Coin Washer Co., lessee, as evidenced by memorandum of lease recorded March 18, 1981, in Book 3200 at Page 706.
30. Property is subject to easements, conditions, covenants, restrictions, reservations and notes on the plat of Amended Plat of W.H. Terry's Resubdivision of Lots 4 & 5, Block 4, Ivywild recorded March 28, 1951 under Reception No. 850818 in Book T at Page 38. (Blanket in nature.)
31. Parcel P is subject to lease between B.B Holdings, lessor, and Jetz Service Co., INC., lessee, as shown by memorandum of lease recorded March 04, 2014, under Reception No. 214017778.
32. Parcel P is subject to lease between JEJAK Enterprises LLC, lessor, and Jetz Service Co., INC., lessee, as shown by memorandum of lease recorded April 28, 2014, under Reception No. 214034632.

AR FP 18–00833

Revisions			
No.	Description	By	Date
6	Addressed comments	NSB	3/21/2019
5	Added public improvement easement	NSB	2/21/2019
4	Addressed comments	NSB	1/28/2019
3	Addressed comments	LMS	05/30/2019
2	Addressed comments	NSB	04/24/2019

Clark Land Surveying, Inc.
www.clarkls.com
177 S. Tiffany Dr., Unit 1 • Pueblo West, CO 81007 • 719.582.1270

SOUTH NEVADA CREEKWALK FILING NO. 1
A PORTION OF THE NE 1/4 OF THE NW 1/4 OF SECTION 30 TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M. CITY OF COLORADO SPRINGS, EL PASO COUNTY, COLORADO

Project No. 180185 | Drawn By: NSB | Checked By: SLM | Date: 03/16/2018 | Sheet 2 of 4

SOUTH NEVADA CREEKWALK FILING NO. 1

A REPLAT OF A PORTION OF LOTS 6–12, BLOCK 4, TOWN OF IVYWILD;
ALONG WITH LOT 1, BLOCK 5, TOWN OF IVYWILD;
ALONG WITH A PORTION OF LOT 5, BLOCK 9, ADDITION NO. 1 TO IVYWILD
ALONG WITH A PORTION OF LOTS 1–10 OF THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, TOWN OF IVYWILD
ALONG WITH PORTIONS OF VACATED MT. WASHINGTON AVENUE, ST. ELMO COURT, AND ADJACENT ALLEYS
ALL BEING A PORTION OF THE NE1/4 OF THE NW1/4 OF SECTION 30, TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

LEGEND

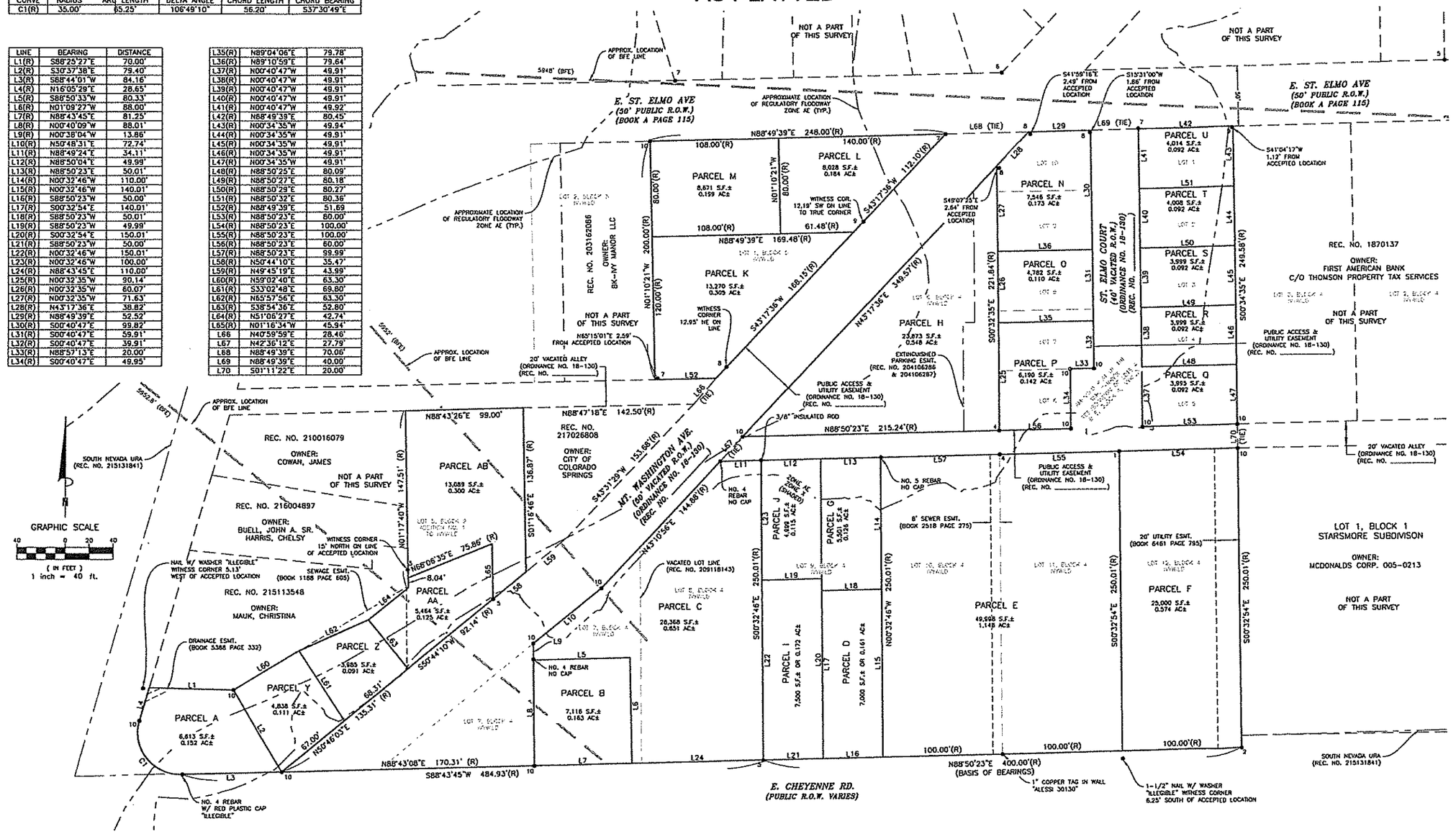
- FOUND MONUMENT (AS NOTED)
- (1) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ILLEGIBLE"
- (2) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ALESSI PLS 30130"
- (3) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "MARIOTH 22373"
- (4) NO. 4 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ALESSI PLS 30130"
- (5) NO. 4 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ILLEGIBLE"
- (6) 1/2" IRON PIPE (NO CAP)
- (7) 1" IRON PIPE (NO CAP)
- (8) 2" IRON PIPE (NO CAP)
- (9) 4" IRON PIPE (NO CAP)
- (10) NO. 5 REBAR W/ 1-1/4" GREEN PLASTIC CAP "PLS 38245"
- FLOODLINE

AS PLATTED

CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD LENGTH	CHORD BEARING
C1(R)	35.00'	65.25'	106°49'10"	56.20'	S37°30'49"E

LINE	BEARING	DISTANCE
L1(R)	S86°25'27"E	70.00'
L2(R)	S30°57'38"E	79.40'
L3(R)	S88°44'01"W	84.16'
L4(R)	N16°05'29"E	28.65'
L5(R)	S86°50'33"W	80.33'
L6(R)	N01°09'27"W	88.00'
L7(R)	N88°43'45"E	81.25'
L8(R)	N00°40'09"W	88.01'
L9(R)	N00°38'04"W	13.86'
L10(R)	N50°48'31"E	72.74'
L11(R)	N88°49'24"E	34.11'
L12(R)	N88°50'04"E	49.99'
L13(R)	N88°50'23"E	50.01'
L14(R)	N00°32'46"W	110.00'
L15(R)	N00°32'46"W	140.01'
L16(R)	S88°50'23"W	50.00'
L17(R)	S00°32'54"E	140.01'
L18(R)	S88°50'23"W	50.01'
L19(R)	S88°50'23"W	49.99'
L20(R)	S00°32'54"E	150.01'
L21(R)	S88°50'23"W	50.00'
L22(R)	N00°32'46"W	150.01'
L23(R)	N00°32'46"W	100.00'
L24(R)	N88°43'45"E	110.00'
L25(R)	N00°32'35"W	90.14'
L26(R)	N00°32'35"W	60.07'
L27(R)	N00°32'35"W	71.63'
L28(R)	N43°17'36"E	38.82'
L29(R)	N88°49'39"E	52.52'
L30(R)	S00°40'47"E	99.82'
L31(R)	S00°40'47"E	59.91'
L32(R)	S00°40'47"E	39.91'
L33(R)	N88°57'13"E	20.00'
L34(R)	S00°40'47"E	49.95'

LINE	BEARING	DISTANCE
L35(R)	N89°04'06"E	79.78'
L36(R)	N89°10'59"E	79.64'
L37(R)	N00°40'47"W	49.91'
L38(R)	N00°40'47"W	49.91'
L39(R)	N00°40'47"W	49.91'
L40(R)	N00°40'47"W	49.91'
L41(R)	N00°40'47"W	49.92'
L42(R)	N68°49'39"E	80.45'
L43(R)	N00°34'35"W	49.94'
L44(R)	N00°34'35"W	49.91'
L45(R)	N00°34'35"W	49.91'
L46(R)	N00°34'35"W	49.91'
L47(R)	N00°34'35"W	49.91'
L48(R)	N88°50'25"E	80.09'
L49(R)	N88°50'27"E	80.18'
L50(R)	N88°50'29"E	80.27'
L51(R)	N88°50'32"E	80.36'
L52(R)	N88°49'39"E	51.69'
L53(R)	N88°50'23"E	80.00'
L54(R)	N88°50'23"E	100.00'
L55(R)	N88°50'23"E	100.00'
L56(R)	N88°50'23"E	60.00'
L57(R)	N88°50'23"E	99.99'
L58(R)	N50°44'10"E	35.47'
L59(R)	N49°45'19"E	43.99'
L60(R)	N59°02'40"E	63.30'
L61(R)	S33°02'48"E	69.80'
L62(R)	N65°57'56"E	63.30'
L63(R)	S38°54'36"E	52.80'
L64(R)	N51°06'27"E	42.74'
L65(R)	N01°16'34"W	45.94'
L66	N40°59'59"E	28.46'
L67	N42°36'12"E	27.79'
L68	N88°49'39"E	70.06'
L69	N88°49'39"E	40.00'
L70	S01°11'22"E	20.00'



AR FP 18-00833

Clark Land Surveying, Inc.
177 S. Tiffany Dr., Unit 1 • Pueblo West, CO 81007 • 719.582.1270
www.clarkls.com

Revisions			
No.	Description	By	Date
6	Addressed comments	NSB	3/21/2019
5	Added public improvement easement	NSB	2/21/2019
4	Addressed comments	NSB	1/28/2019
8	Addressed comments	LMS	05/30/2019
7	Addressed comments	NSB	04/24/2019

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

SOUTH NEVADA CREEKWALK FILING NO. 1
A PORTION OF THE NE1/4 OF THE NW1/4 OF SECTION 30 TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, EL PASO COUNTY, COLORADO

Project No. 180185
Drawn By: NSB
Checked By: SLM
Date: 03/16/2018
Sheet 3 of 4

SOUTH NEVADA CREEKWALK FILING NO. 1

A REPLAT OF A PORTION OF LOTS 6–12, BLOCK 4, TOWN OF IVYWILD;
ALONG WITH LOT 1, BLOCK 5, TOWN OF IVYWILD;
ALONG WITH A PORTION OF LOT 5, BLOCK 9, ADDITION NO. 1 TO IVYWILD
ALONG WITH A PORTION OF LOTS 1–10 OF THE AMENDED PLAT OF W.H. TERRY'S RESUBDIVISION OF LOTS 4 & 5, BLOCK 4, TOWN OF IVYWILD
ALONG WITH PORTIONS OF VACATED MT. WASHINGTON AVENUE, ST. ELMO COURTY AND ADJACENT ALLEYS
ALL BEING A PORTION OF THE NE1/4 OF THE NW1/4 OF SECTION 30, TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, COUNTY OF EL PASO, STATE OF COLORADO

AS REPLATTED

LEGEND

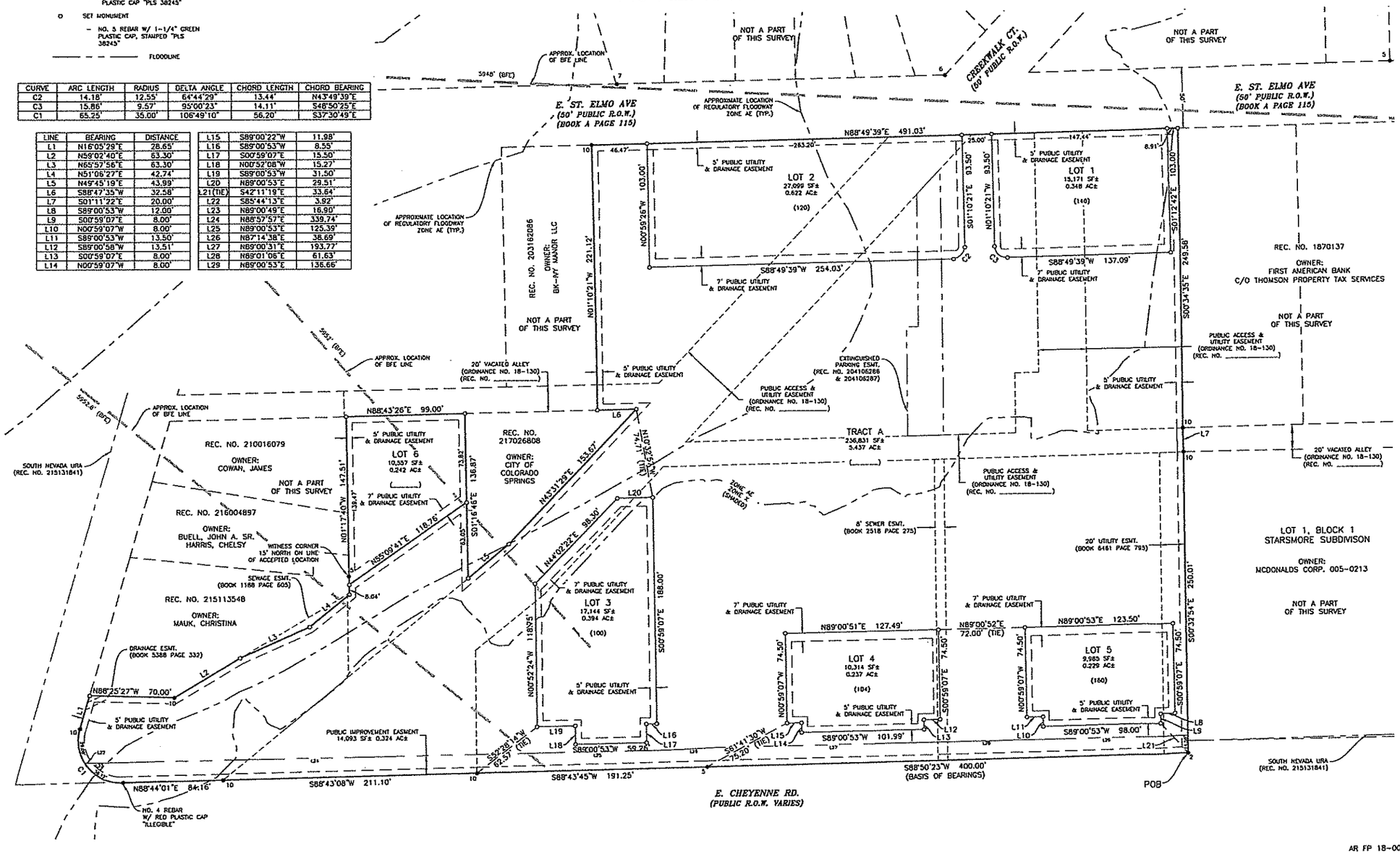
- ● FOUND MONUMENT (AS NOTED)
  - (1) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ILLEGIBLE"
  - (2) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ALESSI PLS 30130"
  - (3) NO. 5 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "MAROTH 22573"
  - (4) NO. 4 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ALESSI PLS 30130"
  - (5) NO. 4 REBAR W/ 1-1/4" YELLOW PLASTIC CAP "ILLEGIBLE"
  - (6) 1/2" IRON PIPE (NO CAP)
  - (7) 1" IRON PIPE (NO CAP)
  - (8) 2" IRON PIPE (NO CAP)
  - (9) 4" IRON PIPE (NO CAP)
  - (10) NO. 5 REBAR W/ 1-1/4" GREEN PLASTIC CAP "PLS 38245"
- ○ SET MONUMENT
  - – NO. 5 REBAR W/ 1-1/4" GREEN PLASTIC CAP, STAMPED "PLS 38245"
- ——— – – – ——— FLOODLINE

CURVE	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD LENGTH	CHORD BEARING
C2	14.18'	12.55'	64°44'29"	13.44'	N43°49'39"E
C3	15.86'	9.57'	95°00'23"	14.11'	S48°50'25"E
C1	65.25'	35.00'	106°49'10"	56.20'	S37°30'49"E

LINE	BEARING	DISTANCE
L1	N16°05'29"E	28.65'
L2	N59°02'40"E	63.30'
L3	N65°57'56"E	63.30'
L4	N51°06'27"E	42.74'
L5	N49°45'19"E	43.99'
L6	S88°47'35"W	32.58'
L7	S01°11'22"E	20.00'
L8	S89°00'53"W	12.00'
L9	S00°59'07"E	8.00'
L10	N00°59'07"W	8.00'
L11	S89°00'53"W	13.50'
L12	S89°00'58"W	13.51'
L13	S00°59'07"E	8.00'
L14	N00°59'07"W	8.00'

LINE	BEARING	DISTANCE
L15	S89°00'22"W	11.98'
L16	S89°00'53"W	8.55'
L17	S00°59'07"E	15.50'
L18	N00°52'08"W	15.27'
L19	S89°00'53"W	31.50'
L20	N89°00'53"E	29.51'
L21(TIE)	S42°11'19"E	33.64'
L22	S85°44'13"E	3.92'
L23	N89°00'49"E	16.90'
L24	N88°57'57"E	339.74'
L25	N89°00'53"E	125.39'
L26	N87°14'38"E	38.69'
L27	N89°00'31"E	193.77'
L28	N89°01'06"E	61.63'
L29	N89°00'53"E	136.66'

GRAPHIC SCALE
40 0 20 40
(IN FEET)
1 inch = 40 ft.



No.	Revisions Description	By	Date
6	Addressed comments	NSB	3/21/2019
5	Added public improvement easement	NSB	2/21/2019
4	Addressed comments	NSB	1/28/2019
3		LMS	05/30/2019
8	Addressed comments	NSB	04/24/2019
7	Addressed comments		

Clark-Land Surveying, Inc.
www.clarkls.com
177 S. Tiffany Dr., Unit 1 ● Pueblo West, CO 81007 ● 719.582.1270

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you discover such defect. In no event may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon.

SOUTH NEVADA CREEKWALK FILING NO. 1
A PORTION OF THE NE 1/4 OF THE NW 1/4 OF SECTION 30 TOWNSHIP 14 SOUTH, RANGE 66 WEST OF THE 6TH P.M.
CITY OF COLORADO SPRINGS, EL PASO COUNTY, COLORADO

Project No. 180185
Drawn By: NSB
Checked By: SLM
Date: 03/16/2018
Sheet 4 of 4

AR FP 18-00833

DRAFT

Sheet 6 of 6

CC-P40 thru CC-P48

Cheyenne Creek Conceptual Plan
El Paso County, CO

0 150 300 Feet

Legend

- Wastewater Line
- Water Line
- Gas Line
- Underground Electric
- County Boundary
- City/Town
- Stream Centerline
- 100-yr Simulated Flood Zone
- Bridge
- Existing Drop Structure
- Hydraulic Model Cross Sections
- Subbasin

Ownership
- Private
- Public

Identified Projects
- Planned Project
- Immediate Repsone Project
- Previously Repaired
- Proposed Drop Structure
- Detention Basin
- Cut Banks

Reach Alternatives
- Protect In Place
- Small Drop Structures w/ Toe Protection

Index Map

CC-P41: Cheyenne Road
EX Size: 5.4ft (H) X 22ft (W) Bridge
PR Size:
Notes: Fail - Overtops, Does Not Meet Freeboard Criteria.

Cascade Ave
EX Size: 5.95ft (H) X 12ft (W) Bridge
Notes:

St. Elmo Ave
EX Size: 6ft (H) X 17ft (W) Bridge
Notes:

Navajo St
EX Size: 8.25ft (H) X 19.6ft (W) Bridge
Notes:

CC-P48: South Ramp
EX Size: 3.78ft (H) X 33.3ft (W) Bridge
Notes: Backwater Flooding

North Ramp
EX Size: 8.56ft (H) X 35ft (W) Bridge
Notes:

CC-P42
Field Identified 7' Cut Bank Requires Immediate Response

CC-P44
Trash and Debris Along South Side of Bank

CC-P45: Brookside St
EX Size: 7ft (H) X 10.6ft (W) Bridge
Notes: Backwater Flooding

Field Identified Existing Rock Drop Structure Stable

CC-P51
Field Identified Eroding Bank Requires Stabilization

CC-P47
Field Identified 6' Cutbank Requires Stabilization

Ramona Ave
EX Size: 7ft (H) X 30ft (W) Bridge
Notes:

CC-P43
Field Identified Headcut Requires Immediate Response

Arvada St
EX Size: 6.46ft (H) X 24.535ft (W) Bridge
Notes:

CC-P46
Field Identified Existing Rock Drop Structure Requires Monitoring

CC-P49
Field Identified Existing Parking Lot Runoff Detention Basins Require Rehabilitation

CC-P50
Field Identified Eroding Bank Requires Stabilization

CC-P52
Field Identified Existing Rock Drop Structure Requires Monitoring

Interstate 25
EX Size: 34.46ft (H) X 918.98ft (W) Bridge
Notes:

EL PASO COUNTY

Matrix DESIGN GROUP

Fountain Creek Watershed Flood Control & Greenway District

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

FILE: G:\gis_projects\UFC and CC\active\apps\Mapbook\CC_ConceptualPlan_Mapbook_20150424.mxd, 4/24/2015, jeff_donts

CHEYENNE CREEK

Hydrology Report

Prepared for:
City of Colorado Springs
30 South Nevada Avenue
Colorado Springs, Colorado 80903

Prepared by:
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

September 4, 2008

HEC-HMS 100-year Summary Output - w/ 6hr rainfall

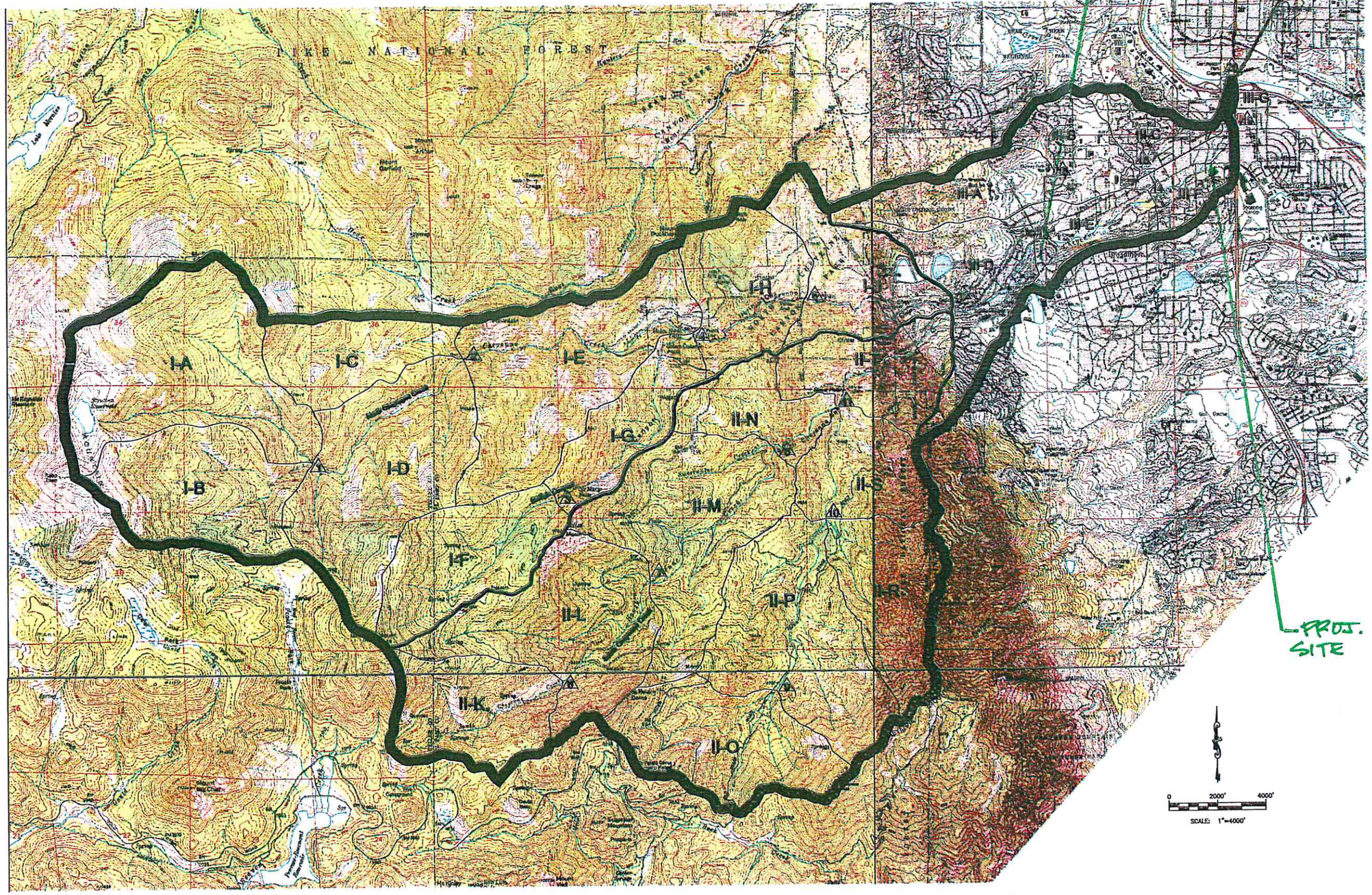
Cheyenne Creek

95% areal reduction factor

Hydrologic Element	Drainage Area (sq.mi.)	Peak Discharge (cfs)	Time of Peak	Volume (acft)
1-A	2.02	1,526	01Jan2000, 01:47	99
1-B	1.27	1,236	01Jan2000, 01:40	59
1-C	0.80	235	01Jan2000, 01:44	18
1-D	1.83	544	01Jan2000, 01:55	53
1-E	1.89	835	01Jan2000, 01:55	76
1-F	1.06	491	01Jan2000, 01:43	31
1-G	0.71	238	01Jan2000, 01:48	19
1-H	0.96	588	01Jan2000, 01:41	33
1-J	0.94	261	01Jan2000, 01:56	27
2-K	0.97	817	01Jan2000, 01:40	40
2-L	1.56	725	01Jan2000, 01:45	50
2-M	1.71	353	01Jan2000, 01:52	36
2-N	0.60	145	01Jan2000, 01:45	12
2-O	1.24	477	01Jan2000, 01:41	29
2-P	1.68	231	01Jan2000, 01:49	25
2-R	0.92	150	01Jan2000, 01:44	14
2-S	0.75	296	01Jan2000, 01:39	17
2-T	0.84	361	01Jan2000, 01:44	25
3-A	0.65	153	01Jan2000, 01:56	16
3-B	0.54	781	01Jan2000, 01:45	43
3-C	0.34	398	01Jan2000, 01:48	25
3-D	0.89	61	01Jan2000, 02:06	10
3-E	0.47	74	01Jan2000, 02:02	9
3-F	0.35	311	01Jan2000, 01:46	19
3-G	0.02	128	01Jan2000, 01:34	3
J1	3.29	2,589	01Jan2000, 01:43	158
J10	3.84	844	01Jan2000, 01:47	68
J11	9.43	2,962	01Jan2000, 01:50	222
J12	21.75	8,339	01Jan2000, 01:56	661
J12N	11.48	5,284	01Jan2000, 01:57	415
J12S	10.27	3,199	01Jan2000, 01:53	247
J13	22.64	8,373	01Jan2000, 02:01	671
J14	23.11	8,402	01Jan2000, 02:08	681
J15	0.65	153	01Jan2000, 01:56	16
J16	1.19	781	01Jan2000, 01:45	59
J19	24.99	8,952	01Jan2000, 02:13	784
J2	5.92	3,265	01Jan2000, 01:47	229
J20	25.01	8,836	01Jan2000, 02:18	787
J3	1.06	491	01Jan2000, 01:43	31
J4	9.58	4,748	01Jan2000, 01:52	355
J5	10.54	5,032	01Jan2000, 01:54	388
J6	0.97	817	01Jan2000, 01:40	40
J7	2.53	1,530	01Jan2000, 01:44	90
J8	4.24	1,866	01Jan2000, 01:49	126
J9	1.24	477	01Jan2000, 01:41	29
R1D	3.29	2,585	01Jan2000, 01:47	158
R1E	5.92	3,264	01Jan2000, 01:52	229
R1G	1.06	490	01Jan2000, 01:48	31
R1H	9.58	4,744	01Jan2000, 01:54	355
R1J	10.54	5,023	01Jan2000, 01:57	388
R2L	0.97	815	01Jan2000, 01:43	40
R2M	2.53	1,525	01Jan2000, 01:49	90
R2N	4.24	1,863	01Jan2000, 01:51	126
R2P	1.24	476	01Jan2000, 01:47	29
R2S	3.84	843	01Jan2000, 01:50	68
R2T	9.43	2,957	01Jan2000, 01:54	222
R3B	0.65	153	01Jan2000, 02:15	16
R3C	1.19	777	01Jan2000, 01:55	59
R3D	21.75	8,314	01Jan2000, 02:01	661
R3E	22.64	8,332	01Jan2000, 02:08	671
R3F	23.11	8,349	01Jan2000, 02:13	681
R3G	24.99	8,832	01Jan2000, 02:18	784

EVANS

UPSTREAM PROJ. SITE



Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

CHEYENNE CREEK HYDROLOGY STUDY

BASIN MAP

CITY OF COLORADO SPRINGS, COLORADO

Project No.:	08069
Date:	SEP 4, 2008
Design:	
Drawn:	BJW
Check:	
Revisions:	

FIGURE 3

Appendix D

Permitting

Variance Request
USACOE Nationwide 27 Permit
FDR Checklist

Kiowa
Engineering Corporation

June 20, 2019

Mr. Jonathan Scherer
City of Colorado Springs
Water Resources Engineering
30 South Nevada Suite 401
Colorado Springs, Colorado 80903

RE: South Nevada Creekwalk Filing No. 1, Variance Request, Colorado Springs, Colorado (Kiowa Project No. 18012)

Dear Jonathan:

The purpose of this letter is to request a variance from certain sections City of Colorado Springs Drainage Criteria Manual (DCM), Volumes 1 and 2. Per the DCM variance requests are to be made early on in the planning for site development. Having resubmitted the Preliminary Drainage Report for Creekwalk North and South and addressing the City's most current comments, it is now appropriate to request the City's review of the variance request associated with the drainage infrastructure at the site. This request is specific to the South Nevada Creekwalk Filing No. 1 that is presently in the development plan stage. A vicinity map has been attached to this request.

Background: the Creekwalk North and South Concept Plan (CPC C 18-00097), is currently under review by the City Planning Department and is close to gaining approval. As development of the Creekwalk North is delayed at this time, only Creekwalk South is being advanced into the development and final platting process. The South Nevada site covers approximately 7 acres. It is proposed to redevelop the property from its current mix of residential and commercial parcels into a single commercial parcel. Mount Washington Avenue will be vacated. The site is impacted by the floodplain of Cheyenne Creek and some of the proposed commercial buildings will have to be elevated to get one foot above the 100-year floodplain. Cheyenne Creek is presently confined between concrete retaining walls for most of the reach which results in very little flood carrying capacity. The drainageway is generally obscured from view by existing structures, overgrown vegetation, trash and debris.

Preliminary Drainage Report (PDR): The PDR prepared in support of the Concept Plan has been submitted for review and approval along with this variance requests. The final drainage report for the South Nevada Creekwalk Filing No. 1 is being prepared at this time and will be submitted pending the outcome of the variance requests. The primary features of the proposed drainage infrastructure for which variances are being requested from the DCM are as follows:

1. Non-standard drainageway design for Cheyenne Creek.
2. Underground detention storage.

Justifications for the issuance of variance request(s) follows for each of the above measures proposed at the site.

Non-standard drainage design for Cheyenne Creek: DCM Chapter 12. Variances from the following section of Chapter 12 are requested:

1604 South 21st Street, Colorado Springs, Colorado 80904
Ph: (719) 630-7342 Fax: (719) 630-0406 www.kiowaengineering.com

Table 12-3:

a. Froude number for 100-year > .8. The Cheyenne Creek 100-year discharge is 8,500 cubic feet per second. Per the hydraulic analysis conducted as part of the Colorado Springs Flood Insurance Study, the 100- year Froude number is 1.09 within the reach subject to stabilization with the Creekwalk project. Since there is no feasible way to confine the 100-year discharge through this reach, there is no way to alter the Froude Number from present conditions. In fact, narrowing of the floodplain would likely increase the Froude number. The low flow as designed does meet the requirements set forth in Table 12-3. A variance from criteria is requested to due to the fact there is insufficient room within the site to be able to convey the 100-year discharge without implementing a hard-lined channel section. Hard lining is inconsistent with section 1.6.1.1 that encourages preservation and/or restoration impacted streams which is what is being proposed in the South Nevada Creekwalk project. To mitigate for the erosive forces associated with the high Froude Number, the typical channel section as proposed will have boulder linings for the length of the project. Boulders will range in size from 24 to 36-inches. Rock vanes will check the invert and maintain the design slope at 0.2 percent. The overbanks will be protected using Type L (9-inch D50), vegetated soil and riprap. Calculations have been conducted showing that the soil/riprap and boulder linings are of adequate size and thickness to withstand the tractive forces for a 100-year event.

It should be pointed out the stabilization measures proposed for the South Nevada Creekwalk site were also identified as the preferred techniques for stream restoration in the Cheyenne Creek Restoration Plan prepared for the City in 2015. The native cobble invert and vegetated overbanks as shown on the design plans is also consistent with the guidelines for the USACOE Nationwide Permit NWP 27 Aquatic Habitat Restoration, Establishment and Enhancement Activities.

Underground Detention Storage: DCM Volume 1, Chapter 3 Section 6.7, Chapter 13 Section 3.13, and DCM Volume 2, Chapter 4 Section 4.0. Variances from the following section of Chapter 13 are requested:

Section 3.1.3: This section of the DCM stipulates that underground detention is prohibited except as may be allowed by a variance. The policy clarification on underground detention systems dated April 12, 2017 states that underground detention is prohibited but may be allowed on a case-by-case basis though the variance process.

a. Various types of detention storage system were examined for the Creekwalk project. A conventional above ground storage BMP with traditional outlet structures and forebay(s) was found to be too large to fit within the site and allow for the drainageway to be restored, accommodate a trail and utility corridor, and provide for adequate parking and driveways. Parking lot storage was examined however it was found that the entire parking area would be inundated to provide for the storage of the 100-year volume (stage 3). Parking lot detention was also judged to represent a greater long-term maintenance burden on the development and could present a hazard to users of the development due to icing in the cold weather months. For these reasons a non-infiltration type underground system was found to be economically feasible, easier to maintain over the long-term, and provide for the desired reduction in suspended sediments. Maintenance of the underground facility(s) will be carried out by accessing each of the storage culverts via manholes. The manhole accesses will allow for vacuum trucks to remove accumulated sediment and debris. Manhole access into the flow control structure will be used to clear debris from the trash rack and/or perforated plate. The required storage in the forebay will be accommodated by depressing the invert of the proposed curb inlet that collects runoff from the parking areas. All routine

and annual maintenance will be the responsibility of the Creekwalk Business Improvement District (BID),

The project will not result in any increase in peak flows to Fountain Creek or cause any negative impacts to the water quality of Fountain Cree over present-day conditions. An Inspection and Maintenance Plan (IM Plan), for the proposed underground storage system(s) will be submitted to the City of Colorado Springs Water Resources Division (WRED), for review and approval prior to the approval of construction plans. The IM plan will outline how the underground systems are to be maintained, including the methods, frequency and documentation of maintenance activities. The Owner will acknowledge as part of gaining approval of the IM plan that the underground system(s) as proposed for the project may require a greater level of operation and maintenance effort as compared to an above ground BMP.

Please let us know if any further justifications or information is necessary to be supplied in support of these variance requests.

Sincerely,
KIOWA ENGINEERING CORPORATION

Richard N. Wray, P.E.
Principal

CC: Jim Houk, Thomas and Thomas
Danny Mientka, Creekwalk LLC

0620rnw1
RNW/rnw

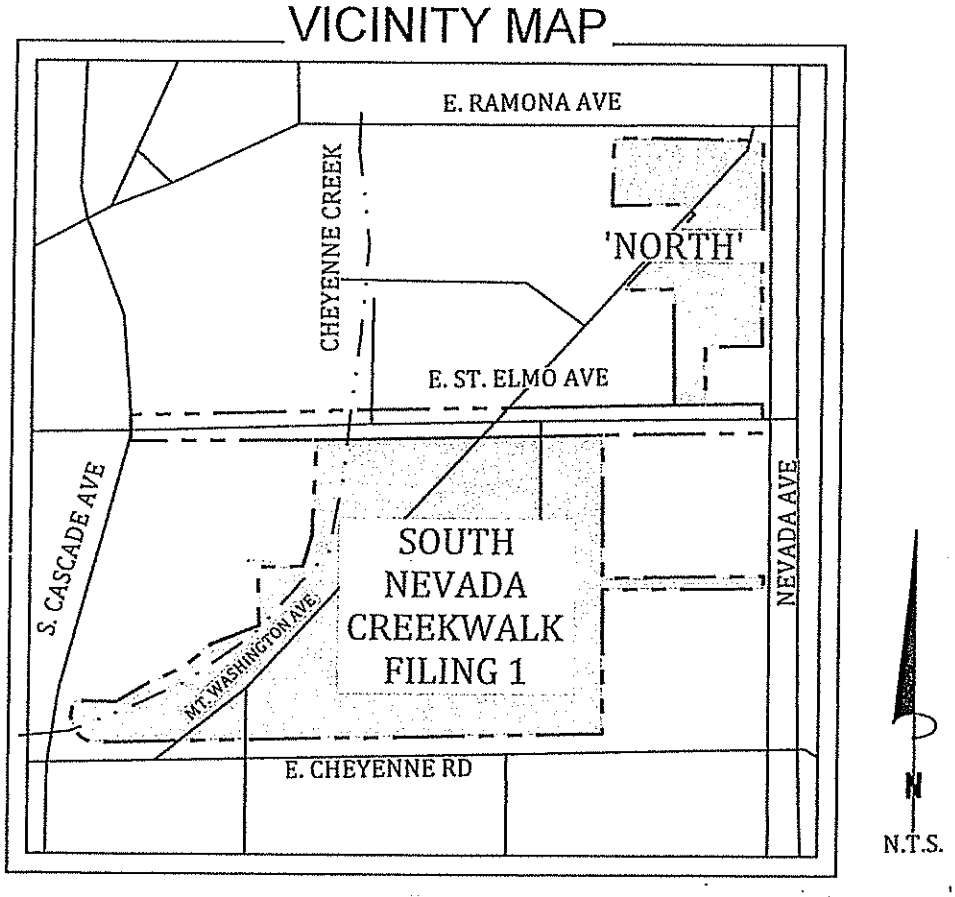


FIGURE 1
CREEKWALK MARKETPLACE

August 2011

GUIDELINES FOR NATIONWIDE PERMIT (NWP) 27 AQUATIC HABITAT RESTORATION, ESTABLISHMENT, & ENHANCEMENT ACTIVITIES IN NEW MEXICO AND TEXAS WITHIN CORPS OF ENGINEERS ALBUQUERQUE DISTRICT

NWP 27 Background

Scope

NWP 27 includes activities in waters of the United States associated with the restoration, enhancement, and establishment wetlands and riparian areas and the restoration and enhancement of streams and other open waters, provided those activities result in net increases in aquatic resource functions and services. Regional conditions may apply within Albuquerque District boundaries in Colorado, New Mexico and Texas. A full summary of the NWP 27 terms and conditions is available at http://www.spa.usace.army.mil/reg/nationwides-new/nationwide%20permits.asp.

NWP 27 Checklist for Applicants

The information below is intended to clarify information specific to requests for authorization under NWP 27. Also refer to the checklist form for information required for a complete Pre-Construction Notification submittal, which can be found at the Regulatory website: www.spa.usace.army.mil/reg.

Purpose

Clearly state the project purpose and objectives for aquatic restoration. A typical purpose description might include induced meandering to address prior channelization, establishing or restoring a wetland, enhancing floodplain functions, and/or enhancing riparian habitat. Ensure that the project purpose and objectives are detailed enough to allow the reviewer to assess how the proposed project fits the requirements of NWP 27. This permit is designed for activities resulting in net increases in aquatic function; all impacts to waters of the United States for NWP 27 should be beneficial and not adverse, and the project purpose should state how this would be achieved.

Existing Conditions

Describe in detail the existing conditions at the project site, as this is the baseline from which restoration efforts will be compared. Include current conditions such as channel form and dimensions (e.g., typical channel cross-sections and longitudinal profile data), watershed size, floodplain condition and function, existing wetland and riparian areas, habitat types, stream substrate, bed load and flow regime. This discussion should also include a description of known impacts (e.g., excessive use by livestock, artificial structures or channelization, road drainage,

etc.) that may have contributed to a degraded condition at the project site. Length of channel prescribed for project activities and the area of potential impact within the ordinary high water mark and/or wetland boundary should also be included. Geo-referenced photographs of existing conditions are required to gauge level of success for restoration efforts.

Reference and Supporting Data

Discuss the approach, e.g., reference wetland or stream reach, used to guide restoration purpose and goals. In many cases, a historical condition is the desired endpoint for restoration efforts. Reference sites and supporting data should typically be derived from a relatively undisturbed reach of the same waterway or desired wetland type within a short distance of the proposed project site. In some instances, historical supporting data, including personal accounts and aerial photos, are used for developing purpose and objectives of restoration. For stream restoration projects, the submittal should clarify if design dimensions are based on reference reach or calculated based on stream and watershed parameters (or a hybrid approach). In either case, the approach should be described in enough detail for the reviewer to understand how the proposed design was derived. Supporting data for wetland restoration projects should include, but is not limited to, soil types, source of hydrology, current and historical photos. All background information used to prescribe restoration efforts with definable goals at the project site should be included.

Monitoring Plan

A Monitoring Plan shall be submitted to the Corps for review and approval prior to commencing the authorized work, and should be included with the pre-construction notification. The monitoring plan should include a description of parameters to be monitored in order to determine if the project is on track to meet the project objectives and if adaptive management is needed. The level of required monitoring should be commensurate with the scale of the proposed restoration project, as well as the potential for risk to the functions and stability of the aquatic environment. Extensive landscape manipulation or reliance on engineered structures will require a more robust monitoring scheme (e.g., for stream restoration projects, the U.S. Forest Service Stream Team assessment protocols or Rosgen level 2 monitoring procedures may be required)..

Monitoring Report

Monitoring reports are documents intended to provide the Corps with information to determine if a project site is successfully meeting its objectives. An annual monitoring report shall be provided to the Corps by November 15 of each year for not less than five years. Should monitoring results indicate there has been a functional lift or, at a minimum, lack of impairment due to the project, a permittee may request to be released from monitoring after the third year.

Remedial and/or adaptive management recommendations to correct deficiencies in project outcomes will be based on information gathered during site inspections and should be included in the monitoring reports.

The annual monitoring report should follow the outline contained in Regulatory Guidance Letter (RGL) 08-03, and at a minimum include the following information:

- A narrative that provides a concise overview of site conditions and functions, with photographic documentation of the baseline conditions (first year only).

- A discussion of peak flows, with focus on spring and monsoon seasons, and the installed structures' response to high flows. This discussion should be cumulative from year to year to enable the reader to obtain an overall understanding of the structures' efficacy since installation.

- Photographs of not less than 3 locations adjacent to structures installed to determine both the efficacy of the structure as well as the encouragement of riparian/wetland vegetation growth. The same locations shall be photographed annually and displayed in the monitoring report. Differences shall be prominently noted, both in the report text and annotated in the photo captions. Submitted photos should be formatted to print on a standard 8 ½" x 11" piece of paper, dated, and clearly labeled with the direction from which the photo was taken. The photo location points should also be identified on the appropriate maps.

- Discussion of any unusual events that might have impacted or may impact the structures or the stream or wetland in the future, such as upstream landslides, unusually large snowpack, large-scale erosion event, drought etc.

- Dates of any recent corrective or maintenance activities conducted since the previous report submission, and specific recommendations for any additional corrective or remedial actions.

The original monitoring period may be extended upon a determination that performance standards have not been met or that the project is not on track to meet them (e.g., high mortality rate of vegetation). Monitoring requirements may also be revised or extended in cases where adaptive management or remediation is required. At any time, should conditions warrant, additional work to increase or repair the structures' efficacy may be required.

City Of Colorado Springs
City Engineering
Drainage Report Checklist

Title/Subdivision Name: South Douglas Creek Wells Filing #1
Prepared by: R Wray
Company: Kiowa Engineering
Date: 6-17-19
Engineering Review Project No: _____

Introduction

The following outline is a compilation of criteria to be used for Final Drainage Report review. MDDP review is very similar and can be done with the following procedures; however a certain level of detail is not required. DBPS review is altogether different and follows formatting and content that is appropriate for that major watershed specifically. This is decided on early in the process with senior EDRD staff and Stormwater Engineering representatives. The following checklist is intended to be a guideline and is not an all inclusive list of report content.

A. Cover Sheet

1. Report type; FDR, MDDP, etc.
2. Subdivision name
3. Prepared for
4. Prepared by
5. Date prepared

B. Statement Sheet

1. Engineer statement/signature block (see DCM I)
2. Developer statement/ signature block (see DCM I)
3. City Engineer signature block (see DCM I)

C. Purpose

1. Type of report and subdivision name
2. State purpose (e.g. – "identify on-site and offsite drainage patterns, storm sewer, culvert and inlet locations, areas tributary to the site, and to safely route developed storm water to adequate outfalls")

D. General Description

1. Subdivision name, acreage and land use
2. Section, township and range ("west of 6th principal meridian")
3. City, County and State
4. Bounded by what developments on all sides (plat names)
5. Number of lots to be platted
6. Is the site in the Streamside Zone, and if so, describe all pertinent issues and compliance

E. Soils Conditions

1. Any pertinent soil discussion
2. Source of soils data (typically NRCS)
3. Hydrologic group (A,B,C or D) used for calculations in this report

F. Drainage Criteria

1. Hydrologic and hydraulic criteria referencing Colorado Springs Drainage Criteria Manual Volume 1 (DCM 1)
2. Hydrologic and hydraulic referencing other criteria such as Urban Drainage Criteria Manual by the Urban Drainage and Flood Control District (UDFCD) of the Denver Metro area
3. Hydrologic and hydraulic criteria per Colorado Department of Transportation (CDOT), usually used for Type "R", "C" and "D" types which vary from the Colorado Springs products
4. Criteria used other than City of Colorado Springs needs to be definitively justified in the narrative
5. Hydrologic methodology must be listed (e.g. – Rational method < 100 acres, NRCS Method > 100 acres, etc.) as well as for what storm recurrence intervals
6. Hydraulic grade line calculation criteria must also be listed (e.g. – Standard method, HEC 22 Energy method, etc.) TO BE PROVIDED WITH PERM. BMP Report + Plans

G. Existing Drainage Conditions

1. List major watershed (e.g. – Sand Creek Basin)
2. List any site improvements (e.g. – grading, swales, utilities, storm drains, etc.)
3. Reference to the existing conditions map Exhibit 1
4. Note vegetation type currently on site
5. General drainage pattern (cardinal direction references) with general slope %'s noted Notes for each SB
6. General drainage information to preface detailed descriptions of certain site attributes listed above (e.g. – swale that runs parallel and adjacent to Maple Street from a 30" RCP...)
7. Specific drainage patterns and hydraulic routing
   a. Some consultants may route their flows by basin as opposed to design point
   b. Basin name, acreage and flow (5 yr and 100 yr min.)
   c. Runoff source (e.g. – "rear of lots 3 and 4") and type (sheet flow or concentrated)
   d. Routing to design points specified and labeled on map
8. Routing of runoff into structures (size, type, condition and material), amount intercepted and flow by (if any)
9. Off-site drainage conditions affecting the site
10. Discussion of prior studies affecting the site

H. Proposed Drainage Conditions

1. Reference to the proposed conditions map
2. General drainage information to preface detailed descriptions of certain site attributes listed above (e.g. – swale that runs parallel and adjacent to Maple Street from a 30" RCP...)
3. Specific drainage patterns and hydraulic routing
   a. Basin name, acreage and flow (5 yr and 100 yr min.)
   b. Runoff source (e.g. – "rear of lots 3 and 4") and type (sheet flow or concentrated)

N/A c. Routing to design points specified and labeled on map

N/A Street capacities (major and minor storm) with street classification noted

✓ Routing of runoff into structures (size, type, condition and material), amount intercepted and flow by (if any)

N/A Emergency overflow routing All collection systems sized for 100 year

N/A Discussion of hydraulic calculations including hydraulic grade line computations. To be provided w/ BMP report + plans

✓ On-site detention requirements discussion with reference to calculations

✓ Discussion regarding compliance or variance with other drainage studies

✓ Public or private maintenance of facilities proposed

✓ Discussion on Four Step Process

I. Water Quality

✓ Statement required specifying criteria used (DCM Volume 2 or other). If other, then definitive reasoning is required to justify its use

✓ What type of facility is proposed underground

✓ Basins contributing to the facility and total acreage (check acreage against total site to verify they are treating the entire site)

✓ Percent impervious listed (composite for site to be included in the calculations which should be referenced in the appendix)

✓ Sized facility information (e.g. – "minimum bottom area of 1450 sf and a minimum volume of 0.25 acre-ft") preliminary plan & profiles provided.

✓ Emergency spillway information (e.g. – "20' broad crested weir which outfalls into the street")

✓ Reference to the design calculations in the appendix

J. Erosion Control Plan

N/A Per DCM Vol. I criteria, an Erosion Control Plan is required to be included with the drainage analysis, however it may be submitted separately as a stand alone construction drawing

N/A If the plan is included, it will need to be in the appendix and a cost estimate in the report text

K. Floodplain Statement

Typically stated as either the following or a variation thereof:

✓ "No portion of the site is located within a 100 year floodplain as determined by the Flood Insurance Rate Map (FIRM) number ###### #### effective date, March 17, 1997 (see appendix)"

✓ If the site is within a floodplain, then the statement must state so

N/A If the development will change the floodplain, then a CLOMR or LOMR may be needed and should be discussed in the narrative

L. Drainage and Bridge Fees

✓ List major watershed

N/A List the current year and the fees associated (fees updated every year by EDRD and approved by City

Council)

3. The fees are derived from the unit price ($/acre) established in the DBPS and the total site platted acreage
4. Some basins have special additional fees associated with them, a review of the basin summary sheet EDRD compiles is appropriate prior to acceptance of the values
5. Fees are due prior to plat recordation and must be stated as such in the report text, typically after the estimate table

M. Construction Cost Opinion

1. Cost opinions are required for private and public facilities
2. A clear distinction needs to be made with regards to what is private and what is public
3. Clearly define what is reimbursable and what is not. Reimbursement is limited to facilities and cost limitations per the D.B.P.S.
4. The table should include a description, quantity, unit price and cost as well as an engineering contingency that should not exceed 10% (per City criteria for drainage reimbursements) and of course a grand total
5. Unit prices should be reviewed for general acceptance only (i.e. – they should be reasonable)

N. Summary

1. Subdivision name [name of development (e.g. – Shops at the Ballpark) if applicable]
2. Statement that site runoff and storm drain and appurtenances will not adversely affect the downstream and surrounding developments
3. Statement that this report and findings is in general conformance with the MDDP or Preliminary Drainage Report or other pertinent studies

Appendices

O. Vicinity Map

1. Show surrounding streets and a label for the site, should show adjacent streets and a few major roadways
2. Site delineated with border shown or border and hatch
3. North arrow and scale reference

P. Soils Map

1. NRCS (or other) map copy or print with soil types (numbered) labeled
2. Site delineated with border shown or border and hatch
3. North arrow and scale reference

Q. FEMA Floodplain Map

1. FIRM map copy or print out (maps can be made on the FEMA web site)
2. Site delineated with border shown or border and hatch
3. North arrow and scale reference
4. FEMA Map number on exhibit, and preferably includes map effective date

R. Hydrologic Calculations

1. Composite runoff coefficients (if applicable)
2. Basin Runoff Summary (individual basins)
   a. Needs to show time of concentration calculations (Tc) for overland and street/channel flow
   b. Intensity values (I) for the applicable design storms (5yr and 100yr minimum)
   c. Discharge (Q) values for the applicable design storms (5yr and 100yr minimum)
3. Surface Routing Summary
   a. Design point references
   b. Contributing basins and/or design points
   c. "CA" equivalents
   d. Maximum Tc
   e. Intensity values
   f. Discharge values
   g. Structure sizes (e.g. – 10' D-10-R sump inlet) or route into feature (e.g. – pond or ditch)

S. Hydraulic Calculations

1. Pipe Routing Summary has same data as Surface Routing Summary except structure would be pipe or feature as listed above
2. Headwater Depth calc sheets or program printouts (if applicable)
3. Hydraulic Grade Line (HGL) calculations - To be provided with permanent BMP plans and report
4. Inlet structure calculations with design point references
5. Channel/ditch/swale calculations

N/A 6. Pipe calculations, at a minimum using "Manning's" formula for open channel flow
N/A 7. Street capacity calculations

T. **Water Quality Calculations**

✓ 1. % impervious calculations (composite) for site
✓ 2. DCM Volume 2 spreadsheet copy or printouts
3. IRF Spreadsheet from UD_BMP

N/A U. **Detention Pond Calculations (if applicable)** – To BE Provided w/Permanent BMP design report

1. Outlet structure input data (orifice, weir, grate, elevation, pipes, etc.)
2. Pond geometry data (contour elevations and areas)
3. Output data (staged flow discharges (i.e. – release rates), water surface elevations for staged discharges, exit flow velocities, storage volumes , etc)

V. **Drainage Maps**

✓ 1. Existing Condition
- ✓ a. Property boundary with label or legend item
- ✓ b. Streets with labels
- ✓ c. Curb and gutter with type noted
- ✓ d. Buildings, parking and landscape areas with labels
- ✓ e. Existing contours
- ✓ f. Lot labels (provided on subdivision plat)
- ✓ g. Storm pipe and structures labeled with size, material and type (and condition if applicable)
- N/A h. Ditches/swales/channels with labels and grades (and cross section identifier if applicable)
- N/A i. Design point identifier
- ✓ j. Basin boundaries with label or legend item
- ✓ k. Adjacent development plat name labels
- ✓ l. Flow arrows
- ✓ m. Basin identifiers
- ✓ n. Basin summary table
- N/A o. Design point summary NO DESIGN POINT
- N/A p. Drainage easements or tracts with labels TRACT 'A' SHOWN
- ✓ q. 100 yr floodplain (if applicable) with label or legend reference
- ✓ r. Discharge values at key locations (typically site inflow and outflow locations minimum)
- N/A s. Off-site basins with labels

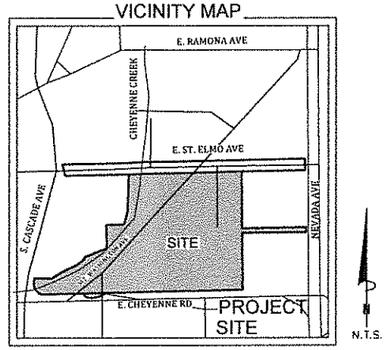
✓ 2. Proposed Conditions (same as for existing conditions with the exception of proposed facilities to include site structures (e.g. – buildings, parking lot, ponds, etc.), storm system and proposed contours

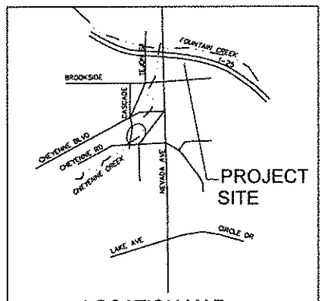
N/A W. Grading and Erosion Control Plan in map pocket (if applicable, see above for more information)

Appendix E
Preliminary Design Plans
Cheyenne Creek Stabilization Design

CHEYENNE CREEK at
SOUTH NEVADA CREEKWALK FILING NO. 1
PRELIMINARY DESIGN PLANS
COLORADO SPRINGS, COLORADO

VICINITY MAP





LOCATION MAP

INDEX OF SHEETS

LEGEND

PROPOSED FIRE HYDRANT	EXISTING FIRE HYDRANT
PROPOSED WATER MAIN	EXISTING WATER MAIN
PROPOSED SANITARY SEWER MAIN	EXISTING SANITARY SEWER MAIN
PROPOSED STORM SEWER	EXISTING STORM SEWER
PROPOSED STORM INLET	EXISTING STORM INLET
ROW/BOUNDARY LINE	EXISTING GAS MAIN
	EXISTING ELECTRIC

ABBREVIATIONS

ASSY	= ASSEMBLY	MIN	= MINIMUM
BNDY	= BOUNDARY	NTS	= NOT TO SCALE
BOP	= BOTTOM OF PIPE	OD	= OUTSIDE DIAMETER
C&G	= CURB & GUTTER	PC	= POINT OF HORIZONTAL CURVATURE
CL	= CENTERLINE	PLBG	= PLUMBING
CO	= CLEAN OUT	POC	= POINT OF CONNECTION
CRA	= CONCRETE REVERSE ANCHOR	PP	= PROPOSED
CR	= POINT OF CURB RETURN	PRC	= POINT OF REVERSE CURVE
CTB	= CONCRETE THRUST BLOCK	PROP	= PROPERTY
DIP	= DUCTILE IRON PIPE	PRT	= PRIVATE
DTL	= DETAIL	PT	= POINT OF HORIZONTAL TANGENCY
EL	= ELEVATION	PVC	= POLY VINYL CHLORIDE PIPE
EOA	= EDGE OF ASPHALT	PVC	= POINT OF VERTICAL CURVATURE
ESMT	= EASEMENT	PVI	= POINT OF VERTICAL INTERSECTION
EX	= EXISTING	PVT	= POINT OF VERTICAL TANGENCY
FC	= FACE OF CURB	R	= RADIUS
FES	= FLARED END SECTION	R	= RIGHT
FLG	= FLANGE	RCP	= REINFORCED CONCRETE PIPE
FL	= FLOWLINE	RD	= ROOF DRAIN (STORM LINE)
FLPI	= FLOWLINE POINT OF INTERSECTION	ROW	= RIGHT OF WAY
GB	= GRADE BREAK	RT	= RIGHT
GI	= GREASE INTERCEPTOR	SHT	= SHEET
GP	= GRADING PLAN	SOI	= SAND OIL INTERCEPTOR
HP	= HIGH POINT	SS	= SANITARY SEWER
HORIZ	= HORIZONTAL	STA	= STATION
HW	= HEADWALL	STD	= STANDARD
HYD	= HYDRANT	TA	= TOP OF ASPHALT
ID	= INSIDE DIAMETER	TB	= THRUST BLOCK
L	= LEFT	TC	= TOP OF CURB
LT	= LEFT	TOA	= TOP OF ASPHALT
LF	= LINEAR FEET	TOC	= TOP OF CONCRETE
LP	= LOW POINT	TOP	= TOP OF PIPE
MAX	= MAXIMUM	TYP	= TYPICAL
MH	= MANHOLE	VC	= VERTICAL CURVE

BENCHMARKS:

PRE-EXCAVATION CHECKLIST

- ☐ GAS AND OTHER UTILITY LINES OF RECORD SHOWN ON PLANS.
- ☐ UTILITIES CENTRAL LOCATING CALLED AT LEAST 2 BUSINESS DAYS AHEAD.
- ☐ UTILITIES LOCATED AND MARKED.
- ☐ EMPLOYEES BRIEFED ON MARKING AND COLOR CODES.*
- ☐ EMPLOYEES TRAINED ON EXCAVATION AND SAFETY PROCEDURES FOR NATURAL GAS LINES.
- ☐ WHEN EXCAVATION APPROACHES GAS LINES, EMPLOYEES EXPOSE LINES BY CAREFUL PROBING AND HAND DIGGING.

*A.G.A./A.P.W.A. STANDARD UTILITY MARKING COLOR CODE

NATURAL GAS	YELLOW	WATER	BLUE
ELECTRIC	RED	WASTEWATER	GREEN

811 Know what's **below.** **Call** before you dig.

JUNE 2019

REVIEW:
STREET DESIGN FOR CITY ENGINEERING:
UTILITY GRADE REVIEW_____ DATE_____
CURB & GUTTER REVIEW_____ DATE_____
FINAL REVIEW_____ DATE_____
DRAINAGE DESIGN_____ DATE_____

This is filed in accordance with section 7.7.906 (Drainage Ordinance) of the code of the City of Colorado Springs, 2001 amended.

DETAILED DRAINAGE CONSTRUCTION PLANS AND SPECIFICATIONS ENGINEERS STATEMENT

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID DETAILED PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE CITY FOR DETAILED DRAINAGE PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH THE MASTER PLAN OF THE DRAINAGE BASIN. SAID DETAILED DRAINAGE PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE DRAINAGE FACILITY(S) IS DESIGNED. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACT, ERRORS, OR OMISSIONS ON MY PART IN PREPARATION OF THE DETAILED DRAINAGE PLANS AND SPECIFICATIONS.

_____ DATE

RICHARD N. WRAY COLORADO P.E. 19310
FOR AND ON BEHALF OF KIOWA ENGINEERING CORP.

Computer File Information

Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

COLORADO SPRINGS

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904, (719) 635-7324

Structure:		Designer:	6/19
Sheet Subset:		Cadd:	6/19
Subset Sheets:		Checker:	6/19

30% CONSTRUCTION PLANS

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

COVER SHEET

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 1 OF 15

STRUCTURAL CONCRETE NOTES:

ALL CONSTRUCTION INVOLVING THE PLACEMENT OF STRUCTURAL CONCRETE SHALL BE COMPLETED IN ACCORDANCE WITH SECTION 600 OF THE CITY OF COLORADO SPRINGS ENGINEERING DIVISION STANDARD SPECIFICATIONS, AND AS SUPPLEMENTED BY THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADWAY AND BRIDGE CONSTRUCTION.

STEEL REINFORCING SHALL BE GRADE 60 FOR ALL REINFORCING STEEL GREATER THAN #4. A TABLE SPECIFYING MINIMUM SPLICE LENGTHS HAS BEEN PROVIDED ON THE STRUCTURAL DETAIL SHEETS. ALL REINFORCING SHALL HAVE A 2-INCH MINIMUM COVER UNLESS OTHERWISE SPECIFIED. ALL REINFORCED STEEL TO BE EPOXY COATED.

CAST-IN-PLACE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (fc) OF 4,000 PSI AT 28 DAYS. ALL CONCRETE PLACED AGAINST SOIL SHALL BE TYPE II OR TYPE V PORTLAND CEMENT. ALL EXPOSED CORNERS SHALL BE FORMED WITH A 3/4" CHAMFER UNLESS OTHERWISE SPECIFIED.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.

BACKFILL AGAINST STRUCTURES SHALL NOT COMMENCE UNTIL ALL SUPPORTING DIAPHRAGMS ARE IN PLACE AND CONCRETE HAS OBTAINED ITS FULL SEVEN DAY STRENGTH. BACKFILL SHALL BE PLACED EQUALLY ON EACH SIDE OF RETAINING WALL STRUCTURES AND CUTOFF WALLS UNTIL THE FINAL GRADE IS REACHED.

FOOTING EXCAVATIONS SHALL BE EXAMINED BY THE GEOTECHNICAL ENGINEER WITH A 24-HOUR MINIMUM NOTIFICATION FOR SOIL AND/OR CONCRETE TESTING. PLACEMENT OF CONCRETE IN THE ABSENCE OF TESTING SHALL BE COMPLETED AT THE SOLE RISK OF THE CONTRACTOR.

ABBREVIATIONS
EC -- EPOXY COATED O.F. -- OUTSIDE FACE E.F. -- EACH FACE
E.W. -- EACH WAY I.F. -- INSIDE FACE N.F. -- NEAR FACE
T.O.C. -- TOP OF CONCRETE B.O.C. -- BOTTOM OF CONCRETE
CONT. -- CONTINUOUS

PRIOR TO THE PLACEMENT OF CONCRETE THE SOIL SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 6-INCHES. THE MOISTURE CONTENT SHALL BE ADJUSTED TO WITHIN PLUS OR MINUS 2 PERCENT OF THE OPTIMUM MOISTURE CONTENT AND RECOMPACTED TO AT LEAST 95 PERCENT RELATIVE COMPACTION (AASHTO-T-180).

GEOTECHNICAL REPORT TITLED " " BY ENTECH

SUMMARY OF APPROXIMATE QUANTITIES

CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	PROJECT TOTALS PLAN	PROJECT TOTALS AS CONST.
1	MOBILIZATION	LS	1	
2	CONSTRUCTION STAKING	LS	1	
3	TRAFFIC CONTROL	LS	1	
4				

SOIL RIPRAP

THE SOIL MATERIAL SHALL BE NATIVE OR TOPSOIL AND MIXED WITH SIXTY FIVE PERCENT (65%) RIPRAP AND THIRTY FIVE PERCENT (35%) SOIL BY VOLUME.

SOIL RIPRAP SHALL CONSIST OF A UNIFORM MIXTURE OF SOIL AND RIPRAP WITHOUT VOIDS.

CONTRACTOR SHALL COOPERATE WITH ENGINEER IN OBTAINING AND PROVIDING SAMPLES OF ALL SPECIFIED MATERIALS.

CONTRACTOR SHALL SUBMIT CERTIFIED LABORATORY TEST CERTIFICATES FOR ALL ITEMS REQUIRED FOR SOIL RIPRAP.

RIPRAP USED SHALL BE THE TYPE DESIGNATED ON THE DRAWINGS AND SHALL CONFORM TO TABLE SHOWN TO THE RIGHT.

THE RIPRAP DESIGNATION AND TOTAL THICKNESS OF RIPRAP SHALL BE AS SHOWN ON THE DRAWINGS. THE MAXIMUM STONE SIZE SHALL NOT LARGER THAN THE THICKNESS OF THE RIPRAP.

NEITHER WIDTH NOR THICKNESS OF A SINGLE STONE OF RIPRAP SHALL BE LESS THAN ONE-THIRD (⅓) OF ITS LENGTH.

THE SPECIFIC GRAVITY OF THE RIPRAP SHALL BE TWO AND ONE-HALF (2.5) OR GREATER.

MINIMUM DENSITY FOR ACCEPTABLE RIPRAP SHALL BE ONE HUNDRED AND SIXTY FIVE (165) POUNDS PER CUBIC FOOT.

RIPRAP SPECIFIC GRAVITY SHALL BE ACCORDING TO THE BULK-SATURATED, SURFACE-DRY BASIS, IN ACCORDANCE WITH AASHTO T85.

THE RIPRAP SHALL HAVE A PERCENTAGE LOSS OF NOT MORE THAN FORTY PERCENT (40%) AFTER FIVE HUNDRED (500) REVOLUTIONS WHEN TESTED IN ACCORDANCE WITH AASHTO T96.

THE RIPRAP SHALL HAVE A PERCENTAGE LOSS OF NOT MORE THAN TEN (10%) AFTER FIVE (5) CYCLES WHEN TESTED IN ACCORDANCE WITH AASHTO T104 FOR LEDGE ROCK USING SODIUM SULFATE.

THE RIPRAP SHALL HAVE A PERCENTAGE LOSS OF NOT MORE THAN TEN PERCENT (10%) AFTER TWELVE (12) CYCLES OF FREEZING AND THAWING WHEN TESTED IN ACCORDANCE WITH AASHTO T103 FOR LEDGE ROCK, PROCEDURE A. ROCK SHALL BE FREE FROM CALCITE INTRUSIONS.

RUBBLE FOR USE AS SOIL/RIPRAP SHALL BE GRADED TO MEET THE EQUIVALENT ROCK RIPRAP GRADATION. RUBBLE PROPOSED FOR USE IN PLACE OF ROCK RIPRAP SHALL BE STOCKPILED FOR OBSERVATION BY THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORK

GRADATION:
A. EACH LOAD OF RIPRAP SHALL BE REASONABLY WELL GRADED FROM THE SMALLEST TO THE LARGEST SIZE SPECIFIED.
B. STONES SMALLER THAN THE TWO TO TEN PERCENT (2%-10%) SIZE WILL NOT BE PERMITTED IN AN AMOUNT EXCEEDING TEN PERCENT (10%) BY WEIGHT OF EACH LOAD.
C. CONTROL OF GRADATION SHALL BE BY VISUAL INSPECTION. HOWEVER IN THE EVENT THE ENGINEER DETERMINES THE RIPRAP TO BE UNACCEPTABLE, THE ENGINEER SHALL PICK TWO (2) RANDOM TRUCKLOADS TO BE DUMPED AND CHECKED FOR GRADATION.
1) MECHANICAL EQUIPMENT AND LABOR NEEDED TO ASSIST IN CHECKING GRADATION SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST.

BROKEN ASPHALT PAVEMENT SHALL NOT BE ACCEPTABLE FOR USE IN THE WORK.

ROUNDED RIPRAP (RIVER ROCK) IS NOT ACCEPTABLE, UNLESS SPECIFICALLY DESIGNATED ON THE DRAWINGS.

CLASSIFICATION AND GRADATION OF RIPRAP

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	d50* (INCHES)
TYPE VL	70-100	12	
	50-70	9	
	35-50	6	6**
	2-10	2	
TYPE L	70-100	15	
	50-70	12	
	35-50	9	9**
	2-10	3	
TYPE M	70-100	21	
	50-70	18	
	35-50	12	12**
	2-10	4	
TYPE H	100	21	
	50-70	24	
	35-50	18	18
	2-10	6	
TYPE VH	100	42	
	50-70	33	
	35-50	24	24
	2-10	9	

* d50=MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.
** MIX VL, L AND M RIPRAP WITH 35% TOPSOIL (BY VOLUME) AND BURY WITH 4-6 INCHES OF TOPSOIL. ALL VIBRATION COMPACTED & REVEGETATE.
(TABLE MO-7: CLASSIFICATION AND GRADATION OF ORDINARY RIPRAP. UDFCD, DRAINAGE CRITERIA MANUAL, VOL. 1)

CLASSIFICATION OF BOULDERS

BOULDER CLASSIFICATION	NOMINAL SIZE AND RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS
B24	24 [22-26]	2.00 [44"-52" MAX.]
B30	30 [28-32]	2.00 [56"-64" MAX.]
B36	36 [34-38]	1.75 [60"-67" MAX.]
B42	42 [40-44]	1.65 [66"-73" MAX.]
B48	48 [45-51+]	1.50 [68"-77" MAX.]

(TABLE MO-8: CLASSIFICATION OF BOULDERS, UDFCD, DRAINAGE CRITERIA MANUAL, VOL. 1)

Computer File Information

Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A
BENCHMARK: FIMS MONUMENT NUMBER F_69.
ELEV.=6975.73 (NAVD 29)

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

COLORADO SPRINGS

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 635-7342

Structure:	Designer: RNW	Date: 6/18
Sheet Subset:	Codd: EAK	Date: 6/18
Subset Sheets:	Checker: RNW	Date: 6/18

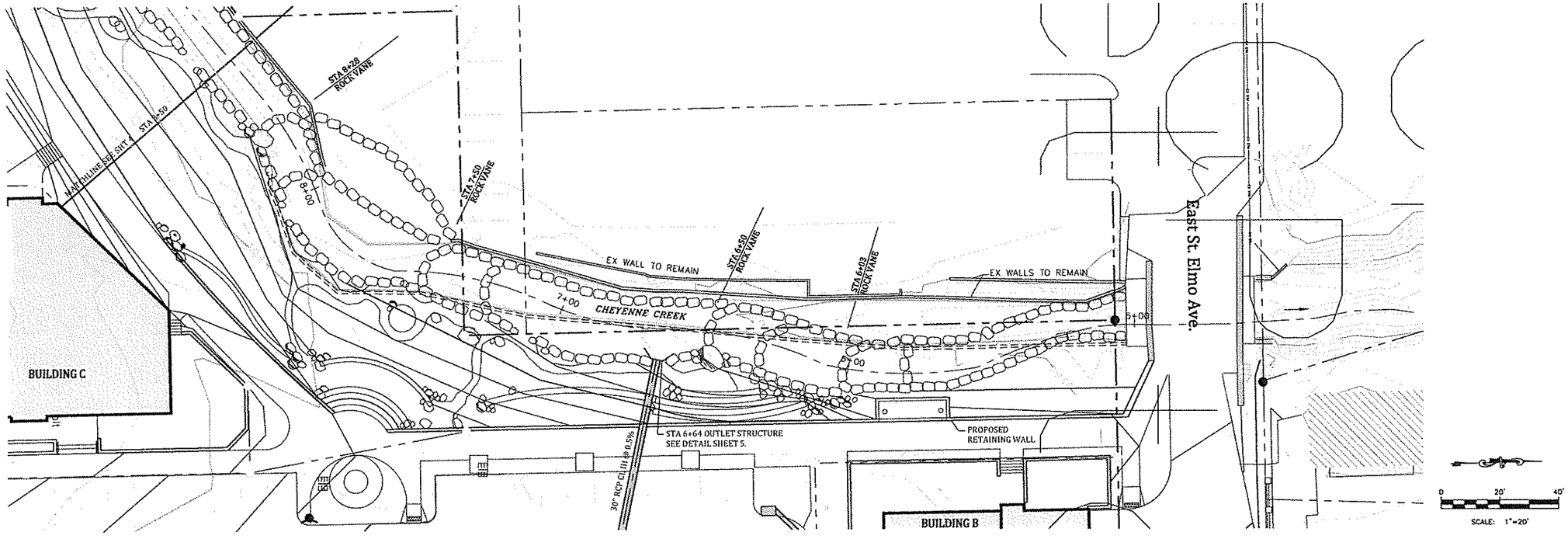
PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

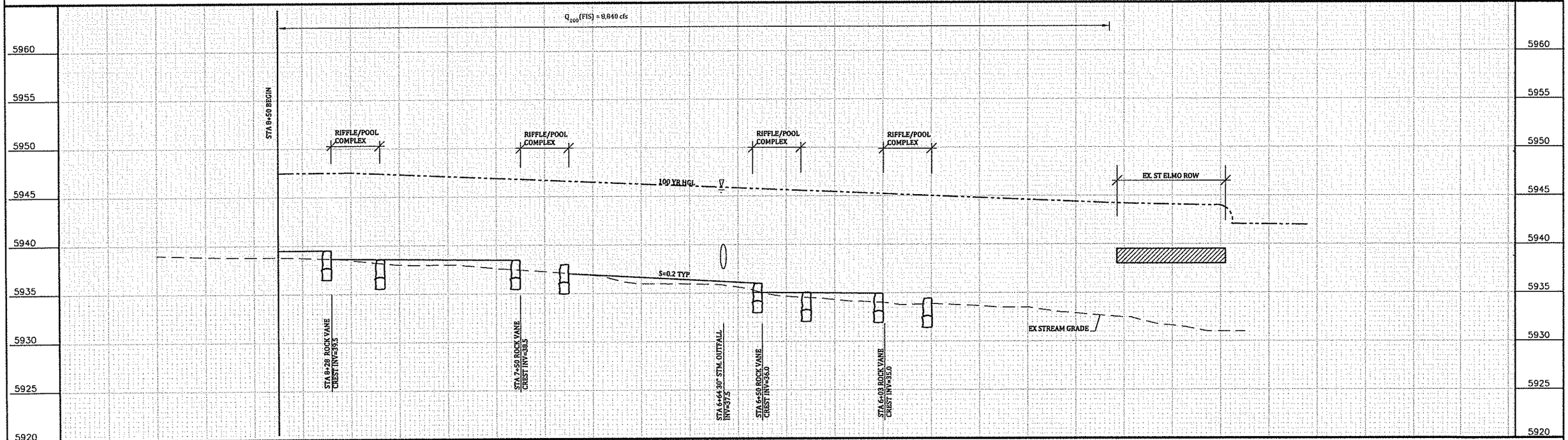
NOTES AND SUMMARY OF QUANTITIES

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 2 OF 15

18012 SH 1-2-3-4.dwg/Jun 18, 2019





Computer File Information

Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:	Designer: 6/19
Sheet Subset:	Codd: 6/19
Subset Sheets:	Checker: 6/19

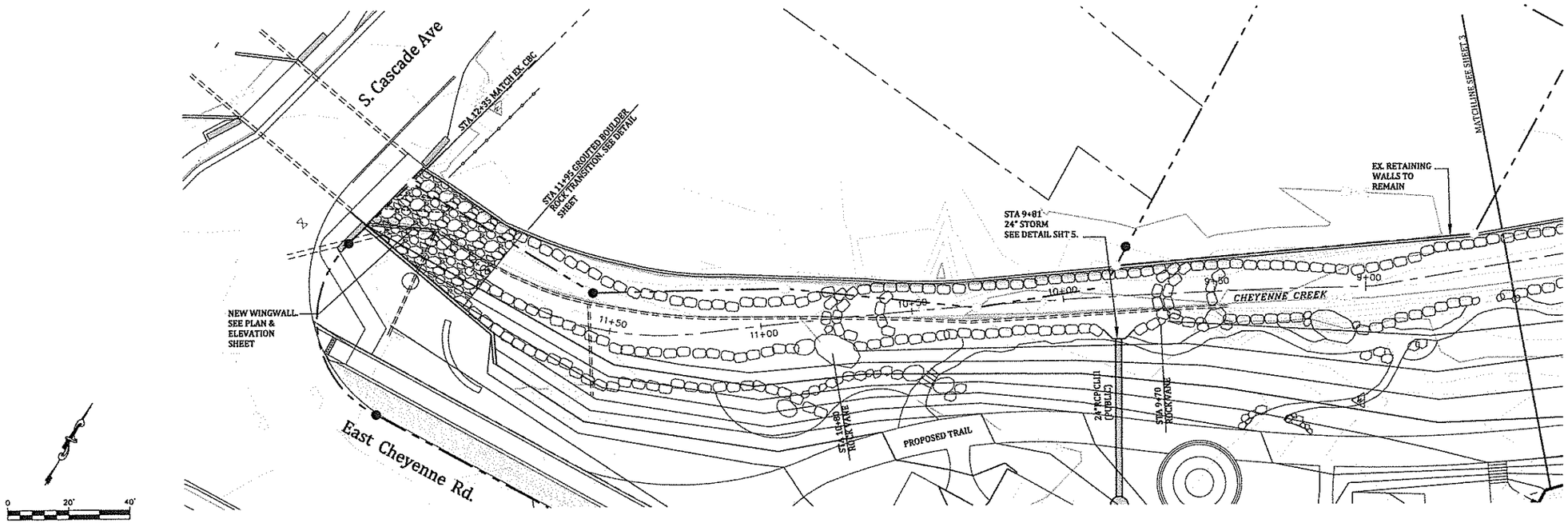
Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 633-2868

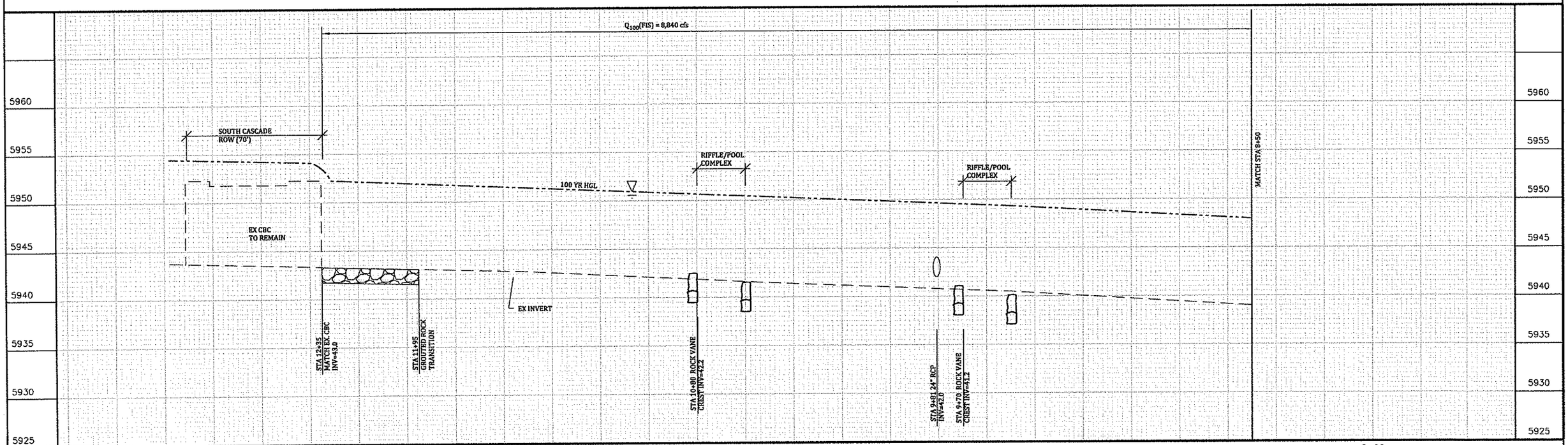
PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

PLAN AND PROFILE

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 3 OF 12





Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 520-7462

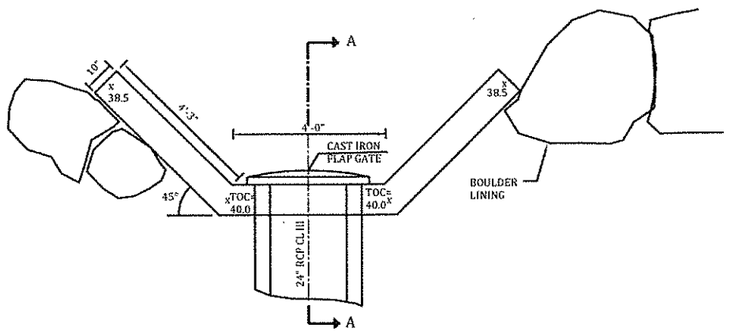
Structure:	Designer: 6/19
Sheet Subset:	Cadd: 6/19
Subset Sheets:	Checker: 6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

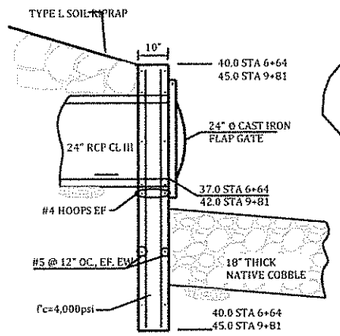
PLAN AND PROFILE

DRAINAGE BASIN: CHEYENNE CREEK

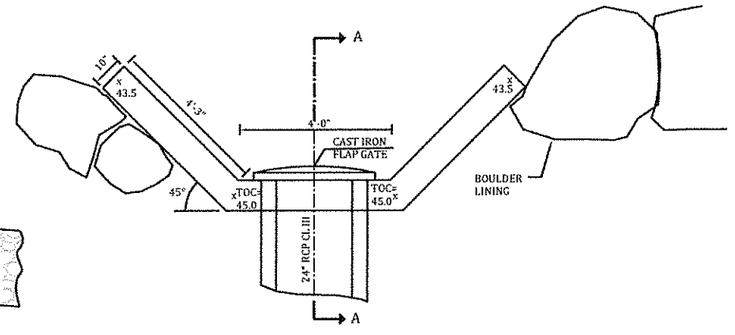
JOB NO 18012 SHEET 4 OF 12



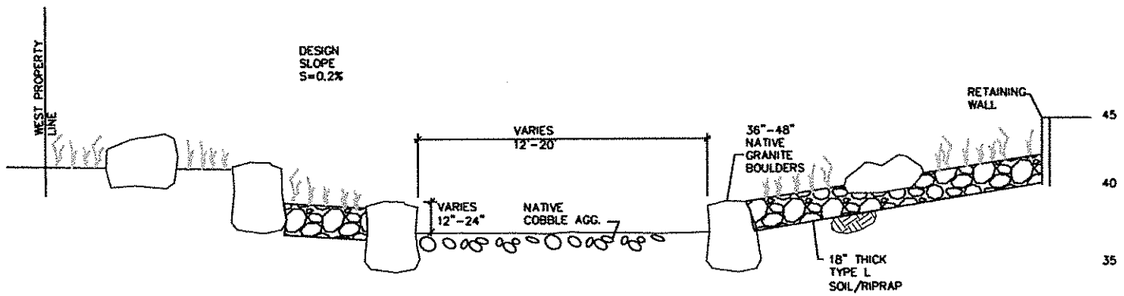
STORM SEWER OUTFALL STA 6+64
1"=2'



SECTION A-A
1"=2'



STORM SEWER OUTFALL STA 9+81
1"=2'

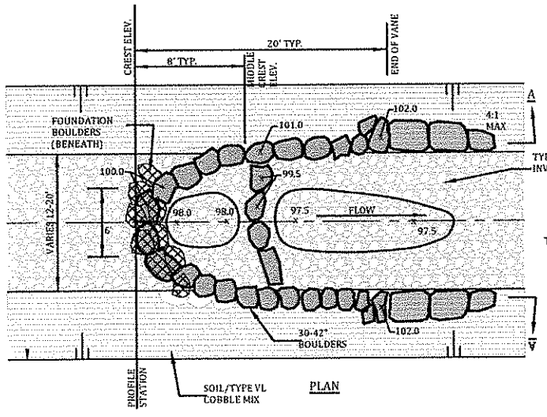


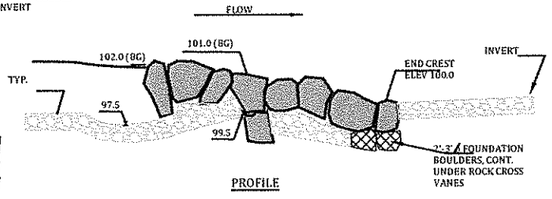
TYPICAL CHANNEL SECTION
NTS

INTERNATIONAL BUILDING CODE (IBC-2012) SUGGESTED DESIGN SPECIFICATIONS FOR PUBLIC ACCESS APPLICATIONS

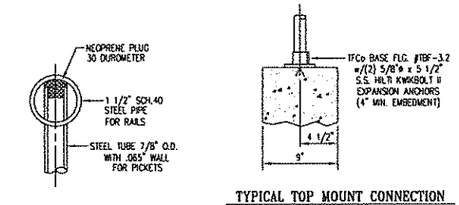
1. Guardrails and Handrails shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.
2. The handrail shall be made of pipes joined together with component fittings. Samples of all components, bases, toe plate and pipe shall be submitted for approval at the request of the engineer. Components that are pop-riveted or glued at the joints will not be acceptable. All components must be mechanically fastened with stainless steel hardware. **Handrail and components shall be TUFRAIL, as manufactured by Thompson Fabricating, LLC (Birmingham, Alabama) or an approved equal.**
3. Railings shall be 1 1/2" Schedule 40 STEEL pipe.
   ASTM-B-221. Posts shall be 1 1/2" Schedule 40 aluminum pipe.
   Post spacing shall be a maximum of 6'-0".
4. Guardrails and Handrails shall be designed to withstand a 200 lb concentrated load applied in any direction and at any point on the top rail. Guardrails and Handrails shall also be designed to withstand a uniform load of 50 lb/ft applied horizontally to the top rail. Uniform loads are not to be applied simultaneously with the concentrated loads.
5. Pickets and intermediate railings shall be provided such that a 4-inch diameter sphere cannot pass through any opening up to a height of 34 inches. From a height of 34 inches to 42 inches above the adjacent walking surface, a sphere 4-3/8 inches max in diameter shall not pass. The triangular openings formed by the riser, tread and bottom rail at the open side of a stairway shall be of a size such that a sphere of 6 inches in diameter cannot pass through the opening.
6. Pickets and intermediate railings shall be designed to withstand a horizontally applied normal load of 50 lb on an area not to exceed one square foot including openings and space between rails.
7. The manufacturer shall submit calculations for approval at the request of the Engineer. Testing of base castings or base extrusions by an independent lab or manufacturer's lab (if manufacturer's lab meets the requirements of the Aluminum Association) will be an acceptable substitute for calculations. Calculations will be required for approval of all other design aspects.
8. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations (OSHA 1910.23). The top surface of the top railing shall be smooth and shall not be interrupted by projected fittings.
9. The mid-rail at a corner return shall be able to withstand a 200 lb load without loosening. The manufacturer is to determine this dimension for their system and provide physical laboratory tests to confirm compliance.
10. Concrete anchors shall be stainless steel type 303 or 304 wedge anchors and shall be furnished by the handrail manufacturer. The anchor design shall include the appropriate reduction factors for spacing and edge distances in accordance with the manufacturer's published data.
11. Toe plate shall conform to OSHA standards. Toe plate shall be a minimum of 4" high and shall be be an extrusion that attaches to the posts with clamps that will allow for expansion and contraction between posts. Toe plates shall be set 1/4" above the walking surface. Toe plates shall be provided on handrails as required by OSHA and/or as shown on drawings. Toe plates shall be shipped loose in stock lengths for field installation.
12. Openings in the railing shall be guarded by a self-closing gate (OSHA 1910.23). Safety chains shall not be used unless specifically shown on the drawings.
13. HANDRAIL FINISH SHALL BE ONE COAT METAL PRIMER AND TWO COATS SHERWIN WILLIAMS "BRIDGE GREEN" COLOR, ACROLON 218 HS ACRYLIC POLYURETHANE, SEMI-GLOSS. COLOR SHALL BE VERIFIED BY THE ENGINEER.

BRIDGE GREEN CUSTOM MANUAL MATCH				
844 COLORANT	02	32	64	128
LB-LAMP BLACK	2	16	–	–
PG-PHTH GREEN	10	–	–	–
TW-WHITE	2	46	–	–
YO-YELLOW OX	–	50	–	–
PB-PHTH	–	50	–	–
4 GALLON KIT	ULTRADEEP			
B65T00654	840335618			

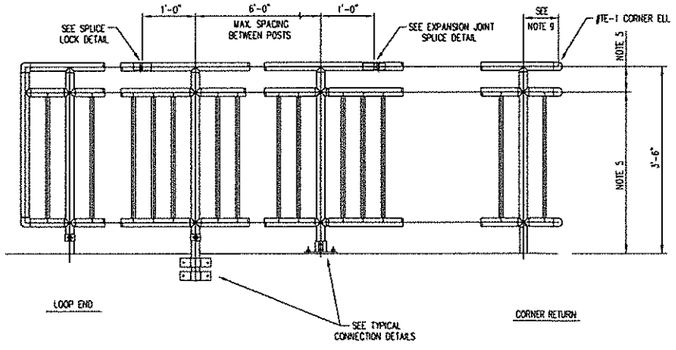




TYPICAL ROCK CROSS VANE
NTS



TYPE I HANDRAIL



TYPICAL TYPE I HANDRAIL
(GUARDRAILS SHALL BE TOP MOUNTED OR SIDE MOUNTED AS SHOWN ON PLANS)

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:	Designer: 6/19
Sheet Subset:	Coddi: 6/19
Subset Sheets:	Checker: 6/19

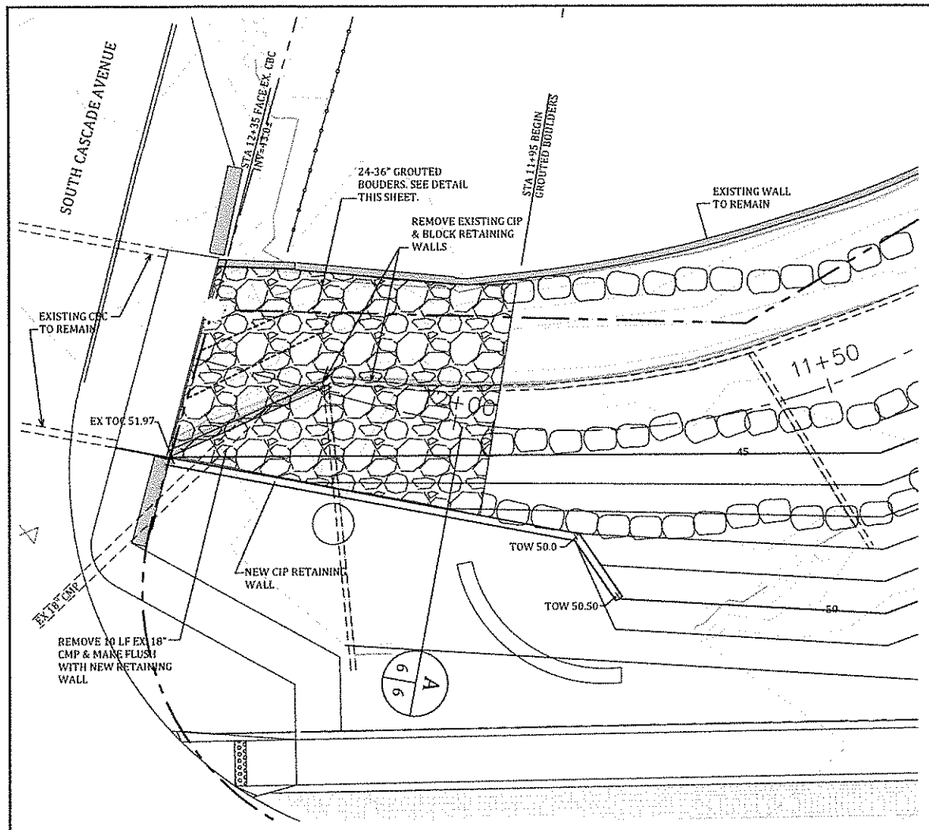
Kiowa Engineering Corporation
1604 Grant Place Street
Colorado Springs, Colorado 80904
(719) 635-3741

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

DETAILS

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 5 OF 15

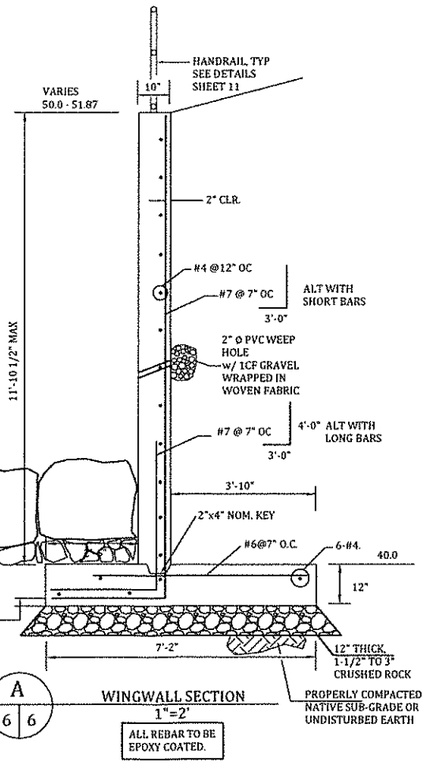


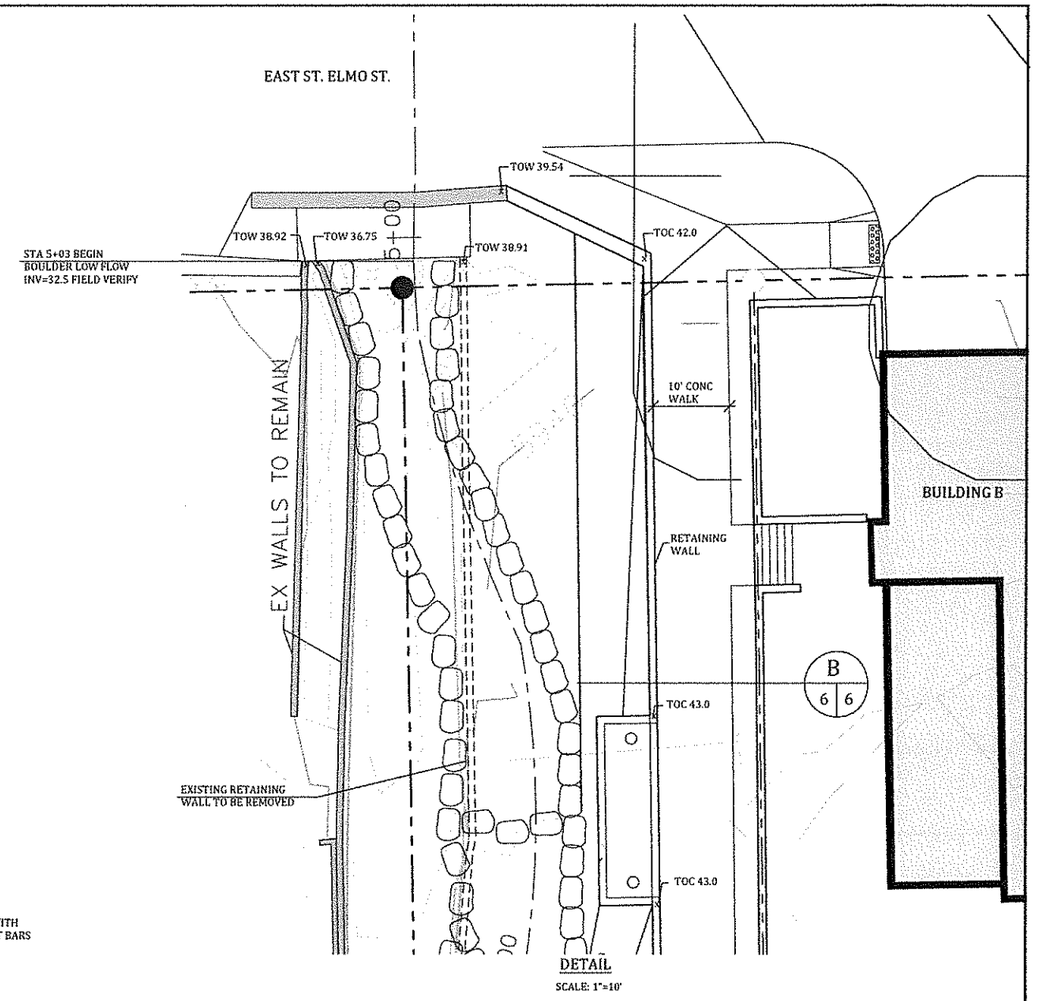
OUTLET STRUCTURE PLAN & DETAILS

SCALE: 1"=10'

GROUTED BOULDER PLACEMENT DETAIL

NTS





DETAIL

SCALE: 1"=10'

X

1"=2'

B

6 | 6

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 520-7342

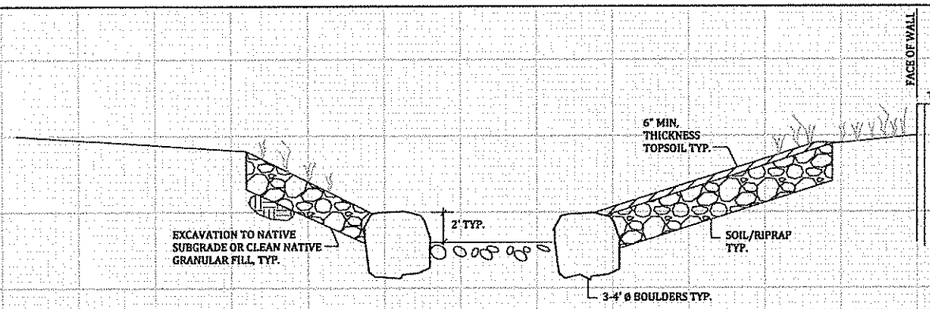
Structure:	Designer:	6/19
Sheet Subset:	Cadd:	6/19
Subset Sheets:	Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

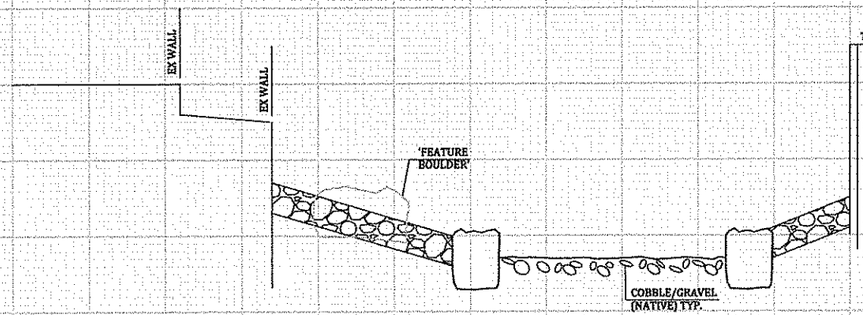
DETAILS

DRAINAGE BASIN: CHEYENNE CREEK

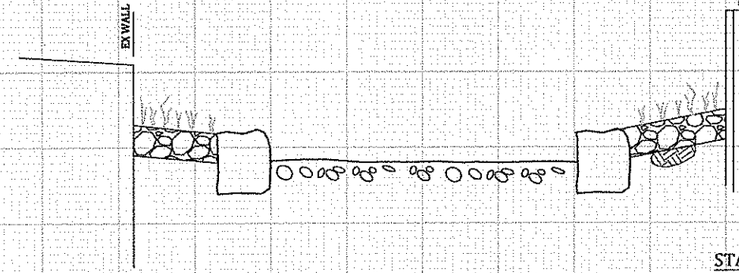
JOB NO. 18012 SHEET 6 OF 15



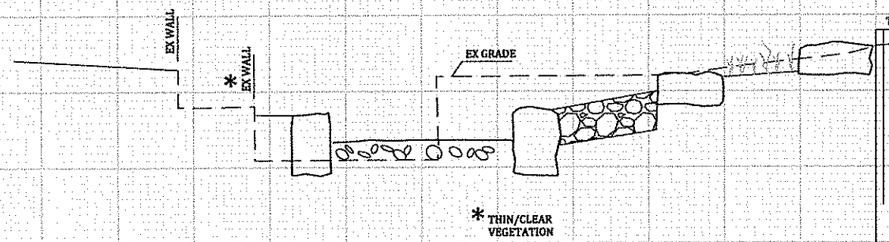
STATION 5+00



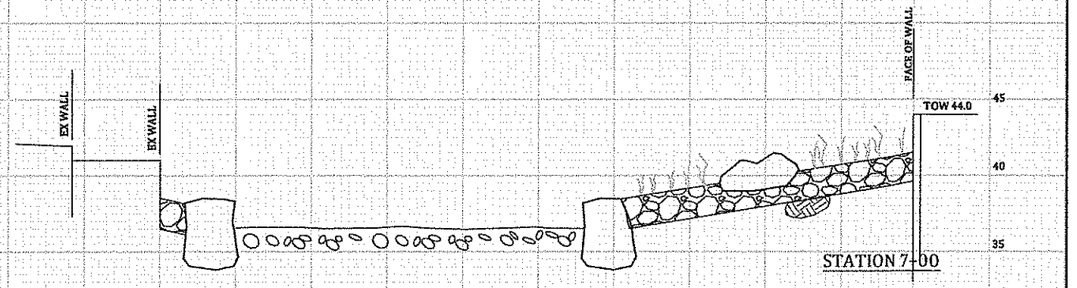
STATION 5+50



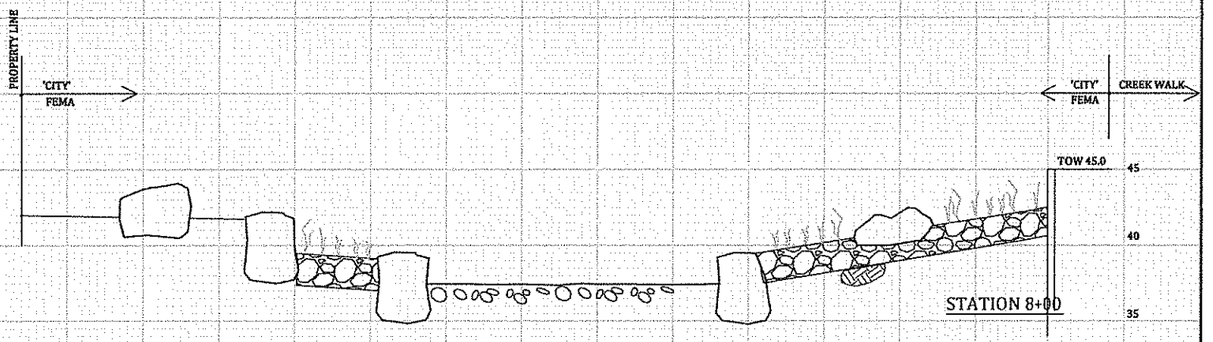
STATION 6+00



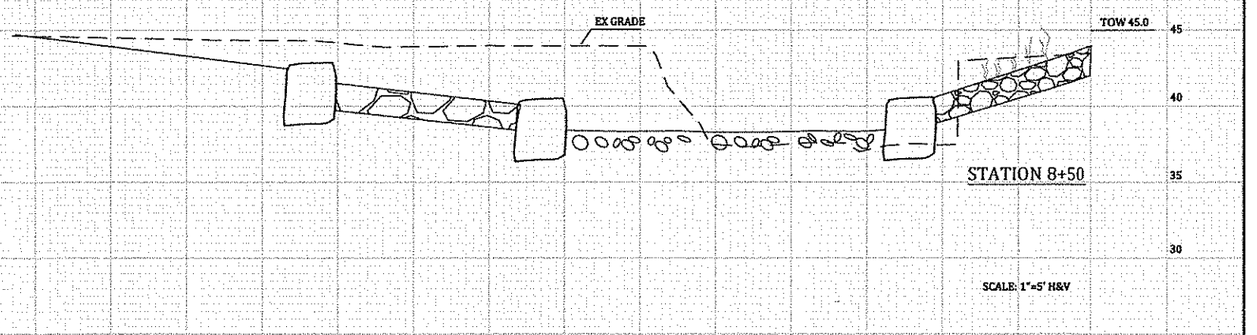
STATION 6+50



STATION 7+00



STATION 8+00



STATION 8+50

SCALE: 1"=5' H&V

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 635-7342

Structure:	Designer:	6/19
Sheet Subset:	Cadd:	6/19
Subset Sheets:	Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

CROSS-SECTIONS

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 7 OF 12

IN PROGRESS

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:	
Sheet Subset:	
Subset Sheets:	

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 635-7942

Designer:	6/19
Cadd:	6/19
Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

CROSS-SECTIONS

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 8 OF 12

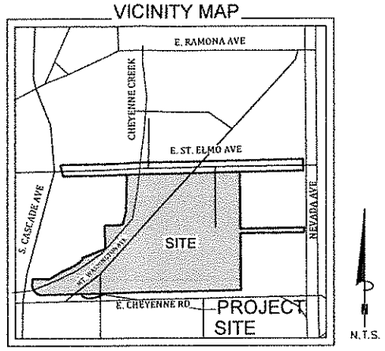
CHEYENNE CREEK at
SOUTH NEVADA CREEKWALK FILING NO. 1
GRADING AND EROSION CONTROL PLAN
COLORADO SPRINGS, COLORADO

GRADING NOTES:
1. ALL EARTHWORK AND EROSION CONTROL REQUIRED OF THIS CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE SECTIONS OF THE PROJECT SPECIFICATIONS AND THE CITY STANDARDS.
2. REFER TO THE PERMANENT BMP CONSTRUCTION PLANS FOR DESIGN OF THE DETENTION BASIN.
3. A GEOTECHNICAL EVALUATION REPORT WAS PREPARED FOR THE SUBJECT SITE. THE RECOMMENDATIONS INCLUDED IN THE REPORT SHOULD BE FOLLOWED DURING CONSTRUCTION UNLESS OTHERWISE NOTED. REFER TO THE REPORT FOR SOIL BORING LOGS. FOLLOWING IS INFORMATION FROM THE REPORT. THE CONTRACTOR SHALL REFER TO THE REPORT FOR REQUIREMENTS.
   3.1. REFER TO GEOTECHNICAL ENGINEERING STUDY FOR COMPACTION REQUIREMENTS.
   3.2. REFER TO THE GEOTECHNICAL REPORT AND STRUCTURAL DRAWINGS FOR COMPACTION AND EARTHWORK REQUIREMENTS FOR THE BUILDING PADS AND ADJACENT AREAS.
   3.3. AS PRESENTED ON BORINGS LOGS, SURFACE SOILS TO DEPTHS OF 7 TO 13 FEET CONSIST OF VARIABLE SAND, SILT AND CLAY FILL MATERIAL OF LOW TO HIGH PLASTICITY.
   3.4. STRIP AND REMOVE EXISTING VEGETATION, ORGANIC TOPSOILS, FILL AND INCLUDED DEBRIS, FROM THE BUILDING AREAS. THE BUILDING AREA IS DEFINED AS THAT AREA WITHIN THE BUILDING FOOTPRINT PLUS A DISTANCE BEYOND THE PERIMETER OF THE FOOTPRINT EQUAL TO 5 FEET OR THE DEPTH OF FILL REMOVED, WHICHEVER IS GREATER. IN THE BUILDING AREAS, REMOVE THE EXISTING FILL SOILS TO THEIR COMPLETE EXTENT. REFER TO GEOTECHNICAL REPORT.
4. FILL SHOULD BE PLACED AND COMPACTED IN HORIZONTAL LIFTS, USING EQUIPMENT AND PROCEDURES THAT WILL PRODUCE RECOMMENDED MOISTURE CONTENTS AND DENSITIES THROUGHOUT THE LIFT. THE PLACEMENT AND COMPACTION OF FILL AND BACKFILL SHOULD BE OBSERVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER.
   4.1. FILL MATERIAL SHOULD BE PLACED IN MAXIMUM 8-INCH LOOSE LIFTS, UNLESS OTHERWISE NOTED.
   4.2. FILL SHOULD BE COMPACTED TO 95% OF THE MATERIALS STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698) AND TO -2 TO +3% OF THE OPTIMUM MOISTURE CONTENT FOR IMPORTED SOILS, UNLESS OTHERWISE NOTED.
   4.3. FILL BELOW BUILDING PAD, BELOW FIVE FEET SHOULD BE COMPACTED TO 100% OF THE MATERIALS STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698)
   4.4. ON-SITE SOILS SHOULD BE SCARIFIED TO A DEPTH OF NO LESS THAN 12 INCHES BELOW PLANNED GRADE, MOISTURE CONDITIONED AND RE-COMPACTED IN ACCORDANCE WITH THE GEOTECHNICAL REQUIREMENTS.
5. ALL SOILS USED FOR FILL AND BACKFILL MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO INSTALLATION. THE GEOTECHNICAL ENGINEER SHALL OBSERVE AND TEST THE FILL COMPACTION, APPROVE THE FILL MATERIALS AND COMMENT, AS NEEDED, ON THE METHOD OF PLACING AND COMPACTION, IN WRITING, TO THE OWNER'S REPRESENTATIVE. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY THE GEOTECHNICAL ENGINEER WHEN TESTS ARE TO BE MADE.
   5.2. THE GEOTECHNICAL ENGINEER SHALL APPROVE ALL FOUNDATION EXCAVATIONS AND GIVE WRITTEN APPROVAL OF THE COMPLETED FOUNDATIONS TO THE ARCHITECT (1) WHEN EXCAVATIONS ARE FIRST OPEN AND (2) JUST PRIOR TO PLACING OF CONCRETE TO TEST AND CONTROL THE FILL COMPACTION. APPROVE THE MATERIALS, OBSERVE AND GIVE WRITTEN APPROVAL TO THE ARCHITECT THAT ALL BEARING SURFACES HAVE BEEN INSPECTED AND FILL REQUIREMENTS HAVE BEEN MET.
   5.3. QUALITY CONTROL BY AN INDEPENDENT TESTING AGENCY AND GEOTECHNICAL ENGINEER SHALL IN NO WAY RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR PERFORMING ALL WORK IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS.
6. RUBBISH AND DEBRIS INCLUDING TIMBER, CONCRETE RUBBLE, TREES, BRUSH AND ASPHALT SHALL NOT BE BACKFILLED ADJACENT TO ANY OF THE STRUCTURES OR BE IN THE PLACEMENT OF ANY UNCLASSIFIED FILL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND HAULING OF SUCH MATERIALS TO A SUITABLE SPOIL AREA.
7. EXISTING UTILITIES: THE LOCATIONS OF EXISTING UTILITIES ARE BASED UPON THE BEST AVAILABLE INFORMATION, ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATION AND VERIFICATION OF THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING WORK. IF IT APPEARS THERE COULD BE A CONFLICT WITH ANY UTILITIES, WHETHER INDICATED ON THE PLANS OR NOT, THE CONTRACTOR IS TO NOTIFY THE ENGINEER AND OWNER IMMEDIATELY. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES WITHIN THE CONSTRUCTION AREA AND SITE. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE THE EXISTING UTILITIES.
8. GRADING CONTOURS SHOWN ON THIS PLAN ARE TO FINAL GRADE.
9. ALL VERTICAL SPOT ELEVATIONS SHOWN ON THE GRADING PLAN ARE FLOWLINE OF CURB (FL) OR FINISH GROUND (FG), UNLESS OTHERWISE NOTED.
   9.1. GRADING ABBREVIATIONS: FL=FLOWLINE, TC=TOP OF CURB, TOC=TOP OF CONCRETE, TOA=TOP OF ASPHALT, EOC=EDGE OF CONCRETE, EOA=EDGE OF ASPHALT, HP=HIGH POINT, LP=LOW POINT, FF=FINISH FLOOR ELEVATION.
10. CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE SITE PRIOR TO BIDDING TO VERIFY SITE CONDITIONS.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVISION OF ADEQUATE SHORING AND/OR BRACING NECESSARY TO FACILITATE THE EXCAVATION ASSOCIATED WITH THE CONSTRUCTION OF THE WALLS, PIPELINES AND FOUNDATIONS. THE BRACING AND/OR SHORING OF EXCAVATED WALLS OR TRENCHES SHALL BE IN COMPLIANCE WITH OSHA REGULATIONS AND SHALL BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER.
12. BUILDING CONTRACTOR(S) WILL BE RESPONSIBLE FOR CONSTRUCTING POSITIVE DRAINAGE AWAY FROM ALL STRUCTURES.
13. SIDEWALK SLOPES SHALL NOT EXCEED 2.0% MAXIMUM CROSS SLOPES AND 5.0% MAXIMUM LONGITUDINAL SLOPES, UNLESS OTHERWISE NOTED. THE SLOPE IN THE HANDICAP PARKING SPACES AND ASSOCIATED STRIPED ISLAND SHALL NOT EXCEED 2.0% IN ANY DIRECTION.
14. IMMEDIATELY PUMP OR BAIL OUT WATER FOUND IN EXCAVATIONS, WHETHER RAIN OR SEEPAGE. EXCAVATIONS MUST BE KEPT FREE FROM WATER AT ALL TIMES. TAKE ALL MEASURES AND FURNISH ALL EQUIPMENT AND LABOR NECESSARY TO CONTROL THE FLOW, DRAINAGE AND ACCUMULATION OF WATER AS REQUIRED TO PERMIT COMPLETION OF THE WORK AND TO AVOID DAMAGE TO THE WORK.
15. WHEN FREEZING TEMPERATURES MAY BE EXPECTED, DO NOT EXCAVATE TO THE FULL DEPTH INDICATED UNLESS THE FOOTING OR SLABS ARE TO BE POURED IMMEDIATELY AFTER THE EXCAVATION HAS BEEN COMPLETED. IF PLACING OF CONCRETE IS DELAYED, PROTECT THE BOTTOMS OF EXCAVATIONS FROM FROST UNTIL CONCRETE IS PLACED.
16. NO FILL MATERIAL SHALL BE PLACED, SPREAD OR ROLLED WHILE IT IS FROZEN OR THAWING OR DURING UNFAVORABLE WEATHER CONDITIONS. WHEN THE WORK IN PROGRESS IS INTERRUPTED BY HEAVY RAIN, FILL OPERATIONS SHALL NOT BE RESUMED UNTIL THE GEOTECHNICAL ENGINEER INDICATES THAT THE MOISTURE CONTENT AND DENSITY OF THE PREVIOUSLY PLACED FILL ARE AS SPECIFIED.
17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND HAULING OF UNSUITABLE FILL MATERIALS TO A SUITABLE SPOIL AREA. EXCESS EXCAVATION SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF AT THE CONTRACTOR'S EXPENSE. THE COST OF HAULAGE AND SPOILING OF EXCESS EXCAVATED MATERIALS SHALL BE PAID FOR AS DOCUMENTED IN THE PROJECT SPECIFICATIONS.
18. AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE ACRE OR MORE, THE OWNER OR OPERATOR OF THE CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORM WATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY CONTROL DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORM WATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT: COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY CONTROL DIVISION--PERMITS.
19. ALL EROSION CONTROL WILL BE DONE IN CONFORMANCE WITH THE CITY STANDARDS. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED BY THE CITY OR ENGINEER.
20. ALL SLOPES STEEPER THAN 3:1 SHALL REQUIRE EROSION CONTROL BLANKET, NORTH AMERICAN GREEN SC150BN DOUBLE NETTED OR EQUAL AS A TEMPORARY STABILIZATION MEASURE.
21. WATER SHALL BE USED AS A DUST PALLIATIVE AS REQUIRED AND SHALL BE INCLUDED IN THE COST FOR EARTHWORK ITEM(S).

BENCHMARKS:
1. A 1 ½" ALUMINUM SURVEYORS CAP STAMPED

2. A 1 ½" ALUMINUM SURVEYORS CAP STAMPED "CCES LLC PLS 30118" LOCATED AT THE NORHTEASTERLY CORNER OF "THE FARM FILING NO. 5" APPROXIMATELY 1400 FEET WEST OF THE INTERSECTION OF RIDGELINE DRIVE AND SECRETARIAT DRIVE. EL: 6671.95
22.
23. THE SUBJECT PROPERTY IS NOT LOCATED WITHIN A FEMA REGULATED FLOODPLAIN BASED ON FLOOD INSURANCE RATE MAP _____ (EFFECTIVE DATE OF DECEMBER 7, 2018).

VICINITY MAP



N.T.S.

INDEX OF SHEETS	
9	GRADING AND EROSION PLAN COVER SHEET
10	GRADING AND EROSION CONTROL PLAN
11	DETAIL SHEET - EROSION CONTROL
12	DETAIL SHEET - EROSION CONTROL
13	DETAIL SHEET - EROSION CONTROL

CITY STANDARD GRADING, EROSION AND STORMWATER QUALITY CONTROL PLAN NOTES:
1. ANY LAND DISTURBANCE BY ANY OWNER, DEVELOPER, BUILDER, CONTRACTOR, OR OTHER PERSON SHALL COMPLY WITH THE BASIC GRADING, EROSION AND STORMWATER QUALITY CONTROL REQUIREMENTS AND GENERAL PROHIBITIONS NOTED IN THE DRAINAGE CRITERIA MANUAL VOLUME 2.
2. NO CLEARING, GRADING, EXCAVATION, FILLING OR OTHER LAND DISTURBING ACTIVITIES SHALL BE PERMITTED UNTIL SIGN OFF AND ACCEPTANCE OF THE GRADING PLAN AND EROSION AND STORMWATER QUALITY CONTROL PLAN IS RECEIVED FROM EDRD.
3. THE INSTALLATION OF THE FIRST LEVEL OF TEMPORARY EROSION CONTROL FACILITIES AND BMP'S SHALL BE INSTALLED AND INSPECTED PRIOR TO ANY EARTH DISTURBANCE OPERATIONS TAKING PLACE. CALL CITY STORMWATER INSPECTIONS, 385-5980, 48 HOURS PRIOR TO CONSTRUCTION.
4. SEDIMENT (MUD AND DIRT) TRANSPORTED ONTO A PUBLIC ROAD, REGARDLESS OF THE SIZE OF THE SITE, SHALL BE CLEANED IMMEDIATELY.
5. CONCRETE WASH WATER SHALL NOT BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
6. SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN TWENTY-ONE (21) CALENDAR DAYS AFTER FINAL GRADING OR FINAL EARTH DISTURBANCE HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN THIRTY (30) DAYS SHALL ALSO BE MULCHED WITHIN TWENTY-ONE (21) DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN SIXTY (60) DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMP'S SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.
7. THE GRADING AND EROSION CONTROL PLAN WILL BE SUBJECT TO RE-REVIEW AND RE-ACCEPTANCE BY THE EDRD SHOULD ANY OF THE FOLLOWING OCCUR: GRADING DOES NOT COMMENCE WITHIN TWELVE (12) MONTHS OF THE CITY ENGINEER'S ACCEPTANCE OF THE PLAN, A CHANGE IN PROPERTY OWNERSHIP, PROPOSED DEVELOPMENT CHANGES, OR PROPOSED GRADING REVISIONS.
8. THE PLAN SHALL NOT SUBSTANTIALLY CHANGE THE DEPTH OF COVER, OR ACCESS TO UTILITY FACILITIES. ACCEPTANCE OF THIS PLAN DOES NOT CONSTITUTE APPROVAL TO GRADE IN ANY UTILITY EASEMENT OR RIGHT-OF-WAY. APPROVALS TO GRADE WITHIN UTILITY EASEMENTS MUST BE OBTAINED FROM THE APPROPRIATE UTILITY COMPANY. IT IS NOT PERMISSIBLE FOR ANY PERSON TO MODIFY THE GRADE OF THE EARTH ON ANY COLORADO SPRINGS UTILITIES EASEMENT OR UTILITY RIGHT-OF-WAY WITHOUT THEIR WRITTEN APPROVAL. THE PLAN SHALL NOT INCREASE OR DIVERT WATER TOWARDS UTILITY FACILITIES. ANY CHANGES TO EXISTING UTILITY FACILITIES TO ACCOMMODATE THE PLAN MUST BE APPROVED BY THE AFFECTED UTILITY OWNER PRIOR TO IMPLEMENTING THE PLAN. THE COST TO RELOCATE OR PROTECT EXISTING UTILITIES OR TO PROVIDE INTERIM ACCESS IS THE APPLICANT'S EXPENSE.

ADDITIONAL EROSION CONTROL NOTES:
1. SOILS ON THE SITE ARE CLASSIFIED WITHIN HYDROLOGIC SOIL GROUP B STAPLETON SANDY LOAM.
2. 100 YEAR RUNOFF COEFFICIENTS. EXISTING: C100=0.35. PROPOSED: C100=0.35.
3. ANTICIPATED SCHEDULE:
   3.1. STARTING AND COMPLETION TIME PERIOD OF SITE GRADING: APRIL--JULY 2019.
   3.2. EXPECTED DATE OF FINAL STABILIZATION: AUGUST 2019.
4. APPROXIMATE TOTAL DISTURBED AREA: 2.2 ACRES.
5. RECEIVING WATERS: MONUMENT CREEK
6. SOIL STOCKPILE: LOCATION IS SHOWN ON THE PLAN, THE CONTRACTOR MAY ADJUST THE LOCATION. IF THE LOCATION IS ADJUSTED THE CONTRACTOR MUST REDLINE THIS PLAN WITH THE LOCATION.
7. STABILIZED STAGING AREA AND MATERIAL STORAGE: LOCATION IS SHOWN ON THE PLAN, THE CONTRACTOR MAY ADJUST THE LOCATION. IF THE LOCATION IS ADJUSTED THE CONTRACTOR MUST REDLINE THIS PLAN WITH THE LOCATION.

REVIEW:
STREET DESIGN FOR CITY ENGINEERING:
UTILITY GRADE REVIEW_____ DATE_____
CURB & GUTTER REVIEW_____ DATE_____
FINAL REVIEW_____ DATE_____
DRAINAGE DESIGN_____ DATE_____

This is filed in accordance with section 7.7.906 (Drainage Ordinance) of the code of the City of Colorado Springs, 2001 amended.

EROSION CONTROL LEGEND

	LIMITS OF DISTURBANCE (2.9 ACRE)
	PROPERTY LINE
ECB	EROSION CONTROL BLANKET
SM	SEED AND MULCH
CWA	CONCRETE WASHOUT AREA
SSA	STABILIZED STAGING AREA
SF	SILT FENCE

ABBREVIATIONS

ASSY	= ASSEMBLY	NTS	= NOT TO SCALE
BNDY	= BOUNDARY	OD	= OUTSIDE DIAMETER
BOP	= BOTTOM OF PIPE	PC	= POINT OF HORIZONTAL CURVATURE
C&G	= CURB & GUTTER	PLBG	= PLUMBING
CL	= CENTERLINE	POC	= POINT OF CONNECTION
CO	= CLEAN OUT	PP	= PROPOSED
CRA	= CONCRETE REVERSE ANCHOR	PRC	= POINT OF REVERSE CURVE
CR	= POINT OF CURB RETURN	PROP	= PROPERTY
CS	= CROSS SLOPE	PRT	= PRIVATE
CTB	= CONCRETE THRUST BLOCK	PT	= POINT OF HORIZONTAL TANGENCY
DIP	= DUCTILE IRON PIPE	PVC	= POLY VINYL CHLORIDE PIPE
DTL	= DETAIL	PVC	= POINT OF VERTICAL CURVATURE
EL	= ELEVATION	PVI	= POINT OF VERTICAL INTERSECTION
EOA	= EDGE OF ASPHALT	PVT	= POINT OF VERTICAL TANGENCY
ESMT	= EASEMENT	R	= RADIUS
EX	= EXISTING	R	= RIGHT
FC	= FACE OF CURB	RCP	= REINFORCED CONCRETE PIPE
FES	= FLARED END SECTION	RD	= ROOF DRAIN (STORM LINE)
FLG	= FLANGE	ROW	= RIGHT OF WAY
FL	= FLOWLINE	RT	= RIGHT
GB	= GRADE BREAK	SHT	= SHEET
GI	= GREASE INTERCEPTOR	SOI	= SAND OIL INTERCEPTOR
HP	= HIGH POINT	SS	= SANITARY SEWER
HORIZ	= HORIZONTAL	STA	= STATION
HYD	= HYDRANT	STD	= STANDARD
ID	= INSIDE DIAMETER	TA	= TOP OF ASPHALT
L	= LEFT	TB	= THRUST BLOCK
LT	= LEFT	TC	= TOP OF CURB
LF	= LINEAR FEET	TOA	= TOP OF ASPHALT
LP	= LOW POINT	TOC	= TOP OF CONCRETE
MAX	= MAXIMUM	TOP	= TOP OF PIPE
MH	= MANHOLE	TYP	= TYPICAL
MIN	= MINIMUM	VC	= VERTICAL CURVE

PRE-EXCAVATION CHECKLIST

- ☐ GAS AND OTHER UTILITY LINES OF RECORD SHOWN ON PLANS.
- ☐ UTILITIES CENTRAL LOCATING CALLED AT LEAST 2 BUSINESS DAYS AHEAD.
- ☐ UTILITIES LOCATED AND MARKED.
- ☐ EMPLOYEES BRIEFED ON MARKING AND COLOR CODES.*
- ☐ EMPLOYEES TRAINED ON EXCAVATION AND SAFETY PROCEDURES FOR NATURAL GAS LINES.
- ☐ WHEN EXCAVATION APPROACHES GAS LINES, EMPLOYEES EXPOSE LINES BY CAREFUL PROBING AND HAND DIGGING.

*A.G.A./A.P.W.A. STANDARD UTILITY MARKING COLOR CODE

NATURAL GAS	YELLOW	WATER	BLUE
ELECTRIC	RED	WASTEWATER	GREEN

811 Know what's below. Call before you dig.

OPINION OF COST FOR EROSION CONTROL REQUIREMENTS

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Silt Fence	X	LF	$2.50	$00.00
Stabilized Staging Area	X	SY	$2000.00	$00.00
Seeding and Mulching	X	AC	$785.00	$.00
Erosion Control Blanket	X	SY	$1.50	$.00
			Subtotal	$.00
			Maintenance (40% of E.C.)	$.00
			TOTAL	$.00

ENGINEER'S STATEMENT
This Erosion and Stormwater Quality Control/Grading Plan was prepared under my direction and supervision and is correct to the best of my knowledge and belief. If such work is performed in accordance with the Grading and Erosion Control Plan, the work will not become a hazard to life and limb, endanger property, or adversely affect the safety, use, or stability of a public way, drainage channel, or other property.

_____
For and on Behalf of Kiowa Engineering Corporation Date

Richard Wray
Printed Name

DEVELOPER'S/OWNER'S STATEMENT
The Owner will comply with the requirements of the Erosion and Stormwater Quality Control Plan including temporary BMP inspection requirements and final stabilization requirements. I acknowledge the responsibility to determine whether the construction activities on these plans require Colorado Discharge Permit System (CDPS) permitting for Stormwater discharges associated with Construction Activity.

Developer/Owner Signature: _____ Date: _____

Name of Developer/Owner: _____

DBA: _____ Phone: _____

Title: Project Manager Email: _____

Address: _____ Fax: N/A

CITY OF COLORADO SPRINGS GRADING AND EROSION CONTROL REVIEW
This Grading Plan is filed in accordance with section 7.7.1503 (enacted as ord. 82-56) of the code of the City of Colorado Springs, 2001, as amended. Erosion control is reviewed in accordance with the Drainage Criteria Manual, Vol. I (May 2014) and Vol. II (May 2014); latest revisions.

_____
For the City Engineer Date

Notes: _____

Computer File Information

Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:	Designer: RNW	Date: 6/19
Sheet Subset:	Coded: EAK	Date: 6/19
Subset Sheets:	Checker: RNW	Date: 6/19

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 520-7462

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

GRADING & EROSION CONTROL COVER SHEET

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 9 OF 15

0 20' 40'

SCALE: 1"=20'

SUMMARY OF EARTHWORK (1)

CUT	CY
FILL (w/20% SHRINKAGE)	CY
NET FILL	CY

(1) QUANTITIES SUMMARIZED ARE PROVIDED FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL INDEPENDENTLY VERIFY EARTHWORK QUANTITIES AS PART OF BIDDING THE GRADING WORK SHOWN ON THE DESIGN PLANS.

Standard Grading, Erosion And Stormwater Quality Control Plan Notes

1. Any land disturbance by any owner, developer, builder, contractor, or other person shall comply with the Basic Grading, Erosion and Stormwater Quality Control Requirements and General Prohibitions noted in the Drainage Criteria Manual Volume II.

2. No clearing, grading, excavation, filling, or other land disturbing activities shall be permitted until sign off and acceptance of the Grading Plan and Erosion and Stormwater Quality Control Plan is received from EDRD.

3. The installation of the first level of temporary erosion control facilities and BMP's shall be installed and inspected prior to any earth disturbance operations taking place. Call City Stormwater inspections, 385-5980, 48 hours prior to construction.

4. Sediment (mud and dirt) transported onto a public road, regardless of the size of the site, shall be cleaned immediately.

5. Concrete wash water shall not be discharged to or allowed to runoff to State Waters, including any surface or subsurface storm drainage system or facilities.

6. Soil erosion control measures for all slopes, channels, ditches, or any disturbed land area shall be completed within twenty-one (21) calendar days after final grading or final earth disturbance has been completed. Disturbed areas and stockpiles which are not at final grade but will remain dormant for longer than thirty (30) days shall also be mulched within twenty-one (21) days after interim grading. An area that is going to remain in an interim state for more than sixty (60) days shall also be seeded. All temporary soil erosion control measures and BMP's shall be maintained until permanent soil erosion control measures are implemented.

7. The grading and erosion control plan will be subject to re-review and re-acceptance by EDRD should any of the following occur: grading does not commence within twelve (12) months of the City Engineer's acceptance of the plan, a change in property ownership, proposed development changes, or proposed grading revisions.

8. The Plan shall not substantially change the depth of cover, or access existing utility lines. Acceptance of this plan does not constitute approval to grade in any utility easement or right-of-way. Approvals to grade within utility easements must be obtained from the appropriate utility company. It is not permissible for any person to modify the grade of the earth on any Colorado Springs Utilities easement or Utility right-of-way without their written approval. The plan shall not increase or divert water towards utility facilities. Any changes to existing utility facilities to accommodate the plan must be approved by the affected utility owner prior to implementing the plan. The cost to relocate or protect existing utilities or to provide interim access is the applicant's expense.

Engineer's Statement

This Erosion and Stormwater Quality Control/Gradjng Plan was prepared under my direction and supervision and is correct to the best of my knowledge and belief. If such work is performed in accordance with the grading and erosion control plan, the work will not become a hazard to life and limb, endanger property, or adversely affect the safety, use, or stability of a public way, drainage channel, or other property.

Signature: _____ Date: _____

Printed Name: Richard N. Wray PE Seal

City Project Manager's Statement

I hereby certify that the drainage and grading for the Cottonwood Creek Detention Basin shall be constructed according to the design presented in this plan. I further understand that field changes must be reviewed by the City Review Engineer to ensure conformance with the original design intent. I am employed by and perform engineering srvices solely for the City of Colorado Springs, and therefore am exempt from Colorado Revised Statute Title 12, Article 25, Part 1 according to § 12-25-103(1), C.R.S.

Jeffery Dunn

Name of City Project Manager

Authorized Signature Date

City of Colorado Springs Grading and Erosion Control Review

This grading plan is filed in accordance with section 7.7.1503 (enacted as ord. 82-56) of the code of the City of Colorado Springs, 2001, as amended. Erosion control is reviewed in accordance with the Drainage Criteria Manual, Vol. I (May 2014) and Vol. II (May 2014); latest revisions

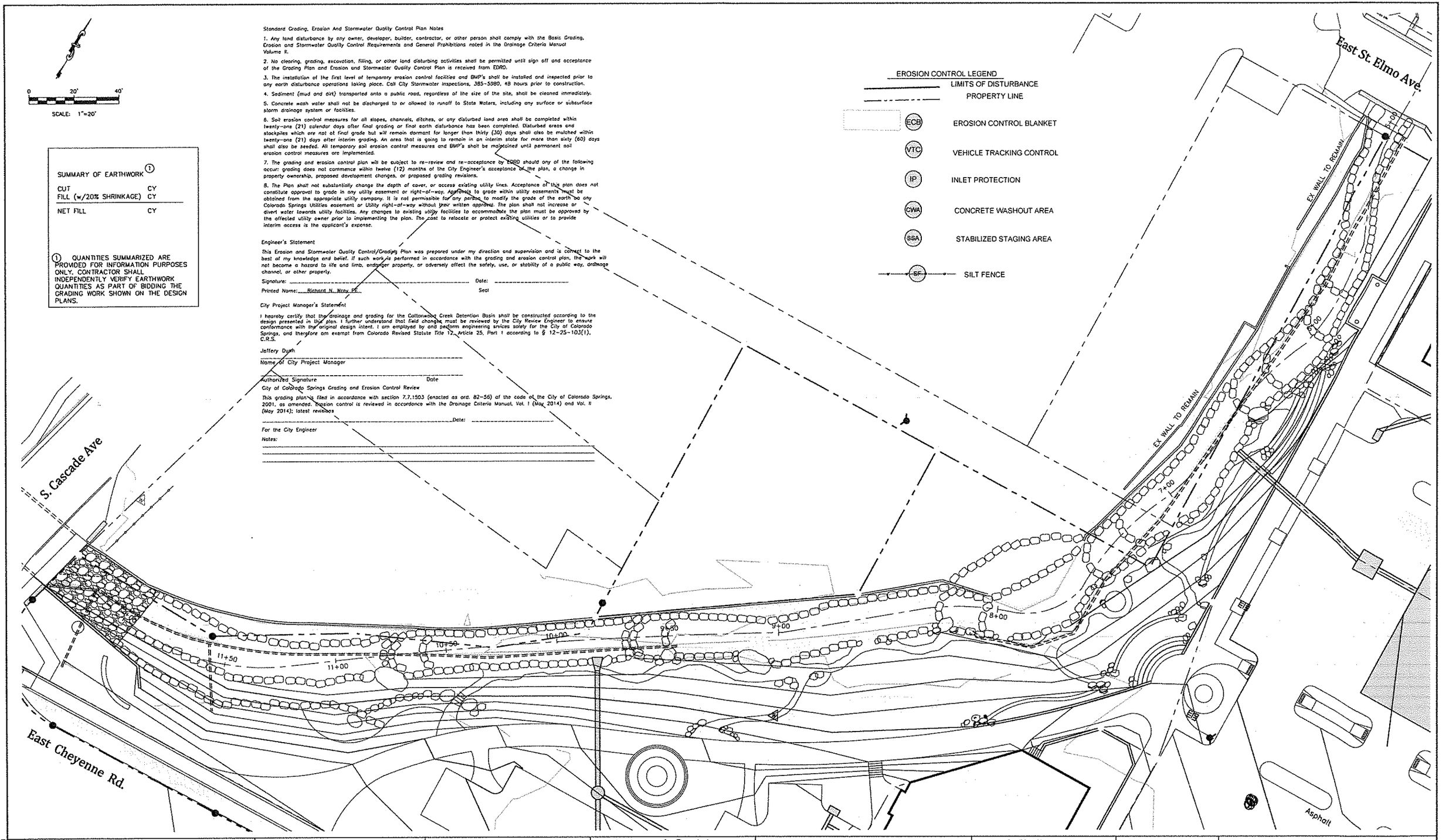
_____ Date: _____

For the City Engineer

Notes:

EROSION CONTROL LEGEND

- LIMITS OF DISTURBANCE
- PROPERTY LINE
- ECB — EROSION CONTROL BLANKET
- VTC — VEHICLE TRACKING CONTROL
- IP — INLET PROTECTION
- CWA — CONCRETE WASHOUT AREA
- SSA — STABILIZED STAGING AREA
- SF — SILT FENCE



Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:	
Sheet Subset:	
Subset Sheets:	

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Designer:	6/19
Cadd:	6/19
Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

GRADING & EROSION CONTROL PLAN

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 10 OF 15

SEEDING AND MULCHING INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - AREA OF SEEDING AND MULCHING.
   - TYPE OF SEED MIX
2. ALL BRANDS FURNISHED SHALL BE FREE FROM SUCH NOXIOUS SEEDS AS RUSSIAN OR CANADIAN THISTLE, COARSE FESCUE, EUROPEAN BINDWEED, JOHNSON GRASS, KNAP WEED AND LEAFY SPURGE.
3. THE SEEDER SHALL FURNISH TO THE CONTRACTOR A SIGNED STATEMENT CERTIFYING THAT THE SEED FURNISHED IS FROM A LOT THAT HAS BEEN TESTED BY A RECOGNIZED LABORATORY. SEED WHICH HAS BECOME WET, MOLDY OR OTHERWISE DAMAGED IN TRANSIT OR IN STORAGE WILL NOT BE ACCEPTABLE. SEED TICKETS SHALL BE PROVIDED TO REGULATING AGENCY UPON REQUEST.
4. DRILL SEEDING MIX SHALL CONFORM TO THE TABLE ON THE RIGHT.
5. IF THE SEED AVAILABLE ON THE MARKET DOES NOT MEET THE MINIMUM PURITY AND GERMINATION PERCENTAGES SPECIFIED, THE SUBCONTRACTOR MUST COMPENSATE FOR A LESSER PERCENTAGE OF PURITY OR GERMINATION BY FURNISHING SUFFICIENT ADDITIONAL SEED TO EQUAL THE SPECIFIED PRODUCT. THE TAGS FROM THE SEED MIXES MUST BE SUPPLIED TO CONTRACTOR AND FORWARDED TO THE REGULATING AGENCY'S GESC INSPECTOR.
6. THE FORMULA USED FOR DETERMINING THE QUANTITY OF PURE LIVE SEED (PLS) SHALL BE (POUNDS OF SEED) X (PURITY) X (GERMINATION) = POUNDS OF PURE LIVE SEED (PLS)
7. PERMANENT SEED MIX SHALL BE USED UNLESS OTHERWISE APPROVED BY THE REGULATING AGENCY.
8. ALL AREAS TO BE SEEDED AND MULCHED SHALL HAVE NATIVE TOPSOIL OR APPROVED SOIL AMENDMENTS SPREAD TO A DEPTH OF AT LEAST 6 INCHES (LOOSE DEPTH). HAUL ROADS AND OTHER COMPACTED AREAS SHALL BE LOOSENED TO A DEPTH OF 6 INCHES PRIOR TO SPREADING TOPSOIL.
9. SOIL IS TO BE THOROUGHLY LOOSENED (TILLED) TO A DEPTH OF AT LEAST 6 INCHES PRIOR TO SEEDING. THE TOP 6 INCHES OF THE SEED BED SHALL BE FREE OF ROCKS GREATER THAN 4 INCHES AND SOIL CLODS GREATER THAN 2 INCHES. SEEDING OVER ANY COMPACTED AREAS THAT HAVEN'T BEEN THOROUGHLY LOOSENED SHALL BE REJECTED.
10. SEED IS TO BE APPLIED USING A MECHANICAL DRILL TO A DEPTH OF 1/4 INCH. ROW SPACING SHALL BE NO MORE THAN 6 INCHES. MATERIAL USED FOR MULCH SHALL CONSIST OF LONG-STEMMED STRAW. AT LEAST 50 PERCENT OF THE MULCH, BY WEIGHT, SHALL BE 10 INCHES OR MORE IN LENGTH. MULCH SHALL BE APPLIED AND MECHANICALLY ANCHORED TO A DEPTH OF AT LEAST 2 INCHES. MULCH SHALL BE APPLIED AT A RATE OF 4000 LB. OF STRAW PER ACRE.
11. IF THE PERMITTEE DEMONSTRATES TO THE REGULATING AGENCY THAT IT IS NOT POSSIBLE TO DRILL SEED, SEED IS TO BE UNIFORMLY BROADCAST AT TWO TIMES THE DRILLED RATE, THEN LIGHTLY HARROWED TO PROVIDE A SEED DEPTH OF APPROXIMATELY 1/4 INCH, THEN ROLLED TO COMPACT, THEN MULCHED AS SPECIFIED ABOVE.
12. SEEDING AND MULCHING SHALL BE COMPLETED WITHIN 30 DAYS OF INITIAL EXPOSURE OR 7 DAYS AFTER GRADING IS SUBSTANTIALLY COMPLETE IN A GIVEN AREA (AS DEFINED BY THE REGULATING AGENCY). THIS MAY REQUIRE MULTIPLE MOBILIZATIONS FOR SEEDING AND MULCHING.
13. MULCH SHALL BE APPLIED WITHIN 24 HOURS OF SEEDING.
14. TACKIFIER SHOULD BE UTILIZED TO HELP WITH STRAW DISPLACEMENT.

SEEDING AND MULCHING MAINTENANCE NOTES

1. SEEDED AND MULCHED AREAS SHALL BE INSPECTED FOR REQUIRED COVERAGE MONTHLY FOR A PERIOD OF TWO YEARS FOLLOWING INITIAL SEEDING. REPAIRS AND RE-SEEDING AND MULCHING SHALL BE UNDERTAKEN AFTER THE FIRST GROWING SEASON FOR ANY AREAS FAILING TO MEET THE REQUIRED COVERAGE.
2. REQUIRED COVERAGE FOR STANDARD, OPEN SPACE AND LOW GROWTH SEED MIXES SHALL BE DEFINED AS FOLLOWS:
   1. THREE (3) PLANTS PER SQUARE FOOT WITH A MINIMUM HEIGHT OF 3 INCHES. THE 3 PLANTS PER SQUARE FOOT SHALL BE OF THE VARIETY AND SPECIES FOUND IN THE DOUGLAS COUNTY-APPROVED MIX.
   2. NO BARE AREAS LARGER THAN 4 SQUARE FEET (TWO-FEET BY TWO-FEET OR EQUIVALENT).
   3. FREE OF ERODED AREAS.
   4. FREE FROM INFESTATION OF NOXIOUS WEEDS IN ACCORDANCE WITH SECTION 6.4 OF THE GESC CRITERIA MANUAL.
3. REQUIRED COVERAGE FOR TURF GRASS AREAS SHALL BE DEFINED AS FOLLOWS:
   1. AT LEAST 80% VEGETATIVE COVER OF GRASS SPECIES PLANTED.
   2. NO BARE AREAS LARGER THAN 4 SQUARE FEET (TWO-FEET BY TWO-FEET OR EQUIVALENT.
   3. FREE OF ERODED AREAS.
   4. FREE FROM INFESTATION OF NOXIOUS WEEDS IN ACCORDANCE WITH SECTION 6.4 OF THE GESC CRITERIA MANUAL.
4. RILL AND GULLY EROSION SHALL BE FILLED WITH TOPSOIL PRIOR TO RESEEDING. THE RESEEDING METHOD SHALL BE APPROVED BY THE COUNTY.

SEED MIX

AREAS DISTURBED BY THE EARTHWORK SHALL BE PERMANENTLY REVEGETATED WITH NATIVE GRASSES. NATIVE SEED MIX FOR THIS PROJECT SHALL BE AS FOLLOWS:

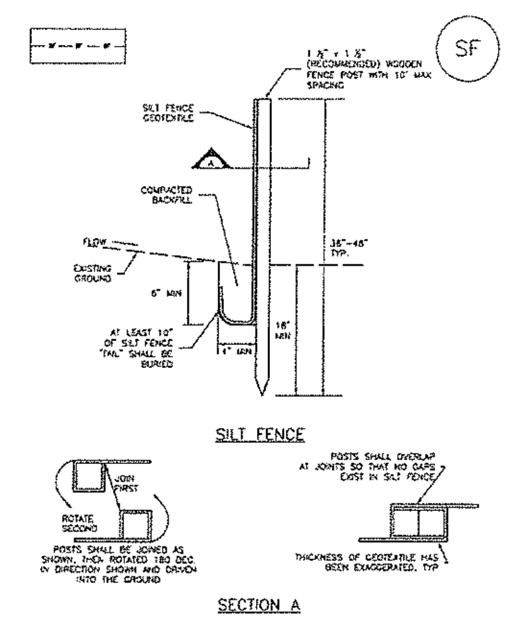
SPECIES		pls/acre
SHEEP FESCUE	*Festuca ovina*	0.6
CANBY BLUEGRASS	*Poa canbyi*	0.5
THICKSPIKE WHEATGRASS	*Elymus lanceolatus*	5.7
WESTERN WHEATGRASS	*Pascopyrum smithii*	7.9
BLUE GRAMA	*chrondrosum gracilis*	1.1
SWITCH GRASS	*Panicum virgatum*	1.0
SIDE-OATS GRAMA	*Bouteloua curtipendual*	2.0
ANNUAL RYE	*Lolium multiflorum*	10.0
		28.7 lbs

SEEDING APPLICATION: DRILL SEED 1/4" TO 1/2" INTO TOPSOIL. IN AREAS INACCESSIBLE TO A DRILL, HAND BROADCAST AT DOUBLE THE RATE AND RAKE 1/4" TO 1/2" INTO THE TOPSOIL.
MULCHING APPLICATION: 1-1/2 TONS NATIVE HAY PER ACRE, MECHANICALLY CRIMPED INTO THE TOPSOIL OR HYDROMULCH.

SEEDING AND MULCH (SM)
NTS

GRADING AND EROSION CONTROL NOTES:

1. ANY LAND DISTURBANCE BY ANY OWNER, DEVELOPER, BUILDER, CONTRACTOR, OR OTHER PERSON SHALL COMPLY WITH THE BASIC GRADING, EROSION AND STORMWATER QUALITY CONTROL REQUIREMENTS AND GENERAL PROHIBITIONS NOTED IN THE DRAINAGE CRITERIA MANUAL VOLUME 2.
2. NO CLEARING, GRADING, EXCAVATION, FILLING OR OTHER LAND DISTURBING ACTIVITIES SHALL BE PERMITTED UNTIL SIGN OFF AND ACCEPTANCE OF THE GRADING PLAN AND EROSION AND STORMWATER QUALITY CONTROL PLAN IS RECEIVED FROM EDRD.
3. ALL EARTHWORK REQUIRED OF THIS CONSTRUCTION SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE SECTIONS OF THE PROJECT SPECIFICATIONS.
4. A GEOTECHNICAL ENGINEERING REPORT TITLED "GEOTECHNICAL INVESTIGATION KING STREET REGIONAL STORMWATER DETENTION FACILITY BETWEEN KING STREET AND WEST CACHE LA POUDRE ST. AT 25TH STREET, COLORADO SPRINGS, COLORADO", PREPARED BY CTL/THOMPSON, INC. (PROJECT NO. 16-2-188) DATED FEBRUARY 16, 2017 WAS PREPARED FOR THE SUBJECT SITE. THE RECOMMENDATIONS INCLUDED IN THE REPORT SHOULD BE FOLLOWED DURING CONSTRUCTION UNLESS OTHERWISE NOTED. REFER TO THE REPORT FOR SOIL BORING LOGS.
5. RUBBISH INCLUDING TIMBER, CONCRETE RUBBLE, TREES, BRUSH, AND ASPHALT SHALL NOT BE BACKFILLED ADJACENT TO ANY OF THE STRUCTURES OR BE IN THE PLACEMENT OF ANY UNCLASSIFIED FILL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND HAULING OF SUCH MATERIALS TO A SUITABLE SPOIL AREA. COSTS ASSOCIATED WITH THE REMOVAL OF SUCH MATERIALS SHALL BE PAID FOR AS DOCUMENTED IN THE PROJECT SPECIFICATIONS.
6. WATER SHALL BE USED AS A DUST PALLIATIVE AS REQUIRED AND SHALL BE INCLUDED IN THE COST FOR EARTHWORK ITEM(S). NO SEPARATE PAYMENT WILL BE MADE FOR DUST CONTROL ASSOCIATED WITH THE SITE CONSTRUCTION.
7. GRADING CONTOURS SHOWN ON THIS PLAN ARE TO FINAL GRADE.
8. NO RUBBLE OR DEBRIS SHALL BE PLACED IN THE BACKFILL.
9. CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE SITE PRIOR TO BIDDING TO VERIFY SITE CONDITIONS.
10. COMPACTION FOR THIS PROJECT SHALL BE IN CONFORMANCE WITH ASTM D698. REFER TO THE GEOTECHNICAL ENGINEERING STUDY FOR REQUIREMENTS.
11. ALL SOILS USED FOR FILL AND BACKFILL MUST BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO INSTALLATION. THE GEOTECHNICAL ENGINEER SHALL OBSERVE AND TEST THE FILL COMPACTION, APPROVE THE FILL MATERIALS AND COMMENT, AS NEEDED, ON THE METHOD OF PLACING AND COMPACTION, IN WRITING, TO THE CITY. REFER TO THE COMPACTION REQUIREMENTS IN THE GEOTECHNICAL REPORT FOR ADDITIONAL REQUIREMENTS.
    11.1. REFER TO THE DETAIL SHEET FOR EARTHWORK, MATERIALS AND COMPACTION REQUIREMENTS ASSOCIATED WITH OUTLET STRUCTURES, WINGWALLS AND CHANNEL SECTION.
12. A CONSTRUCTION FENCE SHALL BE PLACED AROUND THE ANTICIPATED LIMIT OF DISTURBANCE AND CONSTRUCTION SITE LIMITS DURING CONSTRUCTION. THE CONSTRUCTION FENCE LOCATION SHOWN ON THE PLANS IS FOR INFORMATION, THE CONTRACTOR SHALL DETERMINE THE PROPOSED FENCE LOCATION AND SUBMIT TO THE CITY PRIOR TO CONSTRUCTION.
13. EROSION CONTROL BMPS SHOWN ON THIS PLAN ARE FOR INFORMATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREPARE A TEMPORARY EROSION CONTROL PLAN FOR APPROVAL BY THE CITY OF COLORADO SPRINGS PRIOR TO THE START OF CONSTRUCTION.
    13.1. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE INSTALLATION, MAINTENANCE, REPLACEMENT AND REMOVAL OF THE BMPS SHOWN ON THE TEMPORARY EROSION CONTROL PLAN.
14. ALL EROSION CONTROL WILL BE DONE IN CONFORMANCE WITH THE CITY OF COLORADO SPRINGS STANDARDS. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED BY THE CITY OF COLORADO SPRINGS OR ENGINEER.
15. EROSION CONTROL BLANKETS OR EQUIVALENT TO BE PLACED ON SLOPES STEEPER THAN 3:1 FOR SLOPE STABILIZATION.
16. INSTALL VEHICLE TRACKING CONTROL AT ALL CONSTRUCTION ACCESSES TO MINIMIZE THE TRANSPORTATION OF MUD BY VEHICLES.
17. BMPS MAY BE REQUIRED AFTER CONSTRUCTION IS COMPLETE UNTIL FINAL STABILIZATION IS REACHED. CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE OF THE BMPS UNTIL FINAL STABILIZATION IS REACHED.
18. APPROXIMATE AREA OF DISTURBANCE: ~ 6.8 ACRES
19. RECEIVING WATERS: CHEYENNE CREEK
20. TIMING: TO BE DETERMINED



SF-1. SILT FENCE

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.

3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND

4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.

5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.

6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:
Sheet Subset:
Subset Sheets:

Kiowa Engineering Corporation

Designer: RNW	Date: 6/19
Cadd: EAK	Date: 6/19
Checker: RNW	Date: 6/19

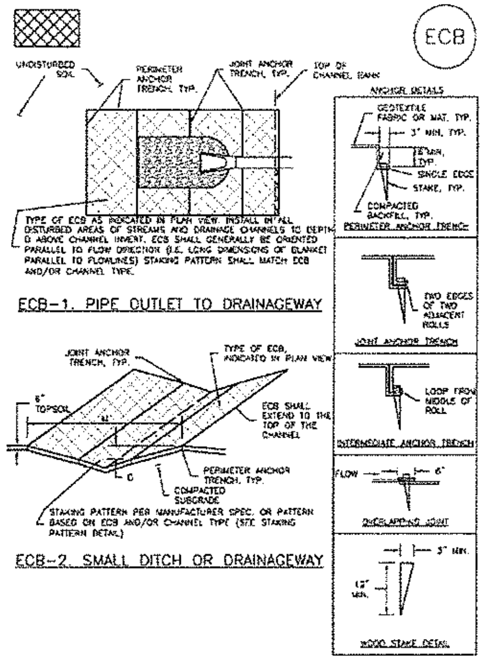
PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

EROSION CONTROL DETAILS

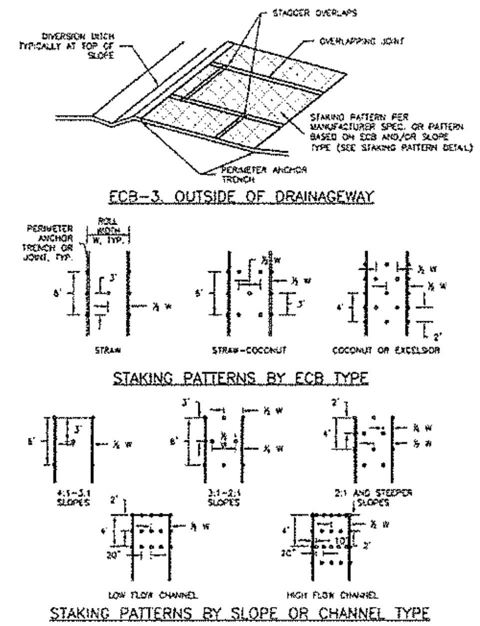
DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 11 OF 15

EC-6 Rolled Erosion Control Products (RECP)



Rolled Erosion Control Products (RECP) EC-6



EC-6 Rolled Erosion Control Products (RECP)

EROSION CONTROL BLANKET INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF ECB.
   - TYPE OF ECB (STRAW, STRAW-COCONUT, COCONUT, OR EXCELSIOR).
   - AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.

2. 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.

3. IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITTEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.

4. PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.

5. JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.

6. INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.

7. OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.

8. MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.

9. ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBS SHALL BE RESEEDED AND MULCHED.

10. DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB-1. ECB MATERIAL SPECIFICATIONS

TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT	RECOMMENDED NETTING**
STRAW*	-	100%	-	DOUBLE/ NATURAL
STRAW-COCONUT	30% MIN	70% MAX	-	DOUBLE/ NATURAL
COCONUT	100%	-	-	DOUBLE/ NATURAL
EXCELSIOR	-	-	100%	DOUBLE/ NATURAL

*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNELS.
**ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS

Rolled Erosion Control Products (RECP) EC-6

EROSION CONTROL BLANKET MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

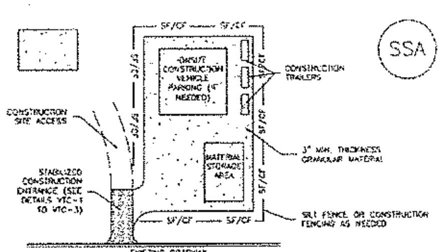
4. ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.

5. ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATE A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO AND TOWN OF PARKER COLORADO, NOT AVAILABLE IN AUTOCAD)

Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATION OF STAGING AREA(S).
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

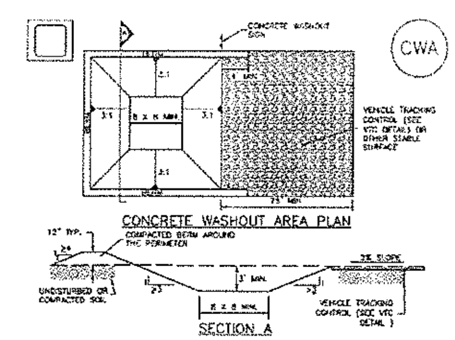
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

Concrete Washout Area (CWA) MM-1



CWA-1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - CWA INSTALLATION LOCATION

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8'. SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

MM-1 Concrete Washout Area (CWA)

CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:
Sheet Subset:
Subset Sheets:

Kiowa Engineering Corporation

Designer: RNW	Date: 6/19
Cadd: EAK	Date: 6/19
Checker: RNW	Date: 6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

EROSION CONTROL DETAILS

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18018 SHEET 12 OF 15

IN PROGRESS

Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:
Sheet Subset:
Subset Sheets:

Kiowa Engineering Corporation

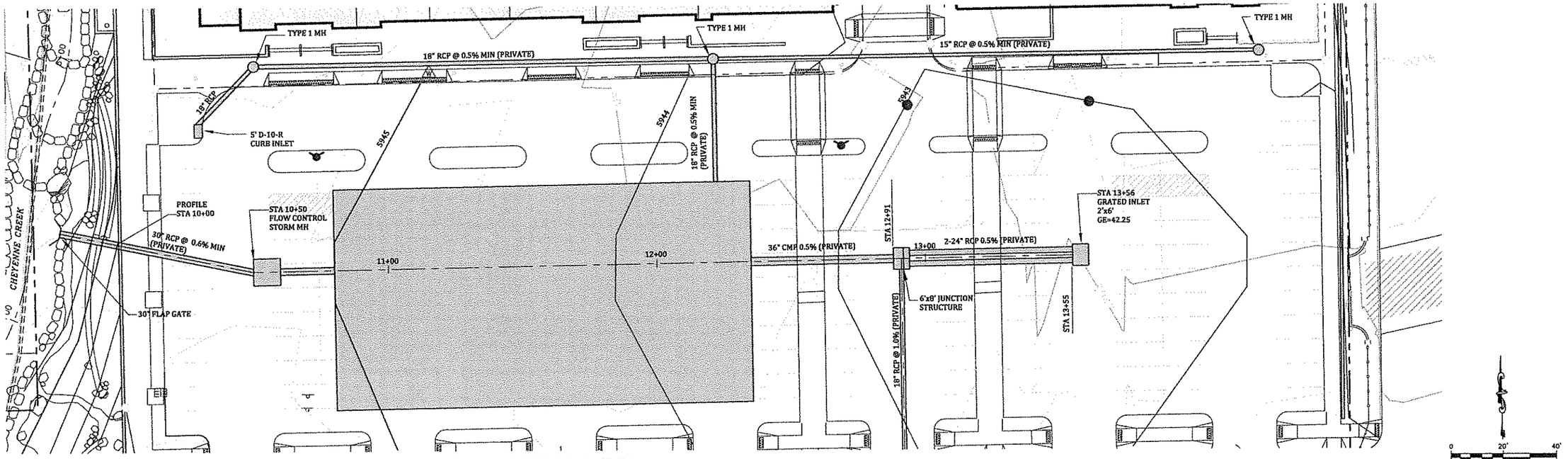
Designer: RNW Date: 6/19
Cadd: EAK Date: 6/19
Checker: RNW Date: 6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

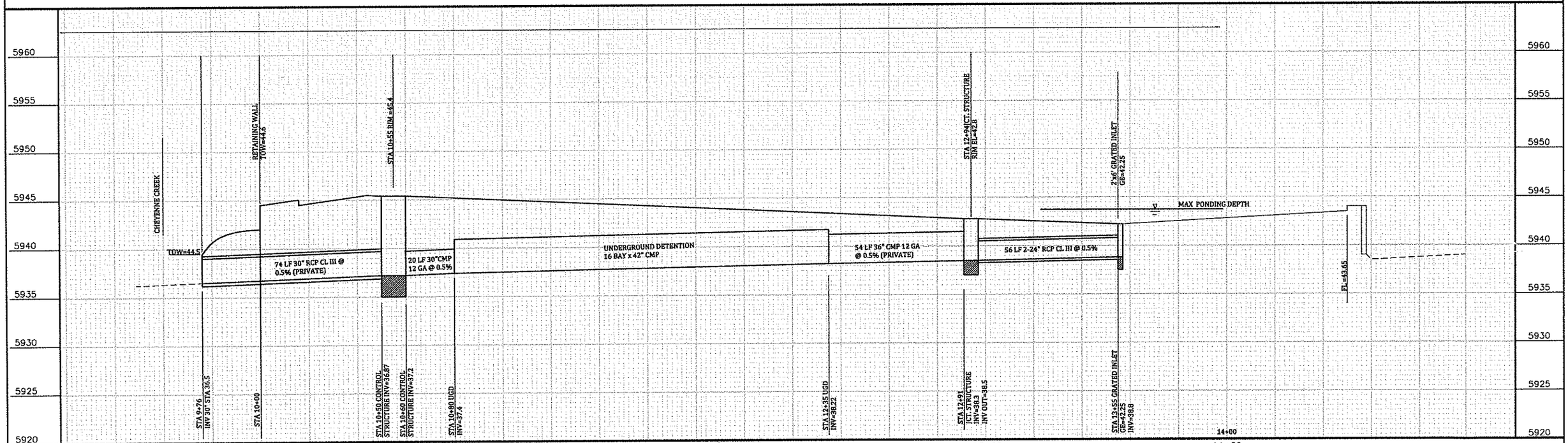
EROSION CONTROL DETAILS

DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18018 SHEET 13 OF 15



UNDERGROUND DETENTION BASIN SB-1



Computer File Information	
Creation Date:	By:
Last Modification Date:	By:
File Path:	
Sheet Model Name:	
Microstation Ver.	

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 520-7342

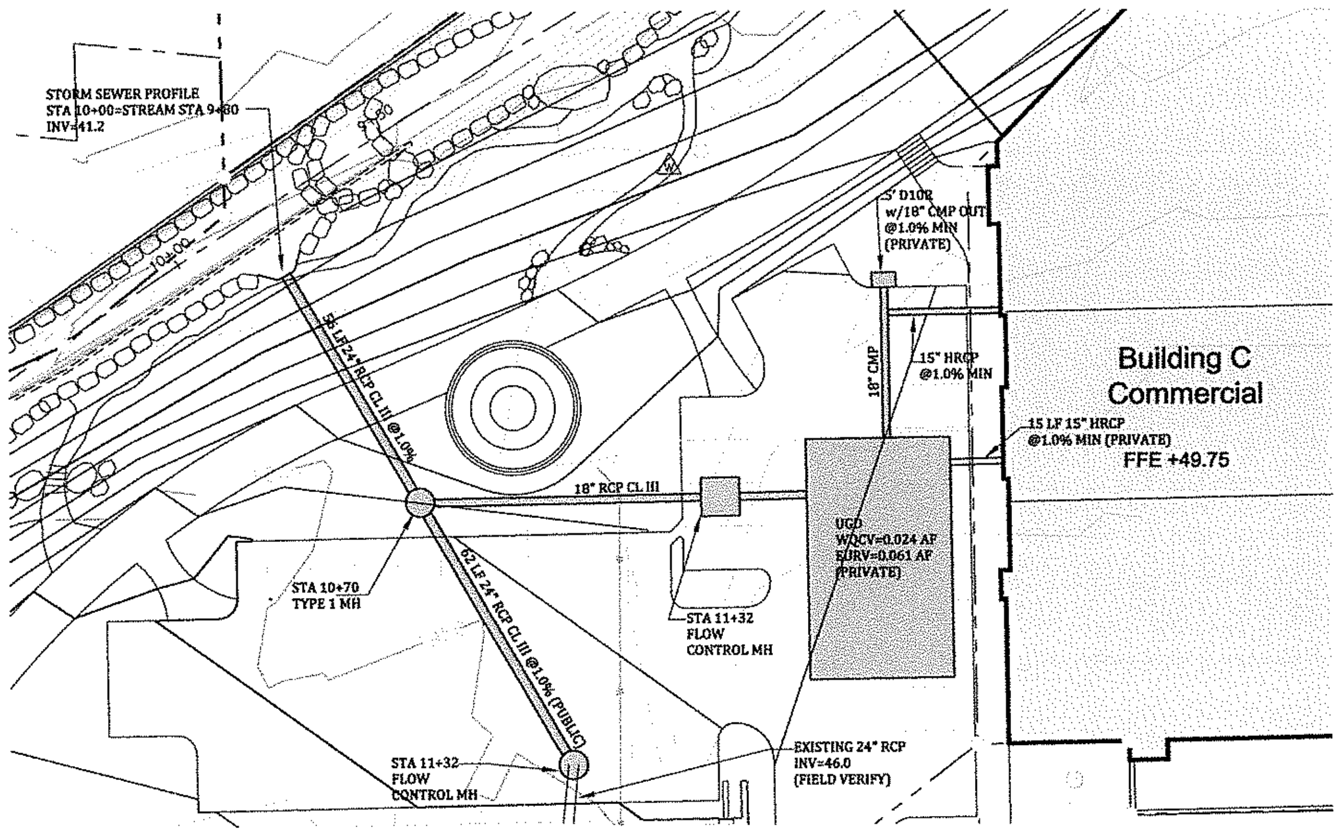
Structure:	Designer:	6/19
Sheet Subset:	Cadd:	6/19
Subset Sheets:	Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

UNDERGROUND DETENTION SB-1

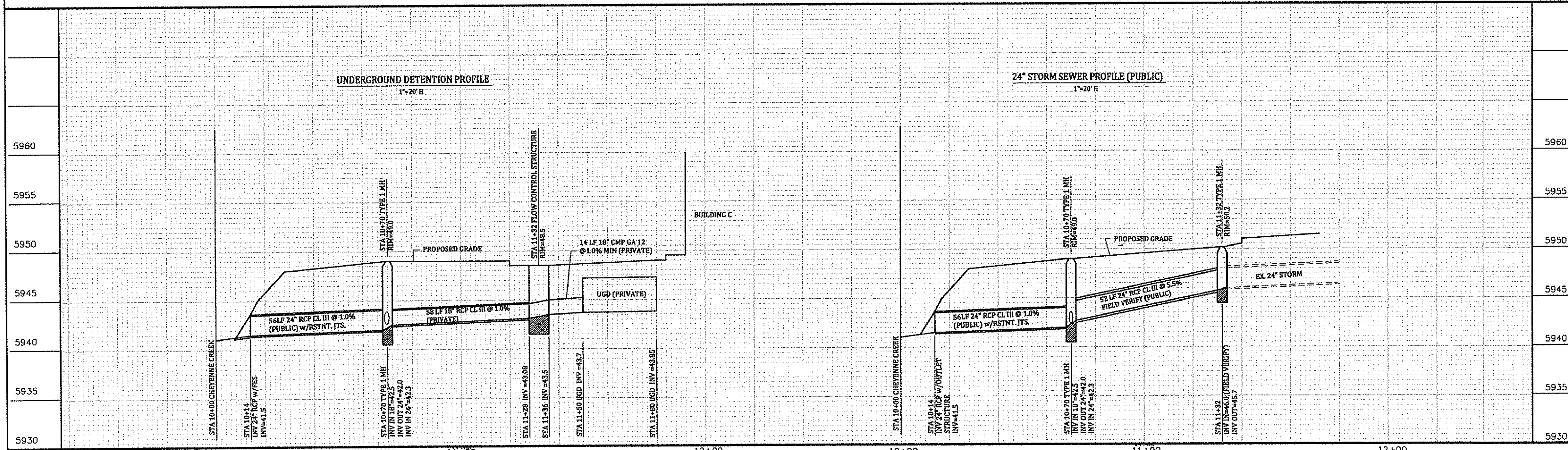
DRAINAGE BASIN: CHEYENNE CREEK

JOB NO. 18012 SHEET 14 OF x



UNDERGROUND DETENTION BASIN SB-3 PLAN
1"=20' H

SCALE: 1"=20'



Computer File Information			
Creation Date:		By:	
Last Modification Date:		By:	
File Path:			
Sheet Model Name:			
Microstation Ver.			

STATEMENT:

THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGNER ENGINEER AS HAVING RESPONSIBILTY FOR THE DESIGN. THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

SCALE: FOR FULL SIZE (22"x34" SHEET)
HORIZ.: N/A VERT.: N/A

Index of Revisions

No.	Description	Date
1		
2		
3		
4		

Structure:
Sheet Subset:
Subset Sheets:

Kiowa Engineering Corporation

Designer:	6/19
Cadd:	6/19
Checker:	6/19

PROJECT: CHEYENNE CREEK at SOUTH NEVADA CREEKWALK FILING #1

UNDERGROUND DETENTION BASIN SB-3 PLAN & PROFILE

DRAINAGE BASIN: CHEYENNE CREEK

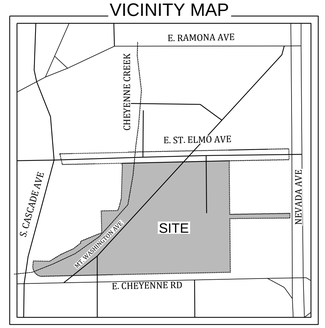
JOB NO. 18012 SHEET 15 OF 15

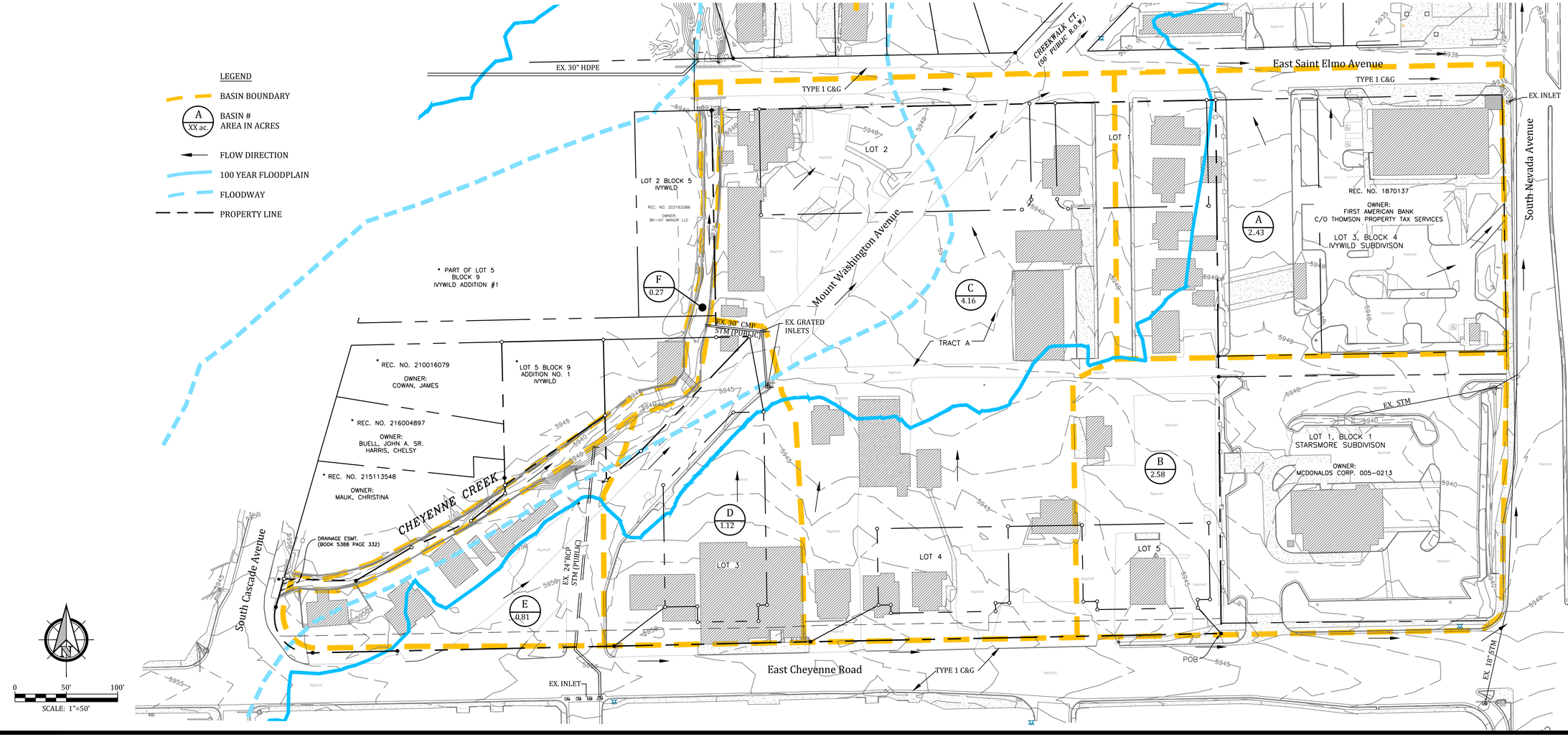
CHEYENNE CREEK HYDROLOGY AT CONFLUENCE WITH FOUNTAIN CREEK
Q_5 = 2,100 cfs
Q_{50} = 5,850 cfs
Q_{100} = 8,840 cfs
Q_{500} = 24,330 cfs

SUMMARY OF DISCHARGES

SUB-BASIN	AREA	Q5	Q100
	ac	cfs	cfs
A	2.43	10.2	18.8
B	2.58	10.9	20.0
C	4.16	6.5	18.3
D	1.12	4.7	8.7
E	0.81	1.1	3.4
F	0.27	0.5	1.2

VICINITY MAP





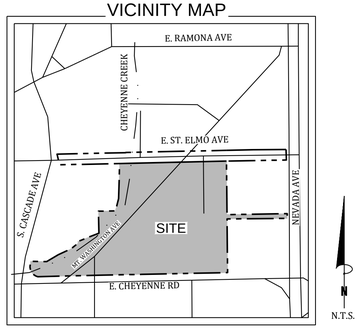
Kiowa Engineering Corporation
Celebrating 30 years
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

SOUTH NEVADA CREEKWALK FILING NO. 1
FINAL DRAINAGE PLAN
EXISTING CONDITION DRAINAGE PLAN
Colorado Springs, Colorado

Project No.:	18012
Date:	June 27, 2019
Design:	RNW
Drawn:	EAK
Check:	RNW
Revisions:	

Exh.1

VICINITY MAP



NOTES:
1. ALL LOTS PLATTED WITH A 7' SIDE, FRONT AND REAR DRAINAGE AND UTILITY EASEMENTS.
2. TRACT A IS A COMMON AREA THAT WILL PROVIDE FOR ACCESS, UTILITIES AND DRAINAGE. TRACT WILL BE MAINTAINED BY CREEKWALK B.I.D.

LEGEND
- BASIN BOUNDARY
- A / XX ac — BASIN # / AREA IN ACRES
- FLOW DIRECTION
- 100 YEAR FLOODPLAIN
- FLOODWAY
- PROPERTY LINE

ALL STORM SEWER FACILITIES SHOWN ON THIS PLAN ARE PRIVATE UNLESS OTHERWISE NOTED.

CHEYENNE CREEK HYDROLOGY AT CONFLUENCE WITH FOUNTAIN CREEK

Q_5 = 2,100 cfs

Q_{50} = 5,850 cfs

Q_{100} = 8,840 cfs

Q_{500} = 24,330 cfs

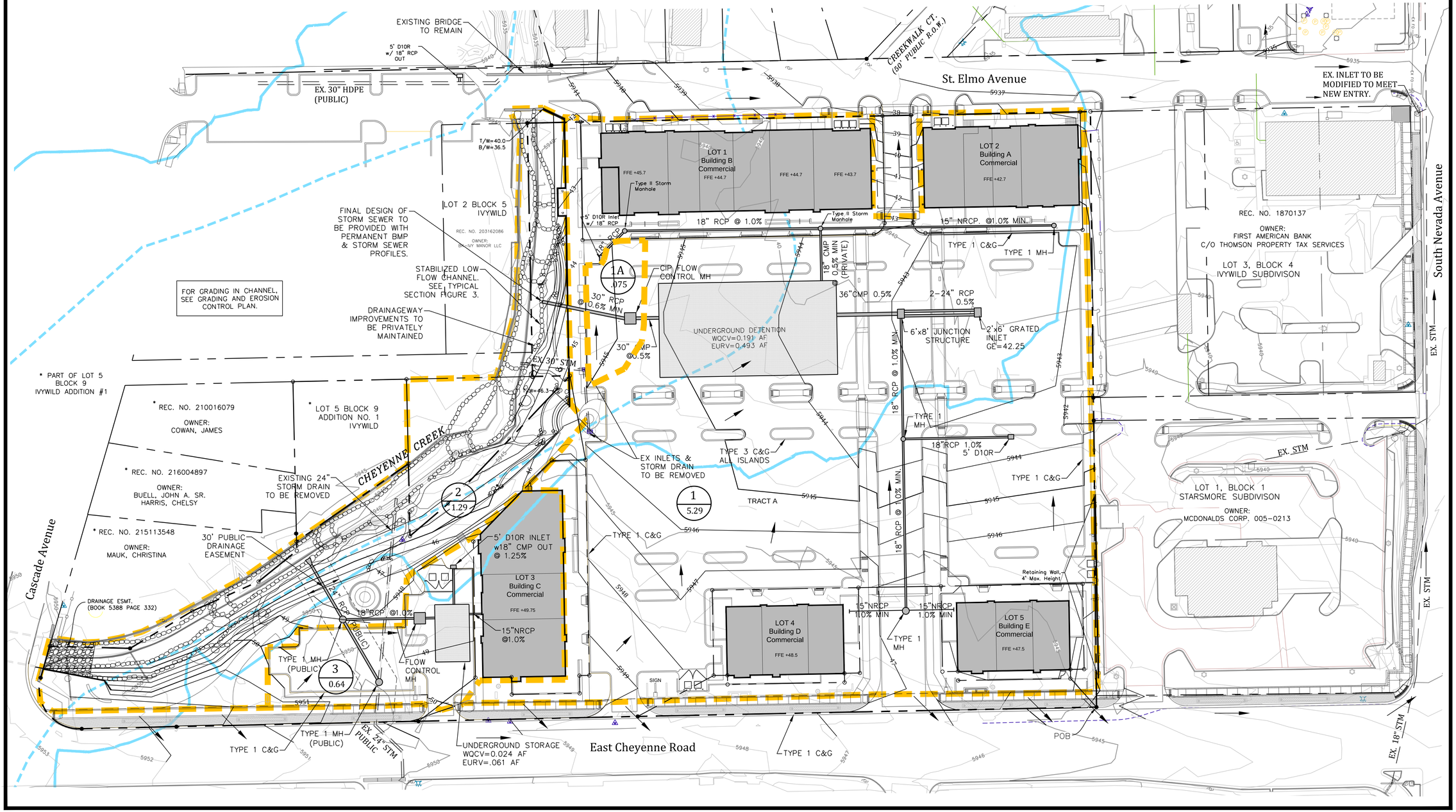
SUMMARY OF DISCHARGES

SUB-BASIN	AREA	Q5	Q100
	ac	cfs	cfs
1	5.29	23.7	42.8
1A	.075	0.3	.6
2	1.29	0.6	4.1
3	0.64	3.0	5.4

N

0 40' 80'

SCALE: 1"=40'



Kiowa Engineering Corporation
Celebrating 30 years
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

SOUTH NEVADA CREEKWALK FILING NO. 1
FINAL DRAINAGE PLAN
PROPOSED CONDITION DRAINAGE PLAN
Colorado Springs, Colorado

Project No.:	18012
Date:	July 3, 2019
Design:	RNW
Drawn:	EAK
Check:	RNW
Revisions:	

Exh.2