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# Summerlin West Village 27

## Technical Drainage Study for Park Drift Trail

### V27 Sunset Run Drive to V22 Lake Mead Boulevard

Prepared for The Howard Hughes Company
May 2023

Update #1

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

# DRAINAGE STUDY INFORMATION FORM

Name of Development: Park Drift Trail: V27 Sunset Run to V22 Lake Mead Date: May 2023

Location of Development: a) Descriptive (Cross Streets) North/South: Sunset Run Drive

East/West: Lake Mead Boulevard

b) Section: 15 & 16 Township: 20S Range: 59E

c) APN : 137-21-501-001 & 137-15-401-003

Name of Owner: Howard Hughes Company, LLC

Telephone No.: (702) 791-4201 Fax No.: (702) 791-4450 E-Mail Address: april.chapman@howardhughes.com

Address: 10845 Griffith Peak Drive Suite 160, Las Vegas, NV 89135

**Contact Person-Name:** Molly Anderson, PE **Telephone No.:** (702) 551 0330

* **E-Mail Address:** Molly.Anderson@atkinsglobal.com **Fax No.:** (702) 263-7200

**Firm:** Atkins

**Address:** 2270 Corporate Circle, Ste 200, Henderson, NV 89074

Type of Land Development/Land Disturbance Process:

| | | | | | |
|---|---|---|---|---|---|
| | Rezoning | | Subdivision Map | | Clearing and Grading Only |
| | Parcel Map | | Planned Unit Development | | Other (Please specify below) |
| | Large Parcel Map | | Building Permit | X | Roadway Improvements |

1. Total Owned Land Area: At Site: +/- 518 acres Being Developed/Disturbed: 18.86 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ **Yes**** ✔ **No**
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? **Yes**** ✔ **No**
4. Proposed type of development (Residential, Commercial, Etc.): Public - Roadway Improvements
5. Approximate upstream land area which drains to the subject site: None
6. Has the site drainage been evaluated in the past? ✔ **YES** **NO** If yes, please identify documentation: Master Conceptual Drainage Study - Summerlin West Villages 27 & 31 Tributary Area to Reverence Detention Basin
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Reverence Detention Basin
8. Briefly describe your proposed schedule for the subject project: ASAP




Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

***New Required Field**

****Review and concurrence of the Clark County Regional Flood Control District is required.**

DS#5563B

Local Entity File No.

| Revision | Date |
|---|---|
| | |
| | |
| | |

REFERENCE:

STANDARD FORM 1

Updated 05/01/2008

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

# DRAINAGE SUBMITTAL CHECKLIST

| | |
|---|---|
| Project Name: V27 Park Drift Trail - V27 Sunset Run Dr to V22 Lake Mead Blvd | Map ID: |
| Firm Name: Atkins | Engineer: Molly Anderson |
| Address: 2270 Corporate Circle, Ste 200<br>City: Henderson | State: NV Zip: 89074 |
| Phone Number: (702) 551-0330 | Fax Number: (702) 263-7200 |
| Property Owner: Howard Hughes Company, LLC | |
| Address: 10845 Griffith Peak Drive Suite 160<br>City: Las Vegas | State: NV Zip: 89135 |

| Reviewed By: | Date Received: | Date Accepted for Review: |
|---|---|---|
| | | |

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

**I. GENERAL REQUIREMENT**

| Yes | No | |
|---|---|---|
| x | | Design Manual **Standard Form 1** with the engineer's seal and signature. |
| X | | Design Manual **Standard Form 4**. |
| X | | 2 copies of the 24” x 36” Drainage Plan. |
| | N/A | A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. |

**II. MAPS AND EXHIBITS**

| Yes | No | |
|---|---|---|
| X | | A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated. |
| X | | A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated. |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**II. MAPS AND EXHIBITS (Continued)**

| Yes | No | |
|---|---|---|
| X | | Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs. |
| X | | On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs. |
| X | | Vicinity Map with local and major cross streets identified and a north arrow. |

**III. DRAINAGE PLAN**

| Yes | No | |
|---|---|---|
| X | | Sheet size: 24” x 36” sealed by a registered engineer in the State of Nevada. |
| X | | Minimum scale: 1” = 60’. |
| X | | Project name. |
| X | | Vicinity Map with local and major cross streets. |
| X | | Revision box. |
| X | | North arrow and bar scale. |
| X | | Engineer’s/consultant’s address and phone number. |
| X | | Elevation datum and benchmark. |
| X | | Legend for symbols and abbreviations. |
| X | | Cut/fill scarps, where applicable. |
| X | | Street names, grades, widths. |
| X | | Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. |
| X | | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate. |
| X | | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot. |
| X | | Proposed typical street sections. |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**III. DRAINAGE PLAN (Continued)**

| Yes | No | |
|---|---|---|
| X | | Streets with off-set crowns. |
| X | | Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes. |
| X | | Property lines. |
| X | | Right-of-way lines and widths, existing and proposed. |
| X | | Existing improvements and their elevations. |
| X | | Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points. |
| X | | Concentration points and drainage flow direction with $Q_{100}$ and $V_{100}$ and $D_{100}$ in streets. |
| X | | Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows. |
| X | | Location and cross-section of street capacity calculations. |
| X | | Cross-sectional detail for channels, including cutoff wall locations. |
| X | | Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations. |
| X | | Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement. |
| | N/A | Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs. |
| | N/A | Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc. |
| | N/A | Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit. |
| X | | Building and/or lot numbers. |
| X | | Alignment of all existing, proposed, or future Regional Facilities adjacent to the site. |
| X | | Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information. |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**III. DRAINAGE PLAN (Continued)**

| Yes | No | |
|---|---|---|
| X | | For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| X | | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the $Q_{100}$ flows. |
| X | | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |
| X | | Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required). |

**IV. HYDROLOGIC ANALYSIS**

| Yes | No | |
|---|---|---|
| X | | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| X | | Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| X | | Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| X | | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| X | | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| X | | A summary table of stormwater flows showing basin area, $Q_{10}$ and $Q_{100}$ for both individual basins and combined basin flows, where applicable. |
| X | | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| X | | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |
| | N/A | Calculation for impervious area for parking lots and LIDs (if required). |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# DRAINAGE SUBMITTAL CHECKLIST

**V. HYDRAULIC ANALYSIS**

| Yes | No | |
|---|---|---|
| | N/A | Flow split calculations and supporting documentation or reference for the method of flow split calculations used. |
| X | | Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the $Q_{100}$ and $Q_{10}$ flows representing the worst case for interior and all perimeter streets. $Q_{100}$ d x v $\leq$ 8. $Q_{10}$ d x v $\leq$ 6 and 12 foot dry lane for rights-of-way $\geq$ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan. |
| X | | A summary table of interior and exterior street capacity calculations showing the street name, $Q_{100}$ flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria. |
| | N/A | Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.) |
| | N/A | Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate. |
| | N/A | Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the $Q_{100}$ weir height or flow depth, whichever is greater. |
| | N/A | A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones.<br>• Field survey data.<br>• Input and output information.<br>• Plotted cross-sections based on survey with proper encroachments.<br>• A map showing the location of the cross-sections.<br>• Analysis of both sub and super-critical flow segments.<br>• A summary table and a discussion of the results in the text of the report. |
| X | | Provide a 50 percent clogging factor in the capacity calculation for drop inlets. |
| X | | Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation. |
| X | | The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed. |
| | N/A | Provide BMP type, size and supporting calculations for parking lots and LIDs (if required). |

| **REFERENCE:** | **STANDARD FORM 2** |
|---|---|

# CITY OF LAS VEGAS

## MINIMUM DRAINAGE STUDY CRITERIA
## STANDARD FORM 2 CHECKLIST SUPPLEMENT

**(Revised 5/18/11)**

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

**If items are not applicable for the subject site, provide N/A.**

| I. GENERAL REQUIREMENT | | |
|---|---|---|
| Yes | No | |
| | N/A | A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.) |
| X | | Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions. |
| X | | An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file.<br>MA by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas. |

| II. GRADING PLAN INFORMATION | | |
|---|---|---|
| Yes | No | |
| X | | (1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer. |
| X | | Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required. |
| X | | Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.) |

| II. GRADING PLAN INFORMATION | | |
|---|---|---|
| Yes | No | |
| X | | Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains. |
| X | | All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property. |
| X | | Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met. |
| | N/A | Back of lot elevations and lot drainage pattern for all lots including common lots. |
| | N/A | Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study. |
| X | | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.) |
| X | | This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included. |
| X | | Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW. |

| III. Local Entity Criteria - City of Las Vegas – Manual Section 1600 | | |
|---|---|---|
| Yes | No | |
| | N/A | Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac. |
| X | | Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation. |
| X | | The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc. |
| | N/A | Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections. |
| | N/A | Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater. |

| III. Local Entity Criteria - City of Las Vegas – Manual Section 1600 | | |
|---|---|---|
| Yes | No | |
| | N/A | Lots with “B and C Type Drainage” that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16” x 24” minimum block wall openings are required for both options. |
| | N/A | Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36”. Inlets must be sized to match the pipe size provided. |

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

# Engineer's Certification

Atkins certifies that the information contained herein has been prepared in accordance with generally accepted engineering principles and practices, and, to the best of our knowledge, is true and correct.

This letter certifies that all items in the **Update #1 to the Technical Drainage Study for Park Drift Trail (Lake Mead Boulevard to Sunset Run Drive) (DS#5563)** submittal matches the paper version bound into the study.




_____

Molly M. Anderson, PE (NV #24365)

Senior Engineer

# Contents


| Chapter | | Page |
|---|---|---|
| **Engineer's Certification** | | **2** |
| **Update #1 Letter** | | **4** |
| **Appendix A.** | **Prior Approval Letter** | |
| **Appendix B.** | **Hydrology Calculations** | |
| B.1. | Hydrology Figures | |
| B.2. | Hydrology Parameters | |
| B.3. | Hydrologic Models (HEC-1) | |
| **Appendix C.** | **Hydraulics Calculations** | |
| C.1. | Hydraulics Figures | |
| C.2. | Drop Inlet / Roadway Normal Depth Calculations | |
| C.3. | WSPG Models | |
| **Appendix D.** | **Plans** | |
| **Appendix E.** | **CD-ROM** | |

# Update #1 Letter

Your reference: DS #5563B

Albert Sung
City of Las Vegas Public Works
495 S. Main Street
Las Vegas, NV 89106

May 2023

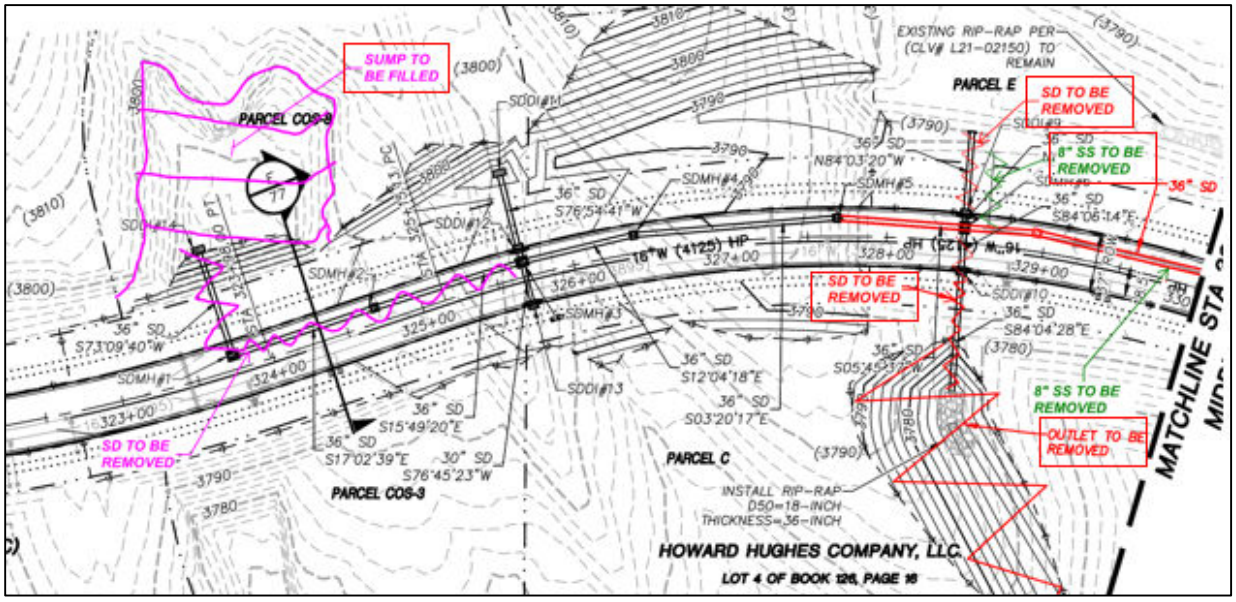
**RE: Summerlin West - Village 27 Park Drift Trail (Lake Mead Boulevard to Sunset Run Drive)**

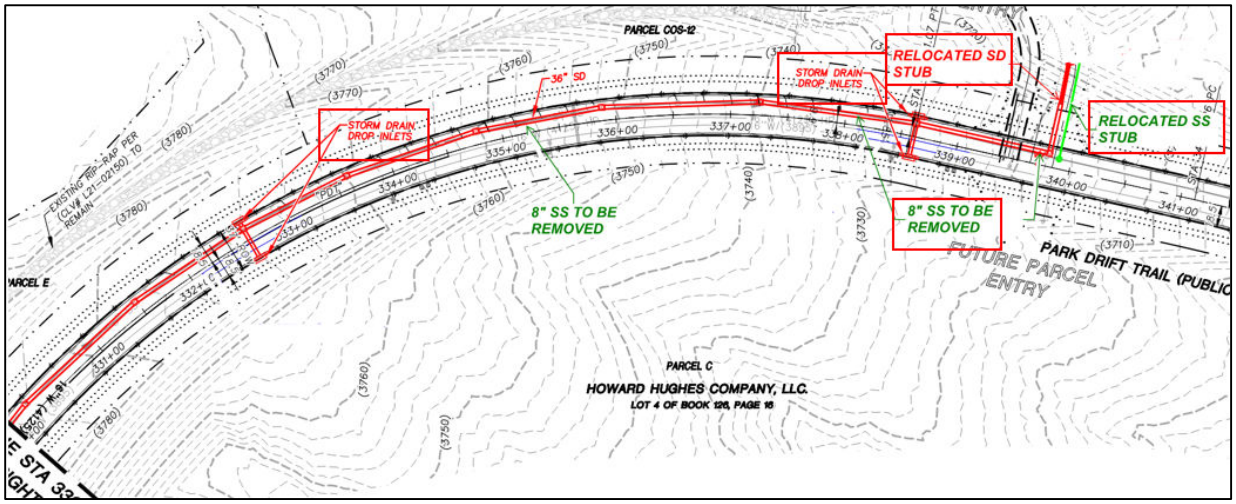
Dear Albert,

This letter and the attached documents have been prepared as an Update #1 to the Technical Drainage Study for Park Drift Trail (Lake Mead Boulevard to Sunset Run Drive).

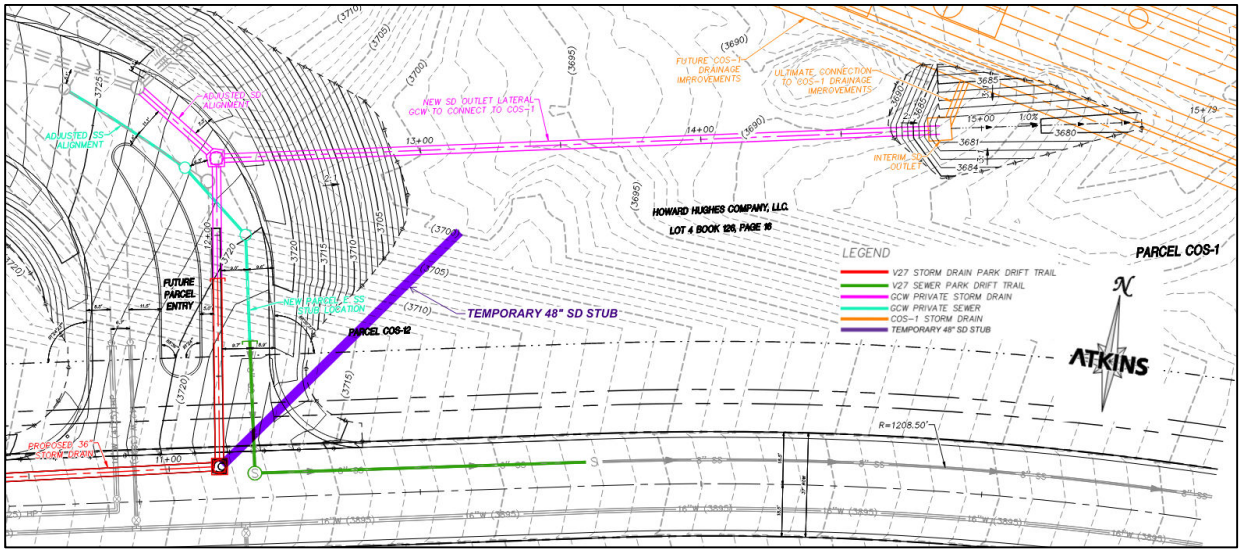
The changes to this study include:

- Minor parcel boundary changes and adding of common element to North-South portion of Park Drift Trail adjacent to Parcel E
- Land use Density revisions to Parcel E and C.
- Additional storm drain to capture flow from subbasin COS-8b and route flow with street flow through the North-South segment of Park Drift Trail. (This flow is no longer routed through Parcel C).






- Parcel E flow is no longer intercepted in this study. Storm Water discharge from Parcel E will be addressed with future Parcel E submittals.




All hydrology calculations have been updated and revised along with the associated hydraulic calculations. The existing riprap placed in the Village 27 Rough Grade proposal will be in place for the interim condition of this study. All riprap calculations and assumptions are still valid.

Molly Anderson

Digitally signed by Molly Anderson
Location: Henderson, NV
Reason: I attest to the accuracy and integrity of this document
Contact Info: molly.anderson@atkinsglobal.com
Date: 2023.05.18 12:32:51-07'00'

Molly M. Anderson, PE (NV #24365)
Senior Engineer

# Appendices

# Appendix A. Prior Approval Letter

| CITY OF LAS VEGAS<br>INTER-OFFICE MEMORANDUM | | | | DATE:<br><br>July 21, 2022 |
|---|---|---|---|---|
| TO:<br>**Land Development Services**<br>Department of Building & Safety | | | | FROM:<br>Albert Sung, P.E.<br>Flood Control Project Engineer<br>Department of Public Works |
| **SUBJECT:** | Drainage Study for: | | | **COPIES TO:** |
| **Summerlin West Village 27 - Park Drift Trail**<br>**(V27 Sunset Run Drive to V22 Lake Mead Boulevard)** | | | | Atkins |
| **Cross Streets:** | V27 Sunset Run Dr. & V22 Lake Mead Blvd. | | | Howard Hughes Company, LLC |
| **File Number:** | F:\Depot\DSMemos\DS5563B.doc | | | Bart Anderson, P.E., DevCo |
| **Parcel Number:** | 137-21-501-001 and 137-15-401-003 | | | CCRFCD |
| **Zoning Action:** | N/A | | | |
| **FEMA Flood Zone** | YES | NO **X** | | |
| **Proposed Storm Drain** | YES **X** | NO | | |

| HISTORY | DATE RECEIVED | DATE REVIEWED | COMMENTS | REVIEW FEES | FEES PAID Payment Trn # |
|---|---|---|---|---|---|
| 1st Submittal | 4/26/2022 | 5/18/2022 | Not Approved | $400.00 | 4755128: $400 |
| 2nd Submittal | 7/6/2022 | 7/21/2022 | See Comments Below | $400.00 | 4860678: $400 |
| | | | **TOTAL FEES (LDDRS):** | **$800.00** | **----** |

**REMARKS:**

***** The Conditional Approval of this Drainage Study is to allow the engineer/developer to submit the Improvement Plans to City Land Development Only**

***** Do not submit the Drainage Study to Clark County Regional Flood Control District (CCRFCD) prior to the Structural Design and Calculations being approved by the City Building & Safety Department**

The Drainage Study for the subject project has been reviewed and:

| | |
|---|---|
| | is approved subject to conformance to all City standards and the following conditions: |
| | must be resubmitted or supplemented including the following: |
| **X** | is conditionally approved subject to Clark County Regional Flood Control District concurrence. |
| | is conditionally approved subject to Clark County Public Works Department concurrence. |

1. The project proposes to build temporary drainage facilities, ie, the interim berms/swales along both sides of *Park Drift Trail* for flood protection. Prior to final plan approval the developer must complete a maintenance and liability agreement for the interim drainage improvements (berms or channels) and post a minimum maintenance bond of $50,000 or 50-percent of the construction cost for the improvements, whichever is greater. The engineer must submit an estimate of the quantities for constructing the facility and an exhibit that adequately shows the location and limits of the drainage facility to *City of Las Vegas Flood Control* for approval. Once the drainage study is conditionally approved, the engineer should contact the *City's Land Development Section* (229-6371) to begin the agreement process.

In order for the maintenance bond to be released in the future, a drainage update / letter will be required to justify that the offsite berms / channels are no longer necessary and can be removed.

2. **This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

   Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

   http://gustfront.ccrfcd.org/LandDev/LandDev.aspx

3. All storm drain inlets that are more than 10'-deep such as *SDDI #12* require a special structural detail and calculations. Submit structural design and calculations to *City Building & Safety Department* for review and approval prior to the final approval of the drainage study.
4. The *Boundary Channel Drainage Study and the Improvement Plans* must be approved and construction bond posted prior to the subject *Park Drift Trail* Improvements. The subject drainage study will not be approved prior to the *Boundary Channel Drainage Study* approval.

**NOTE:** Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the Nevada Division of Environmental Protection a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

**END OF REMARKS**
HDR/AYS

T/R/S: T20S/R59E/21
AREA K-21

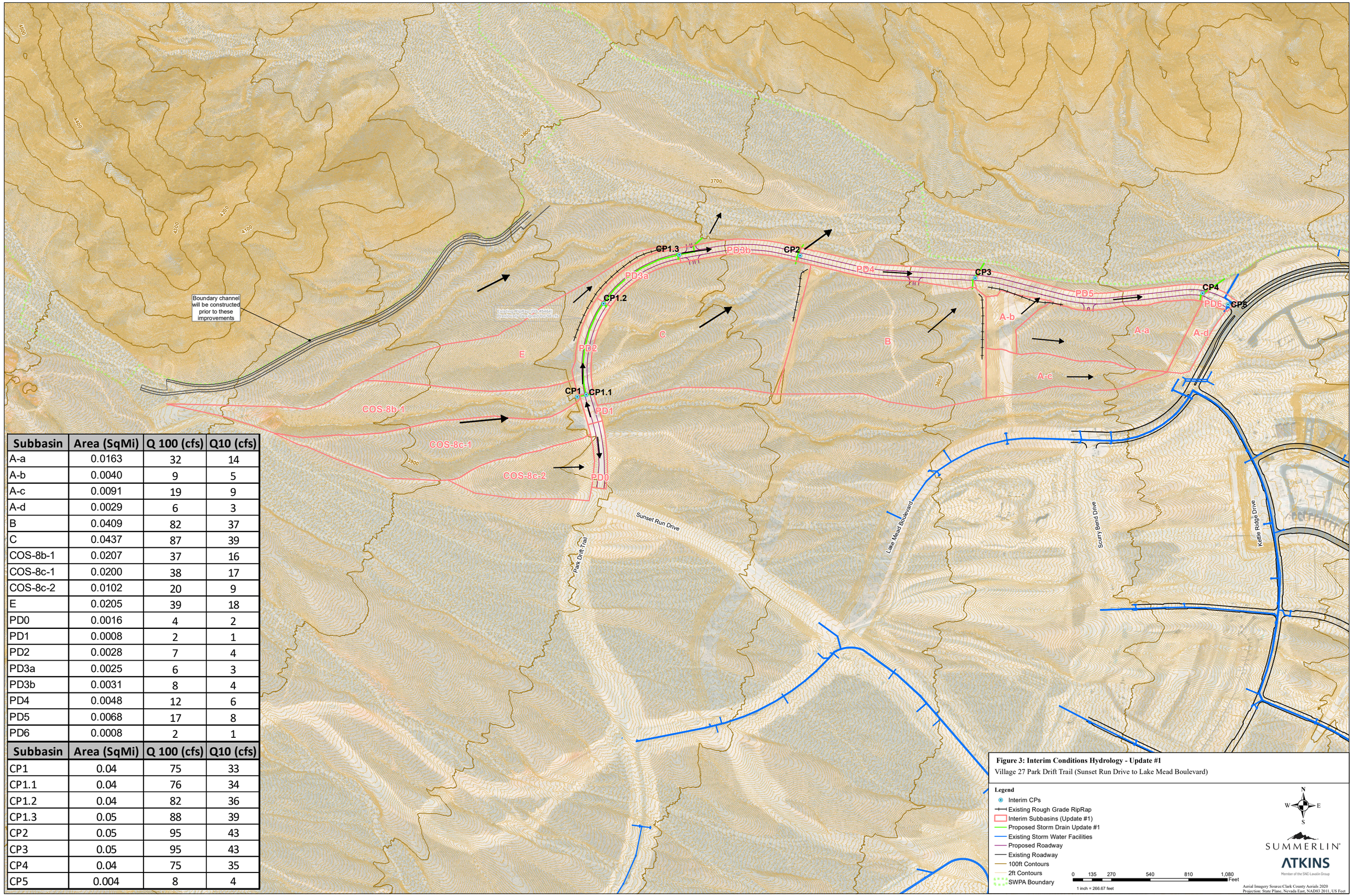
# Appendix B. Hydrology Calculations

## B.1. Hydrology Figures

## B.2. Hydrology Parameters

## B.3. Hydrologic Models (HEC-1)

## B.1. Hydrology Figures




| Subbasin | Area (SqMi) | Q 100 (cfs) | Q10 (cfs) |
|---|---|---|---|
| A-a | 0.0163 | 32 | 14 |
| A-b | 0.0040 | 9 | 5 |
| A-c | 0.0091 | 19 | 9 |
| A-d | 0.0029 | 6 | 3 |
| B | 0.0409 | 82 | 37 |
| C | 0.0437 | 87 | 39 |
| COS-8b-1 | 0.0207 | 37 | 16 |
| COS-8c-1 | 0.0200 | 38 | 17 |
| COS-8c-2 | 0.0102 | 20 | 9 |
| E | 0.0205 | 39 | 18 |
| PD0 | 0.0016 | 4 | 2 |
| PD1 | 0.0008 | 2 | 1 |
| PD2 | 0.0028 | 7 | 4 |
| PD3a | 0.0025 | 6 | 3 |
| PD3b | 0.0031 | 8 | 4 |
| PD4 | 0.0048 | 12 | 6 |
| PD5 | 0.0068 | 17 | 8 |
| PD6 | 0.0008 | 2 | 1 |

| Subbasin | Area (SqMi) | Q 100 (cfs) | Q10 (cfs) |
|---|---|---|---|
| CP1 | 0.04 | 75 | 33 |
| CP1.1 | 0.04 | 76 | 34 |
| CP1.2 | 0.04 | 82 | 36 |
| CP1.3 | 0.05 | 88 | 39 |
| CP2 | 0.05 | 95 | 43 |
| CP3 | 0.05 | 95 | 43 |
| CP4 | 0.04 | 75 | 35 |
| CP5 | 0.004 | 8 | 4 |

**Figure 3: Interim Conditions Hydrology - Update #1**

Village 27 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard)

**Legend**

- Interim CPs
- Existing Rough Grade RipRap
- Interim Subbasins (Update #1)
- Proposed Storm Drain Update #1
- Existing Storm Water Facilities
- Proposed Roadway
- Existing Roadway
- 100ft Contours
- 2ft Contours
- SWPA Boundary

0 135 270 540 810 1,080 Feet

1 inch = 266.67 feet

N W E S

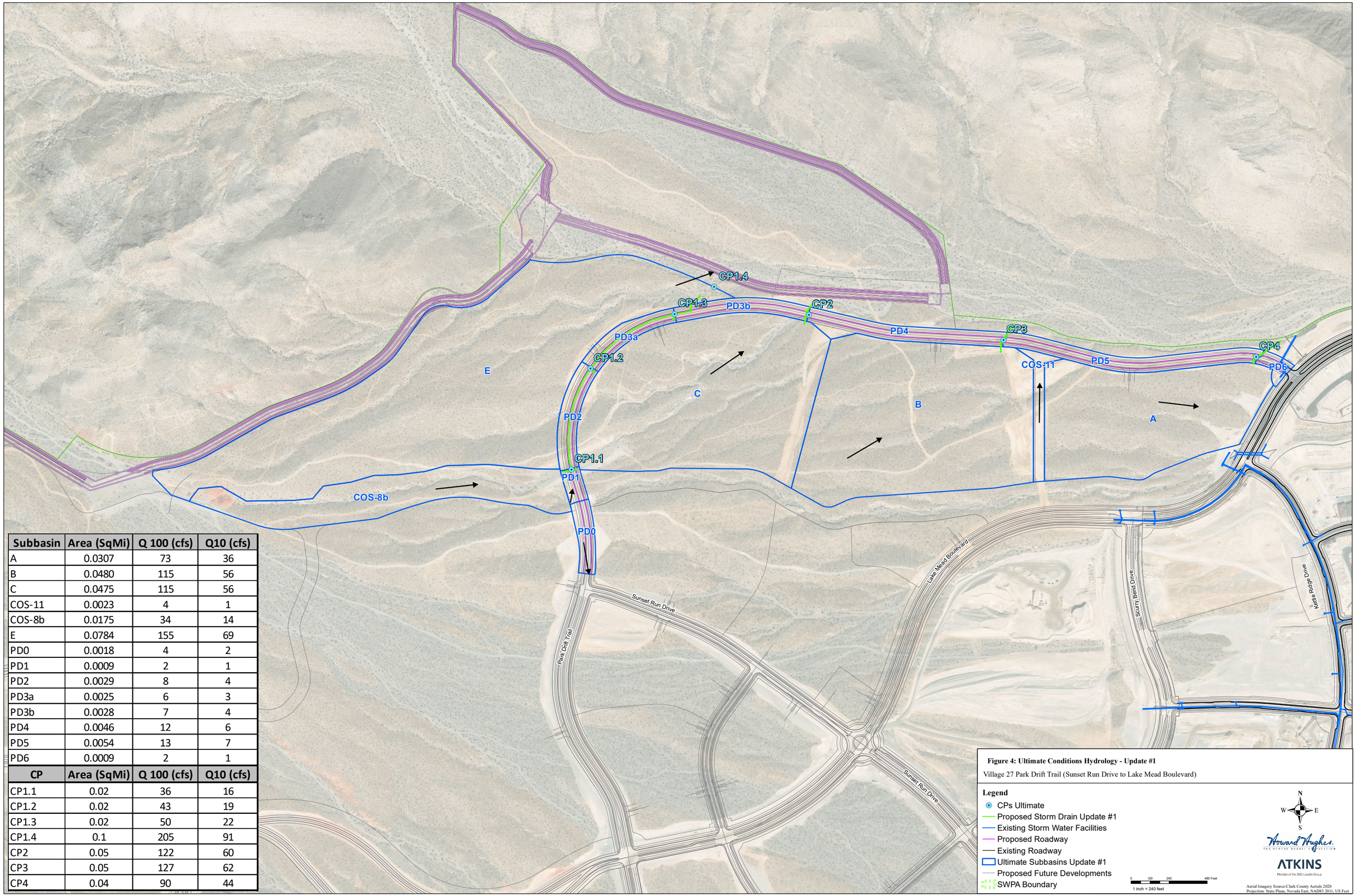
SUMMERLIN

ATKINS

Member of the SNC-Lavalin Group

Aerial Imagery Source:Clark County Aerials 2020

Projection: State Plane, Nevada East, NAD83 2011, US Feet




| Subbasin | Area (SqMi) | Q 100 (cfs) | Q10 (cfs) |
|---|---|---|---|
| A | 0.0307 | 73 | 36 |
| B | 0.0480 | 115 | 56 |
| C | 0.0475 | 115 | 56 |
| COS-11 | 0.0023 | 4 | 1 |
| COS-8b | 0.0175 | 34 | 14 |
| E | 0.0784 | 155 | 69 |
| PD0 | 0.0018 | 4 | 2 |
| PD1 | 0.0009 | 2 | 1 |
| PD2 | 0.0029 | 8 | 4 |
| PD3a | 0.0025 | 6 | 3 |
| PD3b | 0.0028 | 7 | 4 |
| PD4 | 0.0046 | 12 | 6 |
| PD5 | 0.0054 | 13 | 7 |
| PD6 | 0.0009 | 2 | 1 |
| **CP** | **Area (SqMi)** | **Q 100 (cfs)** | **Q10 (cfs)** |
| CP1.1 | 0.02 | 36 | 16 |
| CP1.2 | 0.02 | 43 | 19 |
| CP1.3 | 0.02 | 50 | 22 |
| CP1.4 | 0.1 | 205 | 91 |
| CP2 | 0.05 | 122 | 60 |
| CP3 | 0.05 | 127 | 62 |
| CP4 | 0.04 | 90 | 44 |

**Figure 4: Ultimate Conditions Hydrology - Update #1**

Village 27 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard)

**Legend**

- CPs Ultimate
- Proposed Storm Drain Update #1
- Existing Storm Water Facilities
- Proposed Roadway
- Existing Roadway
- Ultimate Subbasins Update #1
- Proposed Future Developments
- SWPA Boundary

N W E S

0 120 240 480 Feet

1 inch = 240 feet

Howard Hughes

ATKINS

Member of the SNC-Lavalin Group

Aerial Imagery Source:Clark County Aerials 2020
Projection: State Plane, Nevada East, NAD83 2011, US Feet

## B.2. Hydrology Parameters

# CN CALCULATIONS FOR SUMMERLIN WEST VILLAGE 27

## Interim Conditions
## Park Drift Trail
## Sunset Run Drive to Lake Mead Boulevard
Update #1

| BASIN ID | LAND USE INDEX NUMBER | LAND USE DESCRIPTION | SOIL MAP UNIT # | SUBREGION CN | SUBREGION AREA (SQ FT) | SUBBASIN AREA (SQ FT) | PERCENT OF SUBBASIN | CUMULATIVE PERCENT | AREAL WEIGHTED CN | CUMULATIVE CN | COMPOSITE CN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A-a | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 428276 | 455613 | 94.0% | 94.0% | 82.72 | 82.72 | |
| A-a | 14 | Newly Graded Areas | 1155 | 94 | 27337 | 455613 | 6.0% | 100.0% | 5.64 | 88.36 | **88.4** |
| A-b | 14 | Newly Graded Areas | 1155 | 94 | 112380 | 112380 | 100.0% | 100.0% | 94.00 | 94.00 | **94.0** |
| A-c | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 180050 | 253592 | 71.0% | 71.0% | 62.48 | 62.48 | |
| A-c | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 5072 | 253592 | 2.0% | 73.0% | 1.76 | 64.24 | |
| A-c | 14 | Newly Graded Areas | 1155 | 94 | 63398 | 253592 | 25.0% | 98.0% | 23.50 | 87.74 | |
| A-c | 14 | Newly Graded Areas | 1155 | 94 | 5072 | 253592 | 2.0% | 100.0% | 1.88 | 89.62 | **89.6** |
| A-d | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 68425 | 79564 | 86.0% | 86.0% | 75.68 | 75.68 | |
| A-d | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 3978 | 79564 | 5.0% | 91.0% | 4.55 | 80.23 | |
| A-d | 14 | Newly Graded Areas | 1155 | 94 | 7161 | 79564 | 9.0% | 100.0% | 8.46 | 88.69 | **88.7** |
| B | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 1014814 | 1140240 | 89.0% | 89.0% | 78.32 | 78.32 | |
| B | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 1140 | 1140240 | 0.1% | 89.1% | 0.09 | 78.41 | |
| B | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 1140 | 1140240 | 0.1% | 89.2% | 0.09 | 78.50 | |
| B | 14 | Newly Graded Areas | 1155 | 94 | 77536 | 1140240 | 6.8% | 96.0% | 6.39 | 84.89 | |
| B | 14 | Newly Graded Areas | 1155 | 94 | 45610 | 1140240 | 4.0% | 100.0% | 3.76 | 88.65 | **88.7** |
| C | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 1083744 | 1217690 | 89.0% | 89.0% | 78.32 | 78.32 | |
| C | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 1218 | 1217690 | 0.1% | 89.1% | 0.09 | 78.41 | |
| C | 14 | Newly Graded Areas | 1155 | 94 | 133946 | 1217690 | 11.0% | 100.0% | 10.34 | 88.75 | **88.8** |
| COS-8b-1 | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 514400 | 577977 | 89.0% | 89.0% | 78.32 | 78.32 | |
| COS-8b-1 | 1 | Undeveloped Land, Open Desert | 1320 | 88 | 11560 | 577977 | 2.0% | 91.0% | 1.76 | 80.08 | |
| COS-8b-1 | 1 | Undeveloped Land, Open Desert | 1191 | 63 | 52018 | 577977 | 9.0% | 100.0% | 5.67 | 85.75 | **85.8** |
| COS-8c-1 | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 553309 | 558898 | 99.0% | 99.0% | 87.12 | 87.12 | |
| COS-8c-1 | 1 | Undeveloped Land, Open Desert | 1191 | 63 | 5589 | 558898 | 1.0% | 100.0% | 0.63 | 87.75 | **87.8** |
| COS-8c-2 | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 284470 | 284470 | 100.0% | 100.0% | 88.00 | 88.00 | **88.0** |
| E | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 571669 | 571669 | 100.0% | 100.0% | 88.00 | 88.00 | **88.0** |
| PD0 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 44632 | 44632 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD1 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 21377 | 21377 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD2 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 17763 | 77229 | 23.0% | 23.0% | 20.93 | 20.93 | |
| PD2 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 59467 | 77229 | 77.0% | 100.0% | 70.07 | 91.00 | **91.0** |
| PD3a | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 70811 | 70811 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD3b | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 85546 | 85546 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD4 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 18834 | 134531 | 14.0% | 14.0% | 12.74 | 12.74 | |
| PD4 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 107625 | 134531 | 80.0% | 94.0% | 72.80 | 85.54 | |
| PD4 | 14 | Newly Graded Areas | 1155 | 94 | 8072 | 134531 | 6.0% | 100.0% | 5.64 | 91.18 | **91.2** |
| PD5 | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 11397 | 189942 | 6.0% | 6.0% | 5.28 | 5.28 | |
| PD5 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 136758 | 189942 | 72.0% | 78.0% | 65.52 | 70.80 | |
| PD5 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 24692 | 189942 | 13.0% | 91.0% | 11.83 | 82.63 | |

# CN CALCULATIONS FOR SUMMERLIN WEST VILLAGE 27

## Interim Conditions
## Park Drift Trail
## Sunset Run Drive to Lake Mead Boulevard
Update #1

| BASIN ID | LAND USE INDEX NUMBER | LAND USE DESCRIPTION | SOIL MAP UNIT # | SUBREGION CN | SUBREGION AREA (SQ FT) | SUBBASIN AREA (SQ FT) | PERCENT OF SUBBASIN | CUMULATIVE PERCENT | AREAL WEIGHTED CN | CUMULATIVE CN | COMPOSITE CN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PD5 | 14 | Newly Graded Areas | 1155 | 94 | 15195 | 189942 | 8.0% | 99.0% | 7.52 | 90.15 | |
| PD5 | 14 | Newly Graded Areas | 1155 | 94 | 1899 | 189942 | 1.0% | 100.0% | 0.94 | 91.04 | **91.0** |
| PD6 | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 696 | 23201 | 3.0% | 3.0% | 2.64 | 2.64 | |
| PD6 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 22505 | 23201 | 97.0% | 100.0% | 88.27 | 90.91 | **90.9** |
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# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

**Atkins**
**File: FORM4.XLS**

ATKINS
Member of the SNC-Lavalin Group

**Summerlin West Village 27**
**Park Drift Trail**
**(Sunset Run Drive to Lake Mead Boulevard)**
**ATKINS HEC-1 Hydrologic Parameters**
Interim Conditions
Update #1

**BY:** **KP**
**QC:**
**DATE:** **5/11/23**

| DESIG: (1) | DEV./EX. (D or E) | CN | K (2) | AREA Ac (3) | AREA Mi^2 | INITIAL LENGTH Feet (4) | SLOPE % (5) | Ti Min (6) | TRAVEL LENGTH Feet (7) | SLOPE % (8) | V1 VELOCITY FPS (9a) | V2 VELOCITY FPS (9b) | Tt Min (10) | Tc Min (13) | Tc Check Min (14) | Tlag= 0.6Tc/60 Hours | RAINFALL Q100/Q10 Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A-a | E | 88.4 | 0.8 | 10.5 | 0.0163 | 100 | 2.0 | 4.6 | 1204 | 7.6 | 4.1 | 8.1 | 3.5 | 8.1 | N/A | **0.10**** | 3.45 |
| A-b | E | 94.0 | 0.9 | 2.6 | 0.0040 | 100 | 2.0 | 3.6 | 542 | 3.9 | 2.9 | 5.8 | 3.0 | 6.5 | N/A | **0.10**** | 3.46 |
| A-c | E | 89.6 | 0.8 | 5.8 | 0.0091 | 150 | 2.0 | 5.4 | 1,296 | 8.2 | 4.2 | 8.4 | 3.5 | 8.9 | N/A | **0.10**** | 3.46 |
| A-d | E | 88.7 | 0.8 | 1.8 | 0.0029 | 100 | 2.0 | 4.6 | 542 | 4.1 | 3.0 | 6.0 | 2.9 | 7.5 | N/A | **0.10**** | 3.45 |
| B | E | 88.7 | 0.8 | 26.2 | 0.0409 | 100 | 2.0 | 4.6 | 1423 | 8.2 | 4.2 | 8.4 | 3.8 | 8.4 | N/A | **0.10**** | 3.48 |
| C | E | 88.8 | 0.8 | 28.0 | 0.0437 | 100 | 2.0 | 4.5 | 1700 | 7.6 | 4.1 | 8.1 | 4.5 | 9.1 | N/A | **0.10**** | 3.50 |
| COS-8b1 | E | 85.8 | 0.7 | 13.3 | 0.0207 | 100 | 2.0 | 5.1 | 2800 | 7.5 | 4.1 | 8.1 | 6.8 | 11.9 | N/A | **0.12** | 3.53 |
| COS-8c-1 | E | 87.8 | 0.8 | 12.8 | 0.0200 | 100 | 2.0 | 4.7 | 2000 | 8.0 | 4.2 | 8.3 | 5.0 | 9.7 | N/A | **0.12** | 3.52 |
| COS-8c-2 | E | 88.0 | 0.8 | 6.5 | 0.0102 | 100 | 2.0 | 4.7 | 1000 | 8.0 | 4.2 | 8.3 | 3.0 | 7.7 | N/A | **0.10**** | 3.52 |
| E | E | 88.0 | 0.8 | 13.1 | 0.0205 | 100 | 2.0 | 4.7 | 2500 | 7.9 | 4.2 | 8.3 | 6.0 | 10.7 | N/A | **0.11** | 3.52 |
| PD0 | D | 91.0 | 0.8 | 1.0 | 0.0016 | 30 | 2.0 | 2.3 | 450 | 0.7 | 1.7 | 2.6 | 4.4 | 6.7 | 12.7 | **0.07** | 3.50 |
| PD1 | D | 91.0 | 0.8 | 0.5 | 0.0008 | 30 | 2.0 | 2.3 | 200 | 1.9 | 2.8 | 4.2 | 1.2 | 3.5 | 11.3 | **0.05*** | 3.50 |
| PD2 | D | 91.0 | 0.8 | 1.8 | 0.0028 | 30 | 2.0 | 2.3 | 600 | 2.5 | 3.2 | 4.8 | 3.0 | 5.2 | 13.5 | **0.05** | 3.50 |
| PD3a | D | 91.0 | 0.8 | 1.6 | 0.0025 | 30 | 2.0 | 2.3 | 600 | 7.0 | 5.3 | 8.1 | 1.8 | 4.0 | 13.5 | **0.05*** | 3.50 |
| PD3b | D | 91.0 | 0.8 | 2.0 | 0.0031 | 30 | 2.0 | 2.3 | 850 | 7.0 | 5.3 | 8.1 | 2.3 | 4.5 | 14.9 | **0.05*** | 3.50 |
| PD4 | D | 91.2 | 0.8 | 3.1 | 0.0048 | 30 | 2.0 | 2.2 | 1200 | 6.8 | 5.3 | 8.0 | 3.0 | 5.3 | 16.8 | **0.05** | 3.48 |
| PD5 | D | 91.0 | 0.8 | 4.4 | 0.0068 | 30 | 2.0 | 2.3 | 1600 | 6.8 | 5.3 | 8.0 | 3.9 | 6.1 | 19.1 | **0.06** | 3.46 |
| PD6 | D | 90.9 | 0.8 | 0.5 | 0.0008 | 30 | 2.0 | 2.3 | 200 | 3.8 | 3.9 | 6.0 | 0.8 | 3.1 | 11.3 | **0.05*** | 3.45 |

Tc = Ti + Tt  Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

V1 = 14.8*(S/100)^1/2  Developed V1 = 20.2*(S/100)^1/2
V2 = 29.4*(S/100)^1/2  Developed V2 = 30.6*(S/100)^1/2

*Minimum recommended Tc for developed subbasins is 5 mins. A value of 0.05 was use for the Tlag where the calculated Tc was less than 5 mins.
**Minimum recommended Tc for developed subbasins is 10 mins. A value of 0.10 was use for the Tlag where the calculated Tc was less than 10 mins.

**REFERENCE :** **STANDARD FORM 4**

# CN CALCULATIONS FOR SUMMERLIN WEST VILLAGE 27

## Ultimate Conditions
## Park Drift Trail
## Sunset Run Drive to Lake Mead Boulevard
Update #1

| BASIN ID | LAND USE INDEX NUMBER | LAND USE DESCRIPTION | SOIL MAP UNIT # | SUBREGION CN | SUBREGION AREA (SQ FT) | SUBBASIN AREA (SQ FT) | PERCENT OF SUBBASIN | CUMULATIVE PERCENT | AREAL WEIGHTED CN | CUMULATIVE CN | COMPOSITE CN |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 856213 | 856238 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| B | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 1339174 | 1339550 | 100.0% | 100.0% | 90.97 | 90.97 | **91.0** |
| C | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 1323347 | 1323320 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| COS-11 | 2 | Parks, Golf Courses | 1155 | 83 | 63982 | 63982 | 100.0% | 100.0% | 83.00 | 83.00 | **83.0** |
| COS-8b | 1 | Undeveloped Land, Open Desert | 1155 | 88 | 456097 | 488808 | 93.3% | 93.3% | 82.11 | 82.11 | |
| COS-8b | 1 | Undeveloped Land, Open Desert | 1320 | 88 | 4464 | 488808 | 0.9% | 94.2% | 0.80 | 82.91 | |
| COS-8b | 1 | Undeveloped Land, Open Desert | 1191 | 63 | 28266 | 488808 | 5.8% | 100.0% | 3.64 | 86.56 | **86.6** |
| E | 5 | Medium-Density Residential, 2-4 units per acre (uses 3 units/acre) | 1155 | 88 | 2082474 | 2186470 | 95.2% | 95.2% | 83.81 | 83.81 | |
| E | 5 | Medium-Density Residential, 2-4 units per acre (uses 3 units/acre) | 1320 | 88 | 74664 | 2186470 | 3.4% | 98.7% | 3.01 | 86.82 | |
| E | 5 | Medium-Density Residential, 2-4 units per acre (uses 3 units/acre) | 1191 | 62 | 29332 | 2186470 | 1.3% | 100.0% | 0.83 | 87.65 | **87.7** |
| PD0 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 50774 | 50774 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD1 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 25960 | 25960 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD2 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 81701 | 81701 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD3a | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 70807 | 70807 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD3b | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 79238 | 79238 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD4 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 127583 | 127583 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD5 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 151383 | 151383 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |
| PD6 | 6 | High-Density Residential, 4-8 units per acre (uses 6 units/acre) | 1155 | 91 | 24467 | 24467 | 100.0% | 100.0% | 91.00 | 91.00 | **91.0** |

# HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

## TIME OF CONCENTRATION

**Atkins**
**File: FORM4.XLS**

ATKINS
Member of the SNC-Lavalin Group

**Summerlin West Village 27**
**Park Drift Trail**
**(Sunset Run Drive to Lake Mead Boulevard)**
**ATKINS HEC-1 Hydrologic Parameters**
Ultimate Conditions
Update #1

**BY:** **SS**
**QC:**
**DATE:** **5/11/23**

| DESIG: (1) | DEV./EX. (D or E) | CN | K (2) | AREA Ac (3) | AREA Mi^2 | INITIAL LENGTH Feet (4) | SLOPE % (5) | Ti Min (6) | TRAVEL LENGTH Feet (7) | SLOPE % (8) | V1 VELOCITY FPS (9a) | V2 VELOCITY FPS (9b) | Tt Min (10) | Tc Min (13) | Tc Check Min (14) | Tlag= 0.6Tc/60 Hours | RAINFALL Q100/Q10 Inches |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | D | 91.0 | 0.8 | 19.7 | 0.031 | 100 | 5.0 | 3.0 | 1440 | 6.3 | 5.1 | 7.7 | 3.7 | 6.7 | 18.6 | **0.07** | 3.46 |
| B | D | 91.0 | 0.8 | 30.8 | 0.048 | 100 | 5.0 | 3.0 | 1660 | 7.2 | 5.4 | 8.2 | 3.9 | 6.9 | 19.8 | **0.07** | 3.48 |
| C | D | 91.0 | 0.8 | 30.4 | 0.047 | 100 | 5.0 | 3.0 | 1,750 | 8.0 | 5.7 | 8.7 | 3.9 | 6.9 | 20.3 | **0.07** | 3.50 |
| COS-11 | E | 83.0 | 0.7 | 1.5 | 0.002 | 50 | 10.0 | 2.3 | 750 | 4.1 | 3.0 | 6.0 | 3.5 | 5.8 | N/A | **0.10**** | 3.46 |
| COS-8b | E | 86.6 | 0.8 | 11.2 | 0.018 | 100 | 7.5 | 3.2 | 2500 | 7.6 | 4.1 | 8.1 | 6.2 | 9.4 | N/A | **0.10**** | 3.53 |
| E | D | 87.7 | 0.8 | 50.2 | 0.078 | 150 | 7.5 | 3.8 | 3000 | 7.5 | 5.5 | 8.4 | 6.5 | 10.2 | 27.5 | **0.10** | 3.52 |
| PD0 | D | 91.0 | 0.8 | 1.2 | 0.0018 | 30 | 2.0 | 2.3 | 450 | 0.7 | 1.7 | 2.6 | 4.4 | 6.7 | 12.7 | **0.07** | 3.52 |
| PD1 | D | 91.0 | 0.8 | 0.6 | 0.001 | 30 | 2.0 | 2.3 | 200 | 1.9 | 2.8 | 4.2 | 1.2 | 3.5 | 11.3 | **0.05*** | 3.50 |
| PD2 | D | 91.0 | 0.8 | 1.9 | 0.003 | 30 | 2.0 | 2.3 | 600 | 2.5 | 3.2 | 4.8 | 3.0 | 5.2 | 13.5 | **0.05** | 3.50 |
| PD3a | D | 91.0 | 0.8 | 1.6 | 0.003 | 30 | 2.0 | 2.3 | 600 | 7.0 | 5.3 | 8.1 | 1.8 | 4.0 | 13.5 | **0.05*** | 3.50 |
| PD3a | D | 91.0 | 0.8 | 1.8 | 0.003 | 30 | 3.0 | 2.0 | 850 | 7.0 | 5.3 | 8.1 | 2.3 | 4.3 | 14.9 | **0.05*** | 3.50 |
| PD4 | D | 91.0 | 0.8 | 2.9 | 0.005 | 30 | 2.0 | 2.3 | 1200 | 6.8 | 5.3 | 8.0 | 3.0 | 5.3 | 16.8 | **0.05** | 3.48 |
| PD5 | D | 91.0 | 0.8 | 3.5 | 0.005 | 30 | 2.0 | 2.3 | 1600 | 6.8 | 5.3 | 8.0 | 3.9 | 6.1 | 19.1 | **0.06** | 3.46 |
| PD6 | D | 91.0 | 0.8 | 0.6 | 0.001 | 30 | 2.0 | 2.3 | 200 | 3.8 | 3.9 | 6.0 | 0.8 | 3.1 | 11.3 | **0.05*** | 3.45 |

Tc = Ti + Tt  Tlag = 0.6 Tc
Ti = 1.8 (1.1 - K) L^1/2 / S^1/3
K = 0.0132 (CN) - 0.39
Tc Check = L/180+10

For the travel time (Tt) calculations,
V1 applies to the first 500 feet of travel distance;
V2 applies to the remaining travel distance.

V1 = 14.8*(S/100)^1/2  Developed  V1 = 20.2*(S/100)^1/2
V2 = 29.4*(S/100)^1/2  Developed  V2 = 30.6*(S/100)^1/2

*Minimum recommended Tc for developed subbasins is 5 mins. A value of 0.05 was use for the Tlag where the calculated Tc was less than 5 mins.
**Minimum recommended Tc for developed subbasins is 10 mins. A value of 0.10 was use for the Tlag where the calculated Tc was less than 10 mins.

**REFERENCE :** **STANDARD FORM 4**

## B.3. Hydrology Models (HEC-1)

```
1****************************************                 ****************************************
 *                                      *                 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                 *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                 *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                 *          609 SECOND STREET           *
 *                                      *                 *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   11MAY23  TIME  13:48:25  *                 *           (916) 756-1104             *
 *                                      *                 *                                      *
 ****************************************                 ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                                  PAGE  1

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                         *DIAGRAM
 *** FREE ***
              1          ID    INPUT FILE DATE = May 2023
              2          ID    DESIGN STORM = 100-YEAR 6-HR STORM
              3          ID    STORM DISTRIBUTION = SDN #3
              4          ID    MODELED BY ATKINS (KP)
              5          ID    PDT (Sunset Run Drive to LMB)- UPDATE #1
              6          ID
              7          ID
              8          ID
              9          ID                          EVENT    DARF
             10          ID                          ACE
             11          ID                          100-yr   0.99
             12          ID                          10-yr    0.57
             13          ID
             14          ID
             15          ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
             16          ID
             17          ID  100-YEAR,  6-HOUR STORM,  SDN3
             18          ID
             19          IT       5       0       0     500
             20          IO       5       0       0
             21          IN       5       0       0
             22          JR    PREC    0.99    0.57
                         *

             23          KKCOS-8c-1
             24          BA  0.0200
             25          PB    3.52
             26          PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
             27          PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
             28          PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
             29          PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             30          PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             31          PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
             32          PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
             33          PC   0.998   0.999       1
             34          LS       0    87.8
             35          UD    0.12
                         *

             36          KKCOS-8b-1
             37          BA  0.0207
             38          PB    3.53
             39          LS       0    85.8
             40          UD    0.12
                         *

             41          KK     CP1
             42          KM   COMBINE COS-8c-1, COS-8b-1
             43          HC       2
                         *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   44         KK     PD1
   45         BA  0.0008
   46         PB     3.5
   47         LS       0    91.0
   48         UD    0.05
              *

   49         KK   CP1.1
   50         HC       2
              *

   51         KK     PD2
   52         BA  0.0028
   53         PB    3.50
   54         LS       0    91.0
   55         UD    0.05
              *

   56         KK   CP1.2
   57         HC       2
              *

   58         KK    PD3a
   59         BA  0.0025
   60         PB    3.50
   61         LS       0    91.0
   62         UD    0.05
              *

   63         KK   CP1.3
   64         HC       2
              *

   65         KK       E
   66         BA  0.0205
   67         PB    3.52
   68         LS       0    88.0
   69         UD    0.11
              *

   70         KK       C
   71         BA  0.0437
   72         PB    3.50
   73         LS       0    88.0
   74         UD    0.10
              *

   75         KK    PD3b
   76         BA  0.0031
   77         PB    3.50
   78         LS       0    91.0
   79         UD    0.05
              *
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   80         KK     CP2
   81         HC       2
              *

   82         KK     PD4
   83         BA  0.0048
   84         PB    3.48
   85         LS       0    91.2
   86         UD    0.05
              *

   87         KK       B
   88         BA  0.0409
   89         PB    3.48
   90         LS       0    88.7
   91         UD    0.10
              *

   92         KK     CP3
   93         HC       2
              *

   94         KK     A-b
   95         BA  0.0040
   96         PB    3.46
   97         LS       0    94.0
   98         UD    0.10
```

```
                        *

             99         KK    R-Ab
            100         KM   L-Curb
            101         RD    1000   0.068   0.017       0    TRAP       0       3
                        *

            102         KK     PD5
            103         BA  0.0068
            104         PB    3.46
            105         LS       0    91.0
            106         UD   0.062
                        *

            107         KK     A-c
            108         BA  0.0091
            109         PB    3.46
            110         LS       0    89.7
            111         UD    0.10
                        *

            112         KK    R-Ac
            113         KM   Trapezoidal Riprap Channel
            114         RD     500    0.04   0.037       0    TRAP       5       3
                        *
1                                                HEC-1 INPUT                                                 PAGE  4

           LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            115         KK     A-a
            116         BA  0.0163
            117         PB    3.45
            118         LS       0    88.4
            119         UD    0.10
                        *

            120         KK     CP4
            121         KM   COMBINE A-b, PD5, A-c and A-a
            122         HC       4
                        *

            123         KK     A-d
            124         BA  0.0029
            125         PB    3.45
            126         LS       0    88.7
            127         UD    0.10
                        *

            128         KK     PD6
            129         BA  0.0008
            130         PB    3.45
            131         LS       0    90.9
            132         UD    0.05
                        *

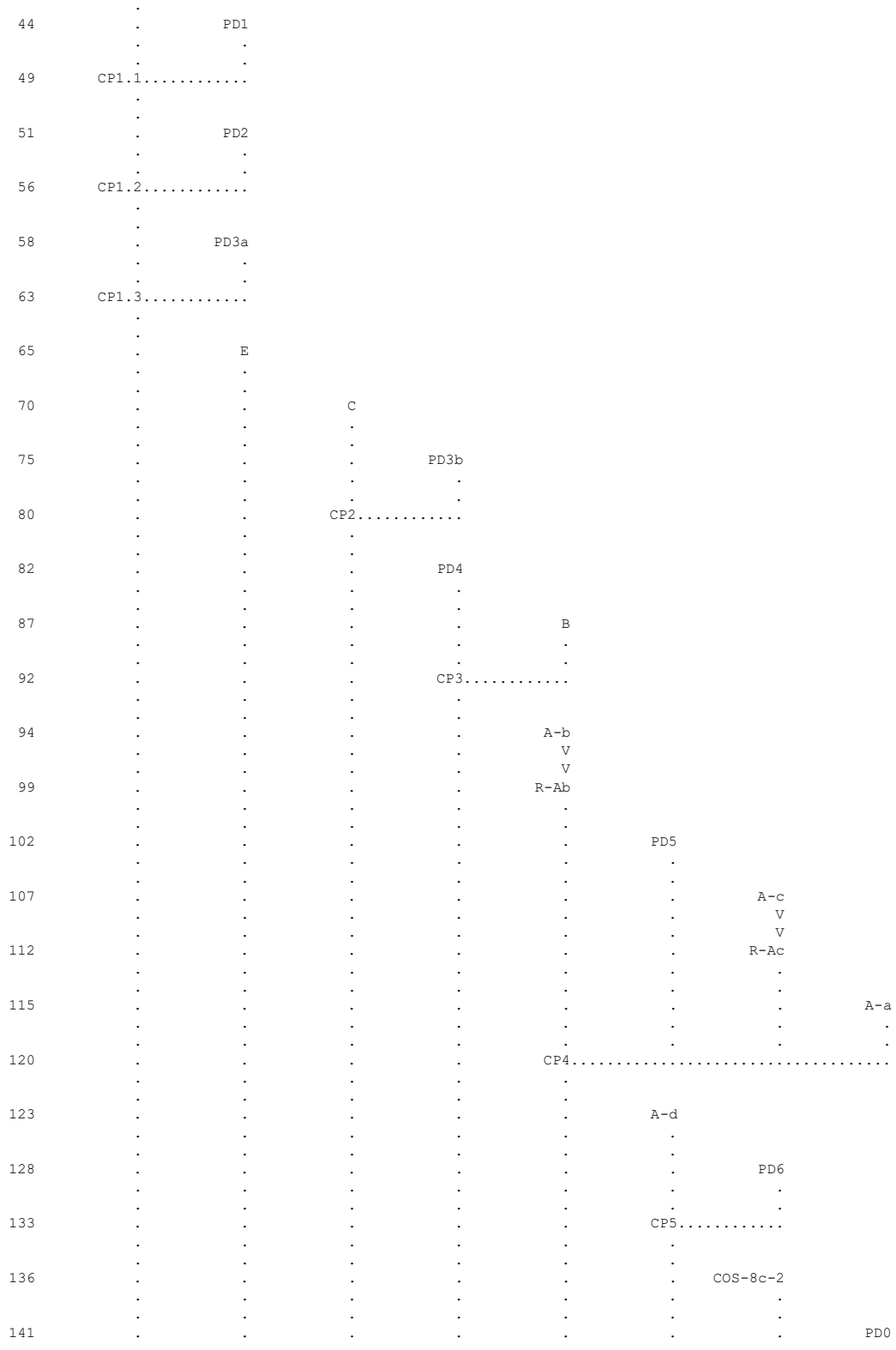
            133         KK     CP5
            134         KM   COMBINE A-d and PD6
            135         HC       2
                        *

            136         KKCOS-8c-2
            137         BA  0.0102
            138         PB    3.52
            139         LS       0    88.0
            140         UD     0.1
                        *

            141         KK     PD0
            142         BA  0.0016
            143         PB    3.50
            144         LS       0    91.0
            145         UD    0.07
                        *
            146         ZZ
1
                    SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23    COS-8c-1
                .
                .
    36          .    COS-8b-1
                .          .
                .          .
    41        CP1............
                .
```




(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   11MAY23  TIME  13:48:25   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

INPUT FILE DATE = June 2022
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY ATKINS (KP)
PDT (Sunset Run Drive to LMB)- UPDATE #1

| EVENT ACE | DARF |
|---|---|
| 100-yr | 0.99 |
| 10-yr | 0.57 |

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR, 6-HOUR STORM, SDN3

```
   20 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME        1735  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   41.58 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                       NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .99       .57
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

| OPERATION | STATION | AREA | PLAN | | RATIOS APPLIED TO PRECIPITATION RATIO 1 .99 | RATIO 2 .57 |
|---|---|---|---|---|---|---|
| HYDROGRAPH AT | | | | | | |
| + | COS-8c-1 | .02 | 1 | FLOW | 38. | 17. |
| | | | | TIME | 3.58 | 3.58 |
| HYDROGRAPH AT | | | | | | |
| + | COS-8b-1 | .02 | 1 | FLOW | 37. | 16. |
| | | | | TIME | 3.58 | 3.58 |
| 2 COMBINED AT | | | | | | |
| + | CP1 | .04 | 1 | FLOW | 75. | 33. |
| | | | | TIME | 3.58 | 3.58 |
| HYDROGRAPH AT | | | | | | |
| + | PD1 | .00 | 1 | FLOW | 2. | 1. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.1 | .04 | 1 | FLOW | 76. | 34. |
| | | | | TIME | 3.58 | 3.58 |
| HYDROGRAPH AT | | | | | | |
| + | PD2 | .00 | 1 | FLOW | 7. | 4. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.2 | .04 | 1 | FLOW | 82. | 36. |
| | | | | TIME | 3.50 | 3.58 |

HYDROGRAPH AT
+ PD3a .00 1 FLOW 6. 3.
TIME 3.50 3.50

2 COMBINED AT
+ CP1.3 .05 1 FLOW 88. 39.
TIME 3.50 3.50

HYDROGRAPH AT
+ E .02 1 FLOW 39. 18.
TIME 3.50 3.58

HYDROGRAPH AT
+ C .04 1 FLOW 87. 39.
TIME 3.50 3.50

HYDROGRAPH AT
+ PD3b .00 1 FLOW 8. 4.
TIME 3.50 3.50

2 COMBINED AT
+ CP2 .05 1 FLOW 95. 43.
TIME 3.50 3.50

HYDROGRAPH AT
+ PD4 .00 1 FLOW 12. 6.
TIME 3.50 3.50

HYDROGRAPH AT
+ B .04 1 FLOW 82. 37.
TIME 3.50 3.50

2 COMBINED AT
+ CP3 .05 1 FLOW 95. 43.
TIME 3.50 3.50

HYDROGRAPH AT
+ A-b .00 1 FLOW 9. 5.
TIME 3.50 3.50

ROUTED TO
+ R-Ab .00 1 FLOW 9. 5.
TIME 3.50 3.58

HYDROGRAPH AT
+ PD5 .01 1 FLOW 17. 8.
TIME 3.50 3.50

HYDROGRAPH AT
+ A-c .01 1 FLOW 19. 9.
TIME 3.50 3.50

ROUTED TO
+ R-Ac .01 1 FLOW 18. 8.
TIME 3.50 3.58

HYDROGRAPH AT
+ A-a .02 1 FLOW 32. 14.
TIME 3.50 3.50

4 COMBINED AT
+ CP4 .04 1 FLOW 75. 35.
TIME 3.50 3.50

HYDROGRAPH AT
+ A-d .00 1 FLOW 6. 3.
TIME 3.50 3.50

HYDROGRAPH AT
+ PD6 .00 1 FLOW 2. 1.
TIME 3.50 3.50

2 COMBINED AT
+ CP5 .00 1 FLOW 8. 4.
TIME 3.50 3.50

HYDROGRAPH AT
+ COS-8c-2 .01 1 FLOW 20. 9.
TIME 3.50 3.50

HYDROGRAPH AT
+ PD0 .00 1 FLOW 4. 2.
TIME 3.50 3.50

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

| | | | | | | INTERPOLATED TO COMPUTATION INTERVAL | | |
|---|---|---|---|---|---|---|---|---|
| ISTAQ | ELEMENT | DT | PEAK | TIME TO PEAK | VOLUME | DT | PEAK | TIME TO PEAK | VOLUME |

```
                              (MIN)      (CFS)       (MIN)      (IN)      (MIN)      (CFS)      (MIN)        (IN)

          FOR PLAN = 1  RATIO=  .00
              R-Ab  MANE         1.56       9.16    211.85       2.76       5.00       8.71    210.00         2.76


CONTINUITY SUMMARY (AC-FT) - INFLOW= .5895E+00 EXCESS= .0000E+00 OUTFLOW= .5896E+00 BASIN STORAGE= .1632E-03 PERCENT ERROR=    .0


          FOR PLAN = 1  RATIO=  .00
              R-Ab  MANE         1.83       4.75    212.81       1.37       5.00       4.55    215.00         1.37


CONTINUITY SUMMARY (AC-FT) - INFLOW= .2923E+00 EXCESS= .0000E+00 OUTFLOW= .2924E+00 BASIN STORAGE= .1605E-03 PERCENT ERROR=   -.1


          FOR PLAN = 1  RATIO=  .00
              R-Ac  MANE         1.56      18.68    211.63       2.35       5.00      17.66    210.00         2.35


CONTINUITY SUMMARY (AC-FT) - INFLOW= .1141E+01 EXCESS= .0000E+00 OUTFLOW= .1141E+01 BASIN STORAGE= .2313E-03 PERCENT ERROR=    .0


          FOR PLAN = 1  RATIO=  .00
              R-Ac  MANE         1.92       8.68    212.92       1.05       5.00       8.44    215.00         1.05


CONTINUITY SUMMARY (AC-FT) - INFLOW= .5099E+00 EXCESS= .0000E+00 OUTFLOW= .5099E+00 BASIN STORAGE= .2473E-03 PERCENT ERROR=   -.1




*** NORMAL END OF HEC-1 ***
```

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *    U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN  1998               *                    *    HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *                    *          609 SECOND STREET           *
 *                                      *                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   04MAY23  TIME  11:35:22  *                    *           (916) 756-1104             *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

                                        X     X  XXXXXXX   XXXXX           X
                                        X     X  X        X     X         XX
                                        X     X  X        X               X
                                        XXXXXXX  XXXX     X        XXXXX   X
                                        X     X  X        X               X
                                        X     X  X        X     X         X
                                        X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL  LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM



```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                        *DIAGRAM
 *** FREE ***
              1         ID    INPUT FILE DATE = MAY 2023
              2         ID    DESIGN STORM = 100-YEAR 6-HR STORM
              3         ID    STORM DISTRIBUTION = SDN #3
              4         ID    MODELED BY ATKINS (KEN PETERSON)
              5         ID    V27 PARK DRIFT TRAIL UPDATE #1
              6         ID    LAKE MEAD BOULEVARD to SUNSET RUN DRIVE
              7         ID    ULTIMATE CONDITION
              8         ID
              9         ID                 EVENT    AREA    DARF
             10         ID                          SQ. MI.
             11         ID                100-yr    0-0.5   0.99
             12         ID                 10-yr    0-0.5   0.57
             13         ID
             14         ID
             15         ID  JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)
             16         ID
             17         ID  100-YEAR,  6-HOUR STORM,  SDN3
             18         ID
             19         IT       5       0       0     500
             20         IO       5       0       0
             21         IN       5       0       0
             22         JR    PREC    0.99    0.57
                        *

             23         KK  COS-8b
             24         BA  0.0175
             25         PB    3.53
             26         PC       0    0.02   0.057    0.07   0.087   0.108   0.124    0.13    0.13    0.13
             27         PC    0.13    0.13    0.13   0.133    0.14   0.142   0.148   0.158   0.172   0.181
             28         PC    0.19   0.197   0.199     0.2   0.201   0.204   0.214   0.229   0.241   0.249
             29         PC   0.251   0.256    0.27   0.278   0.281   0.283   0.295   0.322   0.352   0.409
             30         PC   0.499    0.59    0.71   0.744   0.781   0.812   0.819   0.835   0.851   0.856
             31         PC    0.86   0.868   0.876   0.888    0.91   0.926   0.937    0.95    0.97   0.976
             32         PC   0.982   0.985   0.987   0.989    0.99   0.993   0.993   0.994   0.995   0.998
             33         PC   0.998   0.999       1
             34         LS       0    86.6
             35         UD     0.1
                        *

             36         KK     PD1
             37         BA  0.0009
             38         PB    3.50
             39         LS       0    91.0
             40         UD    0.05
                        *

             41         KK   CP1.1
             42         HC       2
                        *
```

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  43          KK     PD2
  44          BA  0.0029
  45          PB    3.50
  46          LS       0    91.0
  47          UD    0.05
              *

  48          KK   CP1.2
  49          HC       2
              *

  50          KK    PD3a
  51          BA  0.0025
  52          PB    3.50
  53          LS       0    91.0
  54          UD    0.05
              *

  55          KK   CP1.3
  56          HC       2
              *

  57          KK       E
  58          BA  0.0784
  59          PB    3.52
  60          LS       0    87.7
  61          UD     0.1
              *

  62          KK   CP1.4
  63          HC       2
              *

  64          KK    PD3b
  65          BA  0.0028
  66          PB    3.50
  67          LS       0    91.0
  68          UD    0.05
              *

  69          KK       C
  70          BA  0.0475
  71          PB    3.50
  72          LS       0    91.0
  73          UD    0.07
              *

  74          KK     CP2
  75          HC       2
              *
1                                        HEC-1 INPUT                                        PAGE  3

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  76          KK     PD4
  77          BA  0.0046
  78          PB    3.48
  79          LS       0    91.0
  80          UD    0.05
              *

  81          KK       B
  82          BA   0.048
  83          PB    3.48
  84          LS       0    91.0
  85          UD    0.07
              *

  86          KK     CP3
  87          HC       2
              *

  88          KK  COS-11
  89          BA  0.0023
  90          PB    3.46
  91          LS       0    83.0
  92          UD    0.10
              *

  93          KK     PD5
  94          BA  0.0054
  95          PB    3.46
  96          LS       0    91.0
  97          UD    0.06
              *
```

```
             98           KK       A
             99           BA  0.0307
            100           PB    3.46
            101           LS       0    91.0
            102           UD    0.07
                          *

            103           KK     CP4
            104           KM   COMBINE COS-11, PD-5 and A
            105           HC       3
                          *

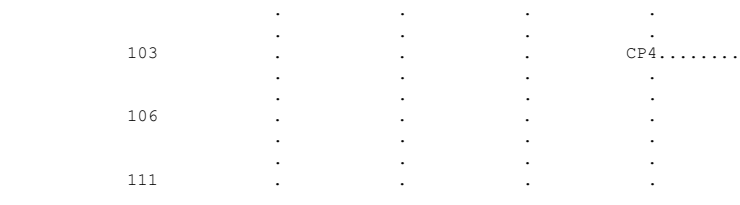
            106           KK     PD6
            107           BA  0.0009
            108           PB    3.45
            109           LS       0    91.1
            110           UD   0.050
                          *
1                                                HEC-1 INPUT                                                PAGE  4

          LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            111           KK     PD0
            112           BA  0.0018
            113           PB    3.52
            114           LS       0    91.0
            115           UD    0.07
                          *
            116           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    23      COS-8b
                .
                .
    36          .         PD1
                .           .
                .           .
    41       CP1.1...........
                .
                .
    43          .         PD2
                .           .
                .           .
    48       CP1.2...........
                .
                .
    50          .        PD3a
                .           .
                .           .
    55       CP1.3...........
                .
                .
    57          .           E
                .           .
                .           .
    62       CP1.4...........
                .
                .
    64          .        PD3b
                .           .
                .           .
    69          .           .          C
                .           .          .
                .           .          .
    74          .         CP2...........
                .           .
                .           .
    76          .           .         PD4
                .           .           .
                .           .           .
    81          .           .           .          B
                .           .           .          .
                .           .           .          .
    86          .           .         CP3...........
                .           .           .
                .           .           .
    88          .           .           .      COS-11
                .           .           .          .
                .           .           .          .
    93          .           .           .          .         PD5
                .           .           .          .           .
                .           .           .          .           .
    98          .           .           .          .           .          A
```




(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*               JUN   1998              *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   04MAY23  TIME  11:35:22   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

INPUT FILE DATE = MAY 2023
DESIGN STORM = 100-YEAR 6-HR STORM
STORM DISTRIBUTION = SDN #3
MODELED BY ATKINS (KEN PETERSON)
V27 PARK DRIFT TRAIL UPDATE #1
LAKE MEAD BOULEVARD to SUNSET RUN DRIVE
ULTIMATE CONDIITONS

| EVENT | AREA SQ. MI. | DARF |
|---|---|---|
| 100-yr | 0-0.5 | 0.99 |
| 10-yr | 0-0.5 | 0.57 |

JR CARD RATIOS REPRESENT DEPTH-AREA REDUCTION FACTORS (DARF'S)

100-YEAR,  6-HOUR STORM,  SDN3

```
   20 IO          OUTPUT CONTROL VARIABLES
                       IPRNT           5  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                        NMIN           5  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2    0  ENDING DATE
                      NDTIME        1735  ENDING TIME
                      ICENT           19  CENTURY MARK

                    COMPUTATION INTERVAL     .08 HOURS
                         TOTAL TIME BASE   41.58 HOURS

          ENGLISH UNITS
               DRAINAGE AREA         SQUARE MILES
               PRECIPITATION DEPTH   INCHES
               LENGTH, ELEVATION     FEET
               FLOW                  CUBIC FEET PER SECOND
               STORAGE VOLUME        ACRE-FEET
               SURFACE AREA          ACRES
               TEMPERATURE           DEGREES FAHRENHEIT

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .99       .57
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

| OPERATION | STATION | AREA | PLAN | | RATIOS APPLIED TO PRECIPITATION RATIO 1 | RATIO 2 |
|---|---|---|---|---|---|---|
| | | | | | .99 | .57 |
| HYDROGRAPH AT | | | | | | |
| + | COS-8b | .02 | 1 | FLOW | 34. | 14. |
| | | | | TIME | 3.50 | 3.50 |

| | | | | | | |
|---|---|---|---|---|---|---|
| HYDROGRAPH AT | | | | | | |
| + | PD1 | .00 | 1 | FLOW | 2. | 1. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.1 | .02 | 1 | FLOW | 36. | 16. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD2 | .00 | 1 | FLOW | 8. | 4. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.2 | .02 | 1 | FLOW | 43. | 19. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD3a | .00 | 1 | FLOW | 6. | 3. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.3 | .02 | 1 | FLOW | 50. | 22. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | E | .08 | 1 | FLOW | 155. | 69. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP1.4 | .10 | 1 | FLOW | 205. | 91. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD3b | .00 | 1 | FLOW | 7. | 4. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | C | .05 | 1 | FLOW | 115. | 56. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP2 | .05 | 1 | FLOW | 122. | 60. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD4 | .00 | 1 | FLOW | 12. | 6. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | B | .05 | 1 | FLOW | 115. | 56. |
| | | | | TIME | 3.50 | 3.50 |
| 2 COMBINED AT | | | | | | |
| + | CP3 | .05 | 1 | FLOW | 127. | 62. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | COS-11 | .00 | 1 | FLOW | 4. | 1. |
| | | | | TIME | 3.50 | 3.58 |
| HYDROGRAPH AT | | | | | | |
| + | PD5 | .01 | 1 | FLOW | 13. | 7. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | A | .03 | 1 | FLOW | 73. | 36. |
| | | | | TIME | 3.50 | 3.50 |
| 3 COMBINED AT | | | | | | |
| + | CP4 | .04 | 1 | FLOW | 90. | 44. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD6 | .00 | 1 | FLOW | 2. | 1. |
| | | | | TIME | 3.50 | 3.50 |
| HYDROGRAPH AT | | | | | | |
| + | PD0 | .00 | 1 | FLOW | 4. | 2. |
| | | | | TIME | 3.50 | 3.50 |

*** NORMAL END OF HEC-1 ***

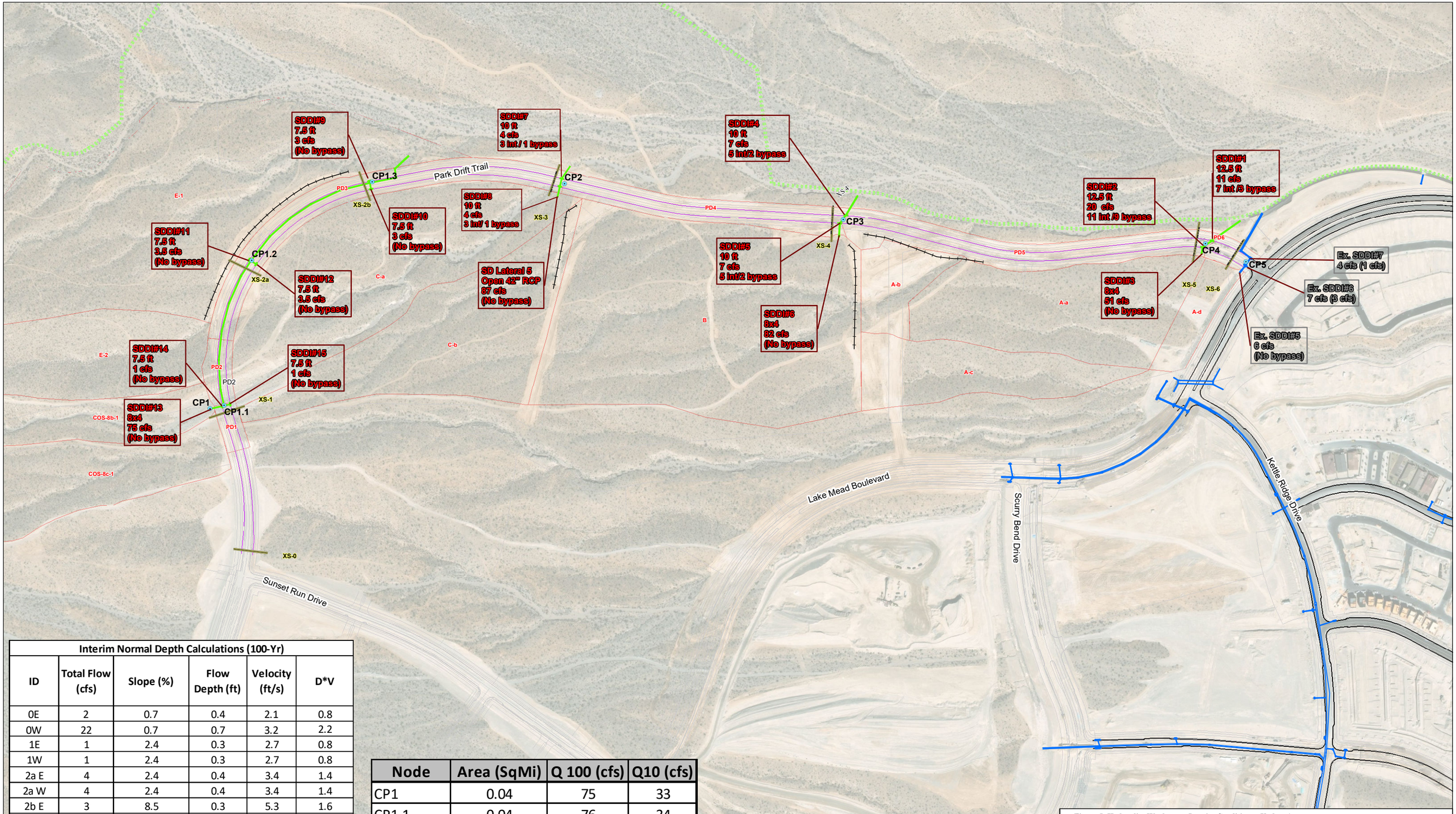
# Appendix C. Hydraulics Calculations

C.1. Hydraulics Figures

C.2. Drop Inlet / Roadway Normal Depth Calculations

C.3. WSPG Models

# C.1. Hydraulics Figures




| Interim Normal Depth Calculations (100-Yr) | | | | | |
|---|---|---|---|---|---|
| ID | Total Flow (cfs) | Slope (%) | Flow Depth (ft) | Velocity (ft/s) | D*V |
| 0E | 2 | 0.7 | 0.4 | 2.1 | 0.8 |
| 0W | 22 | 0.7 | 0.7 | 3.2 | 2.2 |
| 1E | 1 | 2.4 | 0.3 | 2.7 | 0.8 |
| 1W | 1 | 2.4 | 0.3 | 2.7 | 0.8 |
| 2a E | 4 | 2.4 | 0.4 | 3.4 | 1.4 |
| 2a W | 4 | 2.4 | 0.4 | 3.4 | 1.4 |
| 2b E | 3 | 8.5 | 0.3 | 5.3 | 1.6 |
| 2b W | 3 | 8.5 | 0.3 | 5.3 | 1.6 |
| 3S | 4 | 8.5 | 0.3 | 5.6 | 1.7 |
| 3N | 4 | 8.5 | 0.3 | 5.6 | 1.7 |
| 4S | 7 | 6.6 | 0.4 | 5.7 | 2.3 |
| 4N | 7 | 6.6 | 0.4 | 5.7 | 2.3 |
| 5S | 20 | 7.9 | 0.5 | 7.8 | 3.9 |
| 5N | 11 | 7.9 | 0.4 | 6.8 | 2.7 |
| 6S | 10 | 3.0 | 0.4 | 4.6 | 1.8 |
| 6N | 4 | 3.0 | 0.4 | 3.7 | 1.5 |

| Node | Area (SqMi) | Q 100 (cfs) | Q10 (cfs) |
|---|---|---|---|
| CP1 | 0.04 | 75 | 33 |
| CP1.1 | 0.04 | 76 | 34 |
| CP1.2 | 0.04 | 82 | 36 |
| CP1.3 | 0.05 | 88 | 39 |
| CP2 | 0.05 | 95 | 43 |
| CP3 | 0.05 | 95 | 43 |
| CP4 | 0.04 | 75 | 35 |
| CP5 | 0.004 | 8 | 4 |

**Figure 5: Hydraulics Workmap - Interim Conditions - Update 1**

Village 27 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard)

**Legend**

- Interim CPs
- Road XS
- Existing Rough Grade RipRap
- Proposed Storm Drain Update #1
- Existing Storm Water Facilities
- Proposed Roadway
- Existing Roadway
- Proposed Future Developments
- Subbasins Interim
- SWPA Boundary
- Total Flow
- Intercepted Flow / Bypass Flow

0 100 200 400 Feet

1 inch = 180 feet

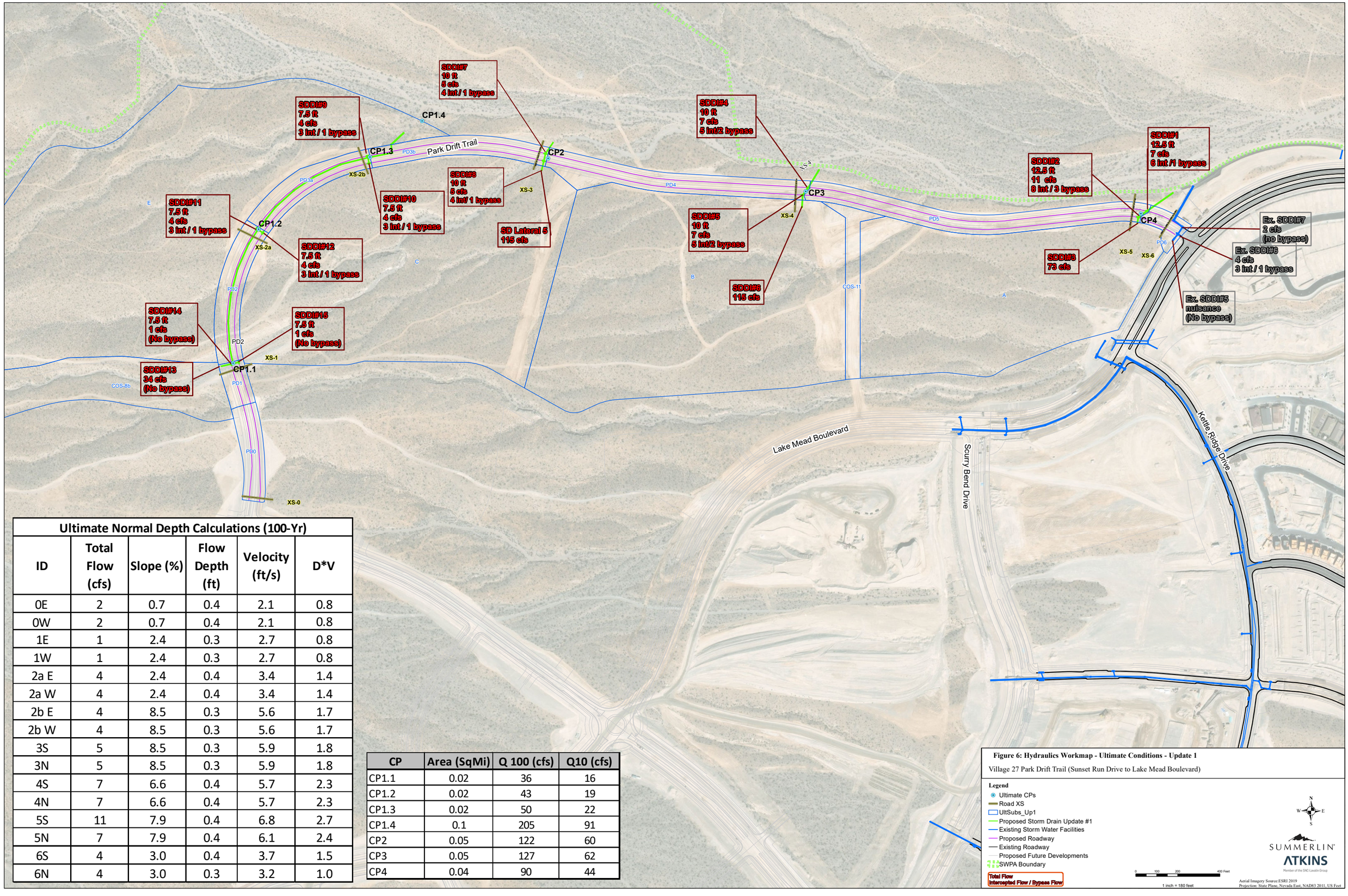
Aerial Imagery Source:ESRI 2019

Projection: State Plane, Nevada East, NAD83 2011, US Feet

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| Ultimate Normal Depth Calculations (100-Yr) | | | | | |
|---|---|---|---|---|---|
| ID | Total Flow (cfs) | Slope (%) | Flow Depth (ft) | Velocity (ft/s) | D*V |
| 0E | 2 | 0.7 | 0.4 | 2.1 | 0.8 |
| 0W | 2 | 0.7 | 0.4 | 2.1 | 0.8 |
| 1E | 1 | 2.4 | 0.3 | 2.7 | 0.8 |
| 1W | 1 | 2.4 | 0.3 | 2.7 | 0.8 |
| 2a E | 4 | 2.4 | 0.4 | 3.4 | 1.4 |
| 2a W | 4 | 2.4 | 0.4 | 3.4 | 1.4 |
| 2b E | 4 | 8.5 | 0.3 | 5.6 | 1.7 |
| 2b W | 4 | 8.5 | 0.3 | 5.6 | 1.7 |
| 3S | 5 | 8.5 | 0.3 | 5.9 | 1.8 |
| 3N | 5 | 8.5 | 0.3 | 5.9 | 1.8 |
| 4S | 7 | 6.6 | 0.4 | 5.7 | 2.3 |
| 4N | 7 | 6.6 | 0.4 | 5.7 | 2.3 |
| 5S | 11 | 7.9 | 0.4 | 6.8 | 2.7 |
| 5N | 7 | 7.9 | 0.4 | 6.1 | 2.4 |
| 6S | 4 | 3.0 | 0.4 | 3.7 | 1.5 |
| 6N | 4 | 3.0 | 0.3 | 3.2 | 1.0 |

| CP | Area (SqMi) | Q 100 (cfs) | Q10 (cfs) |
|---|---|---|---|
| CP1.1 | 0.02 | 36 | 16 |
| CP1.2 | 0.02 | 43 | 19 |
| CP1.3 | 0.02 | 50 | 22 |
| CP1.4 | 0.1 | 205 | 91 |
| CP2 | 0.05 | 122 | 60 |
| CP3 | 0.05 | 127 | 62 |
| CP4 | 0.04 | 90 | 44 |

**Figure 6: Hydraulics Workmap - Ultimate Conditions - Update 1**

Village 27 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard)

**Legend**

- Ultimate CPs
- Road XS
- UltSubs_Up1
- Proposed Storm Drain Update #1
- Existing Storm Water Facilities
- Proposed Roadway
- Existing Roadway
- Proposed Future Developments
- SWPA Boundary
- Total Flow
- Intercepted Flow / Bypass Flow

0 100 200 400 Feet

1 inch = 180 feet

Aerial Imagery Source:ESRI 2019
Projection: State Plane, Nevada East, NAD83 2011, US Feet

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ATKINS
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## C.2. Interim Drop Inlet / Roadway Normal Depth Calculations

# Combination Inlet On Grade - SDDI#1

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 11 | cfs |
| Slope | 0.079 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 10.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 12.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 70.25 | % |
| Intercepted Flow | 7 | cfs |
| Bypass Flow | 3 | cfs |
| Spread | 11.3 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.3 | ft² |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 7.8 | ft/s |
| Splash Over Velocity | 10.8 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.118 | |
| Grate Flow Ratio | 0.400 | |
| Equivalent Cross Slope | 0.100 | ft/ft |
| Active Grate Length | 5.0 | ft |
| Length Factor | 0.209 | |
| Total Interception Length | 35.9 | ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#2

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 20 cfs |
| Slope | 0.079 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 10.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 12.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 55.21 % |
| Intercepted Flow | 11 cfs |
| Bypass Flow | 9 cfs |
| Spread | 14.6 ft |
| Depth | 0.4 ft |
| Flow Area | 2.2 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 9.0 ft/s |
| Splash Over Velocity | 10.8 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.093 |
| Grate Flow Ratio | 0.307 |
| Equivalent Cross Slope | 0.081 ft/ft |
| Active Grate Length | 5.0 ft |
| Length Factor | 0.141 |
| Total Interception Length | 53.2 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Ditch Inlet In Sag - SDDI#3

| Project Description | |
|---|---|
| Solve For | Spread |

| Input Data | |
|---|---|
| Discharge | 51 cfs |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 2.000 H:V |
| Bottom Width | 5.00 ft |
| Grate Width | 4.00 ft |
| Grate Length | 8.0 ft |
| Local Depression | 0.0 in |
| Local Depression Width | 24.0 in |
| Grate Type | P-50 mm x 100 mm (P-1-7/8"-4") |
| Clogging | 50.0 % |

| Results | |
|---|---|
| Spread | 8.6 ft |
| Depth | 0.9 ft |
| Wetted Perimeter | 9.0 ft |
| Top Width | 8.59 ft |
| Open Grate Area | 12.8 ft² |
| Active Grate Weir Length | 20.0 ft |

# Combination Inlet On Grade - SDDI#4

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 7 cfs |
| Slope | 0.066 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 7.5 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 10.0 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 74.78 % |
| Intercepted Flow | 5 cfs |
| Bypass Flow | 2 cfs |
| Spread | 9.9 ft |
| Depth | 0.3 ft |
| Flow Area | 1.1 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.7 ft/s |
| Splash Over Velocity | 8.1 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.084 |
| Grate Flow Ratio | 0.455 |
| Equivalent Cross Slope | 0.111 ft/ft |
| Active Grate Length | 3.8 ft |
| Length Factor | 0.232 |
| Total Interception Length | 26.9 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#5

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 7 cfs |
| Slope | 0.066 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 7.5 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 10.0 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 74.78 % |
| Intercepted Flow | 5 cfs |
| Bypass Flow | 2 cfs |
| Spread | 9.9 ft |
| Depth | 0.3 ft |
| Flow Area | 1.1 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.7 ft/s |
| Splash Over Velocity | 8.1 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.084 |
| Grate Flow Ratio | 0.455 |
| Equivalent Cross Slope | 0.111 ft/ft |
| Active Grate Length | 3.8 ft |
| Length Factor | 0.232 |
| Total Interception Length | 26.9 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Ditch Inlet In Sag - SDDI#6

| Project Description | |
|---|---|
| Solve For | Spread |

| Input Data | |
|---|---|
| Discharge | 82 cfs |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 2.000 H:V |
| Bottom Width | 5.00 ft |
| Grate Width | 4.00 ft |
| Grate Length | 8.0 ft |
| Local Depression | 0.0 in |
| Local Depression Width | 24.0 in |
| Grate Type | P-50 mm x 100 mm (P-1-7/8"-4") |
| Clogging | 50.0 % |

| Results | |
|---|---|
| Spread | 10.7 ft |
| Depth | 1.4 ft |
| Wetted Perimeter | 11.4 ft |
| Top Width | 10.68 ft |
| Open Grate Area | 12.8 ft² |
| Active Grate Weir Length | 20.0 ft |

# Combination Inlet On Grade - SDDI#7

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 4 cfs |
| Slope | 0.085 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 84.20 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 1 cfs |
| Spread | 7.3 ft |
| Depth | 0.2 ft |
| Flow Area | 0.6 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.6 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 0.999 |
| Side Flow Factor | 0.035 |
| Grate Flow Ratio | 0.597 |
| Equivalent Cross Slope | 0.139 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.250 |
| Total Interception Length | 20.0 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#8

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 4 cfs |
| Slope | 0.085 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 84.20 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 1 cfs |
| Spread | 7.3 ft |
| Depth | 0.2 ft |
| Flow Area | 0.6 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.6 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 0.999 |
| Side Flow Factor | 0.035 |
| Grate Flow Ratio | 0.597 |
| Equivalent Cross Slope | 0.139 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.250 |
| Total Interception Length | 20.0 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#9

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 3 cfs |
| Slope | 0.085 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 91.31 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 0 cfs |
| Spread | 6.3 ft |
| Depth | 0.2 ft |
| Flow Area | 0.5 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.3 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.038 |
| Grate Flow Ratio | 0.666 |
| Equivalent Cross Slope | 0.153 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.298 |
| Total Interception Length | 16.8 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#10

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 3 cfs |
| Slope | 0.085 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 91.31 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 0 cfs |
| Spread | 6.3 ft |
| Depth | 0.2 ft |
| Flow Area | 0.5 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.3 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.038 |
| Grate Flow Ratio | 0.666 |
| Equivalent Cross Slope | 0.153 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.298 |
| Total Interception Length | 16.8 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#11

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 4 cfs |
| Slope | 0.024 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 86.17 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 0 cfs |
| Spread | 9.1 ft |
| Depth | 0.3 ft |
| Flow Area | 0.9 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 3.9 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.088 |
| Grate Flow Ratio | 0.490 |
| Equivalent Cross Slope | 0.118 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.350 |
| Total Interception Length | 14.3 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#12

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 4 cfs |
| Slope | 0.024 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 86.17 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 0 cfs |
| Spread | 9.1 ft |
| Depth | 0.3 ft |
| Flow Area | 0.9 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 3.9 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.088 |
| Grate Flow Ratio | 0.490 |
| Equivalent Cross Slope | 0.118 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.350 |
| Total Interception Length | 14.3 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Ditch Inlet In Sag - SDDI#13

| Project Description | |
|---|---|
| Solve For | Spread |

| Input Data | |
|---|---|
| Discharge | 75 cfs |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 2.000 H:V |
| Bottom Width | 5.00 ft |
| Grate Width | 4.00 ft |
| Grate Length | 8.0 ft |
| Local Depression | 4.0 in |
| Local Depression Width | 24.0 in |
| Grate Type | P-50 mm x 100 mm (P-1-7/8"-4") |
| Clogging | 50.0 % |

| Results | |
|---|---|
| Spread | 8.4 ft |
| Depth | 0.9 ft |
| Wetted Perimeter | 8.8 ft |
| Top Width | 8.42 ft |
| Open Grate Area | 12.8 ft² |
| Active Grate Weir Length | 20.0 ft |

# Combination Inlet On Grade - SDDI#14

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 1 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 100.00 | % |
| Intercepted Flow | 1 | cfs |
| Bypass Flow | 0 | cfs |
| Spread | 4.9 | ft |
| Depth | 0.2 | ft |
| Flow Area | 0.3 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 3.1 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.123 | |
| Grate Flow Ratio | 0.784 | |
| Equivalent Cross Slope | 0.177 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.754 | |
| Total Interception Length | 6.6 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Combination Inlet On Grade - SDDI#15

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 1 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 100.00 | % |
| Intercepted Flow | 1 | cfs |
| Bypass Flow | 0 | cfs |
| Spread | 4.9 | ft |
| Depth | 0.2 | ft |
| Flow Area | 0.3 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 3.1 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.123 | |
| Grate Flow Ratio | 0.784 | |
| Equivalent Cross Slope | 0.177 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.754 | |
| Total Interception Length | 6.6 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Section 1E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 1 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.4 ft² |
| Wetted Perimeter | 4.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 4.63 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 2.7 ft/s |
| Velocity Head | 0.11 ft |
| Specific Energy | 0.36 ft |
| Froude Number | 1.654 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

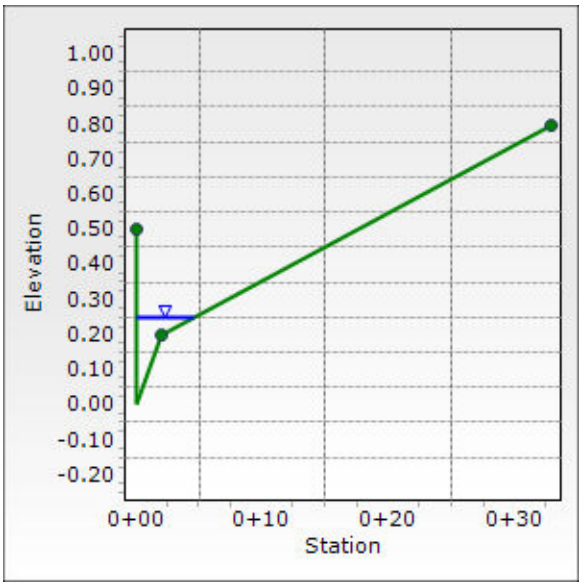
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Cross Section for Section 1E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 1 cfs |



# Section 1W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 1 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.4 ft² |
| Wetted Perimeter | 4.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 4.63 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 2.7 ft/s |
| Velocity Head | 0.11 ft |
| Specific Energy | 0.36 ft |
| Froude Number | 1.654 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

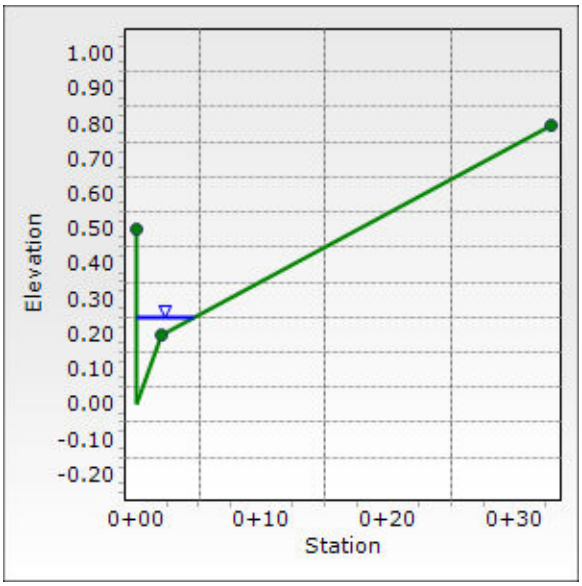
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Cross Section for Section 1W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 1 cfs |



# Section 2a E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.09 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.4 ft/s |
| Velocity Head | 0.18 ft |
| Specific Energy | 0.54 ft |
| Froude Number | 1.753 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

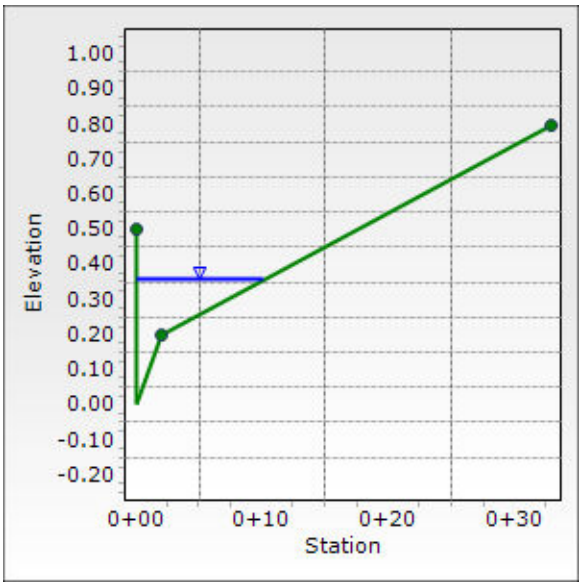
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 2a E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 4 cfs |



# Section 2a W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.09 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.4 ft/s |
| Velocity Head | 0.18 ft |
| Specific Energy | 0.54 ft |
| Froude Number | 1.753 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

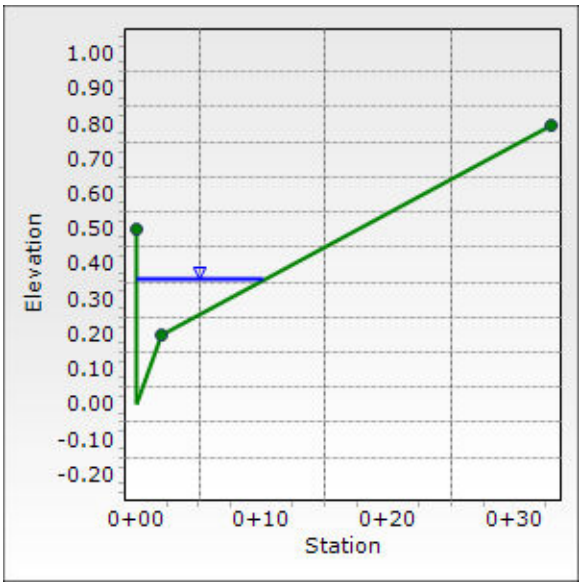
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 2a W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 4 cfs |



# Section 2b E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 3 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.6 ft² |
| Wetted Perimeter | 6.6 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 6.35 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.3 ft/s |
| Velocity Head | 0.44 ft |
| Specific Energy | 0.73 ft |
| Froude Number | 3.153 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

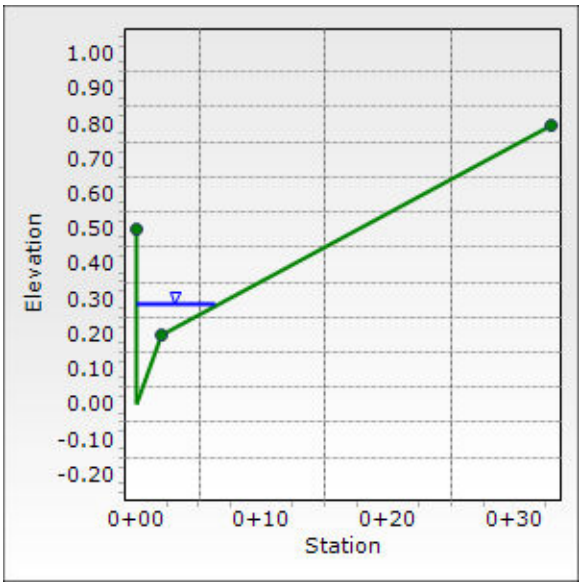
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 2b E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 3 cfs |



# Section 2b W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 3 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.6 ft² |
| Wetted Perimeter | 6.6 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 6.35 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.3 ft/s |
| Velocity Head | 0.44 ft |
| Specific Energy | 0.73 ft |
| Froude Number | 3.153 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

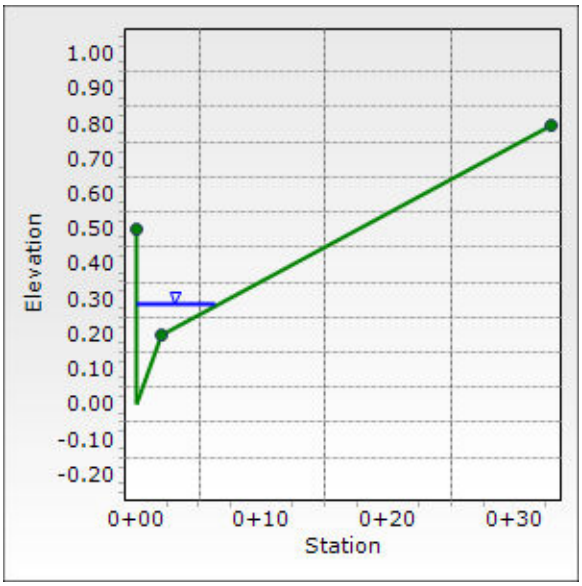
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 2b W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 3 cfs |



# Section 3S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.7 ft² |
| Wetted Perimeter | 7.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 7.43 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.6 ft/s |
| Velocity Head | 0.49 ft |
| Specific Energy | 0.80 ft |
| Froude Number | 3.202 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

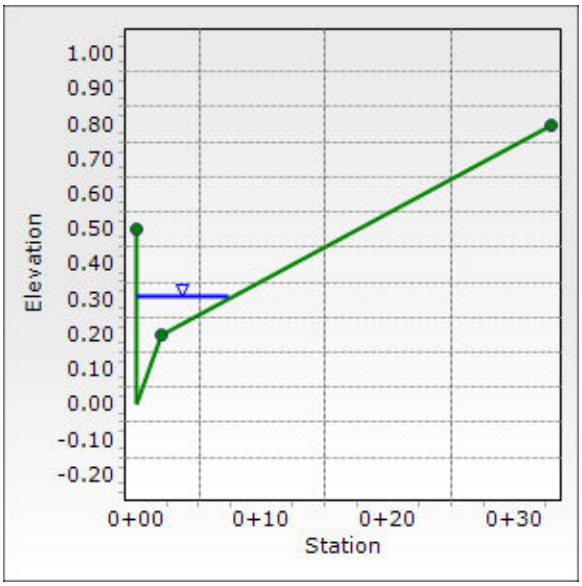
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 3S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 4 cfs |



# Section 3N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.7 ft² |
| Wetted Perimeter | 7.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 7.43 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.6 ft/s |
| Velocity Head | 0.49 ft |
| Specific Energy | 0.80 ft |
| Froude Number | 3.202 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

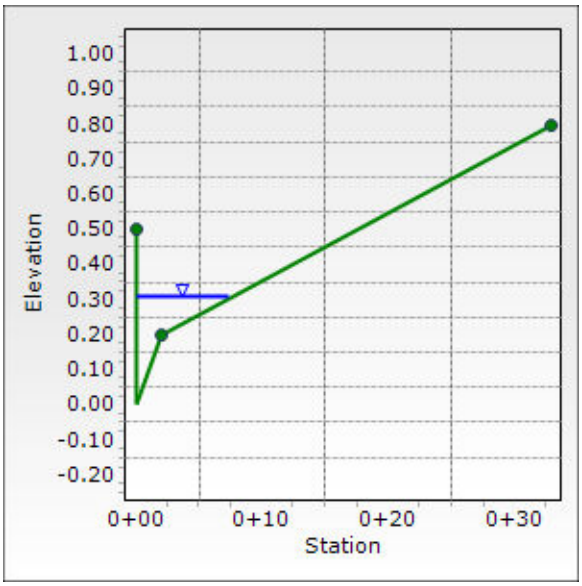
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 3N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 4 cfs |



# Section 4S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Discharge | 7 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.32 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.7 ft/s |
| Velocity Head | 0.51 ft |
| Specific Energy | 0.87 ft |
| Froude Number | 2.924 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

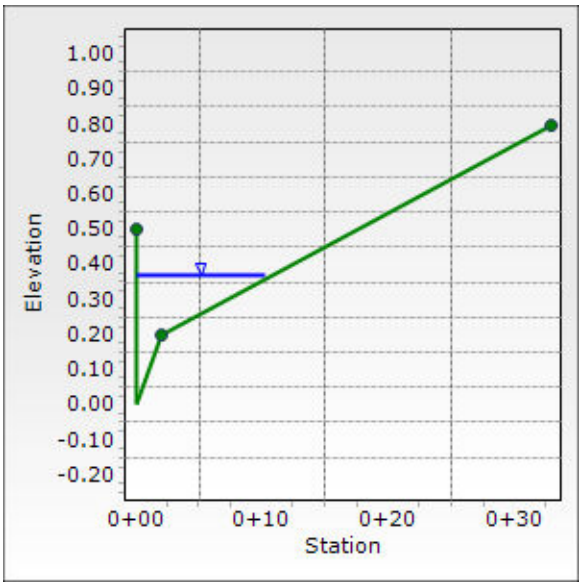
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.066 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 4S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 7 cfs |



# Section 4N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Discharge | 7 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.32 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.7 ft/s |
| Velocity Head | 0.51 ft |
| Specific Energy | 0.87 ft |
| Froude Number | 2.924 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.066 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Section 5S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Discharge | 20 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.5 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 2.6 ft² |
| Wetted Perimeter | 16.0 ft |
| Hydraulic Radius | 0.2 ft |
| Top Width | 15.53 ft |
| Normal Depth | 0.5 ft |
| Critical Depth | 0.7 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 7.8 ft/s |
| Velocity Head | 0.94 ft |
| Specific Energy | 1.41 ft |
| Froude Number | 3.370 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

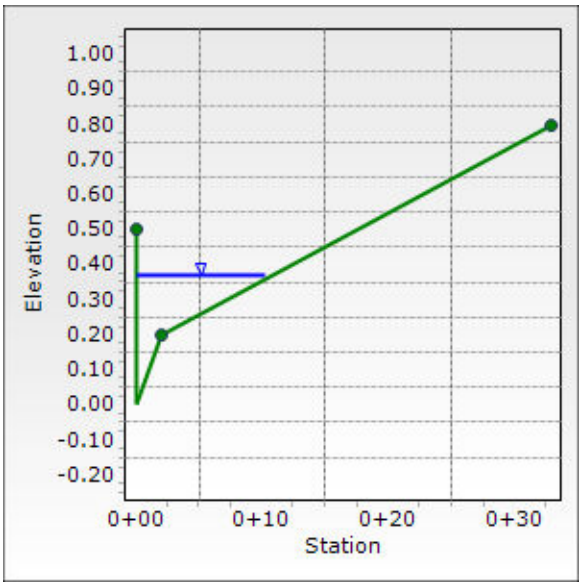
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.5 ft |
| Critical Depth | 0.7 ft |
| Channel Slope | 0.079 ft/ft |
| Critical Slope | 0.006 ft/ft |

# Cross Section for Section 4N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 7 cfs |



# Section 5N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Discharge | 11 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.6 ft² |
| Wetted Perimeter | 12.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 12.11 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.6 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 6.8 ft/s |
| Velocity Head | 0.71 ft |
| Specific Energy | 1.11 ft |
| Froude Number | 3.253 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

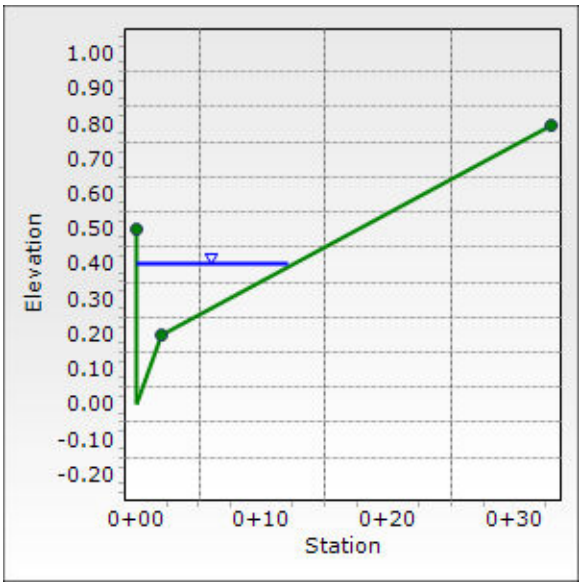
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.6 ft |
| Channel Slope | 0.079 ft/ft |
| Critical Slope | 0.006 ft/ft |

# Cross Section for Section 5N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 11 cfs |



# Worksheet for Section 5S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Discharge | 20 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.5 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 2.6 ft² |
| Wetted Perimeter | 16.0 ft |
| Hydraulic Radius | 0.2 ft |
| Top Width | 15.53 ft |
| Normal Depth | 0.5 ft |
| Critical Depth | 0.7 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 7.8 ft/s |
| Velocity Head | 0.94 ft |
| Specific Energy | 1.41 ft |
| Froude Number | 3.370 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

# Worksheet for Section 5S

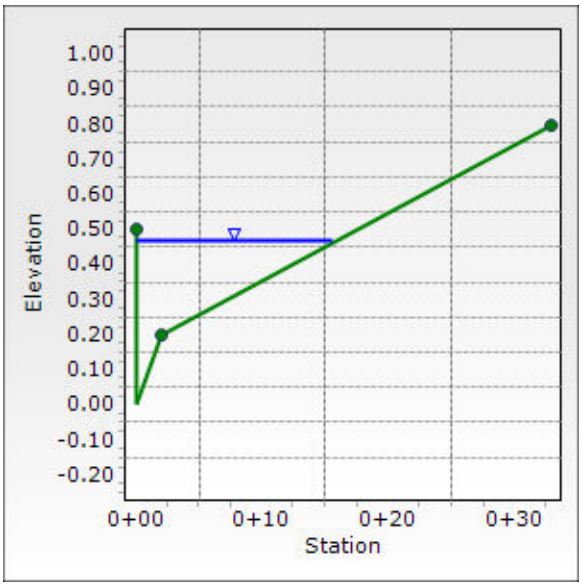
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.5 ft |
| Critical Depth | 0.7 ft |
| Channel Slope | 0.079 ft/ft |
| Critical Slope | 0.006 ft/ft |

# Cross Section for Section 5S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Normal Depth | 0.5 ft |
| Discharge | 20 cfs |



# Section 6S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Discharge | 10 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 2.2 ft² |
| Wetted Perimeter | 14.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 14.24 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 4.6 ft/s |
| Velocity Head | 0.32 ft |
| Specific Energy | 0.77 ft |
| Froude Number | 2.056 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

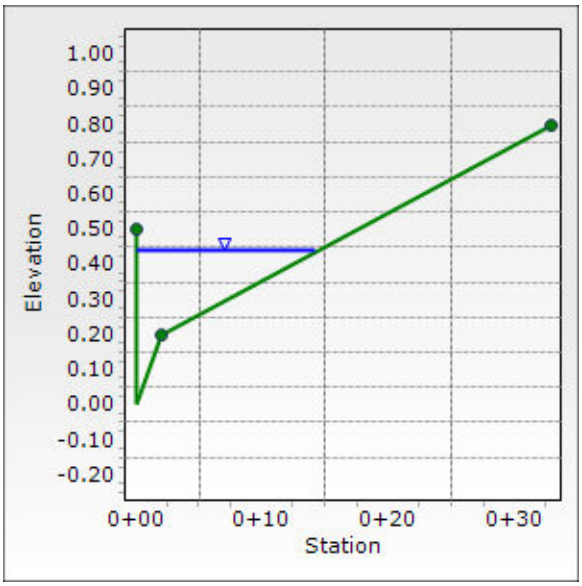
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.030 ft/ft |
| Critical Slope | 0.006 ft/ft |

# Cross Section for Section 6S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 10 cfs |



# Section 6N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 9.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.57 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.7 ft/s |
| Velocity Head | 0.21 ft |
| Specific Energy | 0.57 ft |
| Froude Number | 1.955 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

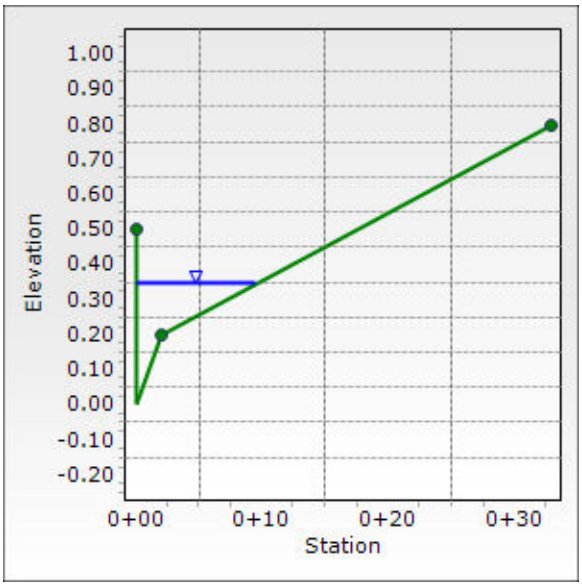
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.030 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Section 6N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Normal Depth | 0.4 ft |
| Discharge | 4 cfs |



# Section 0E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.007 ft/ft |
| Discharge | 2 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 10.1 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.74 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 1.8 ft/s |
| Velocity Head | 0.05 ft |
| Specific Energy | 0.41 ft |
| Froude Number | 0.942 |
| Flow Type | Subcritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.007 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Section 0W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.007 ft/ft |
| Discharge | 22 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.7 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 6.9 ft² |
| Wetted Perimeter | 26.7 ft |
| Hydraulic Radius | 0.3 ft |
| Top Width | 26.01 ft |
| Normal Depth | 0.7 ft |
| Critical Depth | 0.7 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 3.2 ft/s |
| Velocity Head | 0.16 ft |
| Specific Energy | 0.84 ft |
| Froude Number | 1.085 |
| Flow Type | Supercritical |

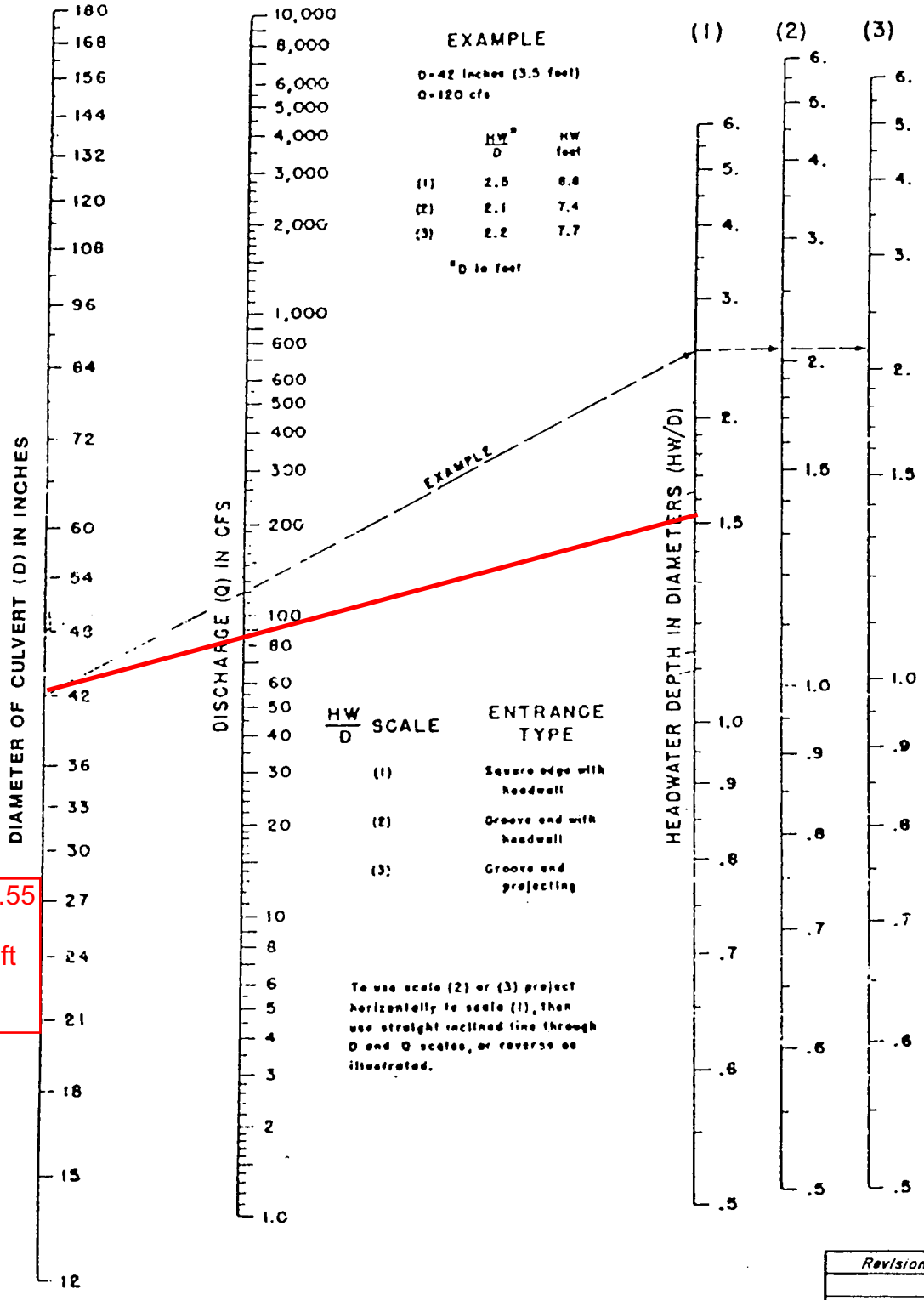
| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.7 ft |
| Critical Depth | 0.7 ft |
| Channel Slope | 0.007 ft/ft |
| Critical Slope | 0.006 ft/ft |

# NOMOGRAPH – INLET CONTROL RCP

Parcel C Interim Stub - Open 42" RCP




HW/D = 1.55

HW = 5.4 ft

FB= 1.2 ft

| Revision | Date |
|---|---|
| | |
| | |
| | |
| | |

WRC ENGINEERING

REFERENCE: USDOT, FHWA, HDS, No. 5, 1985

FIGURE 1005

## C.2. Ultimate Drop Inlet / Roadway Normal Depth Calculations

# Copy of Combination Inlet On Grade - SDDI#1

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 7 | cfs |
| Slope | 0.079 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 10.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 12.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 80.38 | % |
| Intercepted Flow | 6 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 9.5 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.0 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 7.2 | ft/s |
| Splash Over Velocity | 10.8 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.135 | |
| Grate Flow Ratio | 0.471 | |
| Equivalent Cross Slope | 0.114 | ft/ft |
| Active Grate Length | 5.0 | ft |
| Length Factor | 0.269 | |
| Total Interception Length | 27.9 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#2

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 11 | cfs |
| Slope | 0.079 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 10.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 12.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 69.10 | % |
| Intercepted Flow | 8 | cfs |
| Bypass Flow | 3 | cfs |
| Spread | 11.5 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.4 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 7.9 | ft/s |
| Splash Over Velocity | 10.8 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.116 | |
| Grate Flow Ratio | 0.392 | |
| Equivalent Cross Slope | 0.098 | ft/ft |
| Active Grate Length | 5.0 | ft |
| Length Factor | 0.203 | |
| Total Interception Length | 36.9 | ft |

| Messages |
|---|

| Messages | |
|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). |

# Copy of Combination Inlet On Grade - SDDI#4

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 7 cfs |
| Slope | 0.066 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 7.5 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 10.0 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 74.78 % |
| Intercepted Flow | 5 cfs |
| Bypass Flow | 2 cfs |
| Spread | 9.9 ft |
| Depth | 0.3 ft |
| Flow Area | 1.1 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.7 ft/s |
| Splash Over Velocity | 8.1 ft/s |
| Frontal Flow Factor | 1.000 |
| Side Flow Factor | 0.084 |
| Grate Flow Ratio | 0.455 |
| Equivalent Cross Slope | 0.111 ft/ft |
| Active Grate Length | 3.8 ft |
| Length Factor | 0.232 |
| Total Interception Length | 26.9 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#5

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 7 | cfs |
| Slope | 0.066 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 7.5 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 10.0 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 74.78 | % |
| Intercepted Flow | 5 | cfs |
| Bypass Flow | 2 | cfs |
| Spread | 9.9 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.1 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 6.7 | ft/s |
| Splash Over Velocity | 8.1 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.084 | |
| Grate Flow Ratio | 0.455 | |
| Equivalent Cross Slope | 0.111 | ft/ft |
| Active Grate Length | 3.8 | ft |
| Length Factor | 0.232 | |
| Total Interception Length | 26.9 | ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#7

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 5 | cfs |
| Slope | 0.085 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 78.28 | % |
| Intercepted Flow | 4 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 8.1 | ft |
| Depth | 0.3 | ft |
| Flow Area | 0.7 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 6.9 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 0.974 | |
| Side Flow Factor | 0.033 | |
| Grate Flow Ratio | 0.547 | |
| Equivalent Cross Slope | 0.129 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.218 | |
| Total Interception Length | 23.0 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#8

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 5 | cfs |
| Slope | 0.085 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 78.28 | % |
| Intercepted Flow | 4 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 8.1 | ft |
| Depth | 0.3 | ft |
| Flow Area | 0.7 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 6.9 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 0.974 | |
| Side Flow Factor | 0.033 | |
| Grate Flow Ratio | 0.547 | |
| Equivalent Cross Slope | 0.129 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.218 | |
| Total Interception Length | 23.0 | ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#9

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | |
|---|---|
| Discharge | 4 cfs |
| Slope | 0.085 ft/ft |
| Gutter Width | 1.50 ft |
| Gutter Cross Slope | 0.086 ft/ft |
| Road Cross Slope | 0.020 ft/ft |
| Roughness Coefficient | 0.016 |
| Local Depression | 4.0 in |
| Local Depression Width | 26.0 in |
| Grate Width | 1.50 ft |
| Grate Length | 5.0 ft |
| Grate Type | Curved Vaned |
| Clogging | 50.0 % |
| Curb Opening Length | 7.5 ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | |
|---|---|
| Efficiency | 84.20 % |
| Intercepted Flow | 3 cfs |
| Bypass Flow | 1 cfs |
| Spread | 7.3 ft |
| Depth | 0.2 ft |
| Flow Area | 0.6 ft² |
| Gutter Depression | 1.2 in |
| Total Depression | 5.2 in |
| Velocity | 6.6 ft/s |
| Splash Over Velocity | 6.6 ft/s |
| Frontal Flow Factor | 0.999 |
| Side Flow Factor | 0.035 |
| Grate Flow Ratio | 0.597 |
| Equivalent Cross Slope | 0.139 ft/ft |
| Active Grate Length | 2.5 ft |
| Length Factor | 0.250 |
| Total Interception Length | 20.0 ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#10

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 4 | cfs |
| Slope | 0.085 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 84.20 | % |
| Intercepted Flow | 3 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 7.3 | ft |
| Depth | 0.2 | ft |
| Flow Area | 0.6 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 6.6 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 0.999 | |
| Side Flow Factor | 0.035 | |
| Grate Flow Ratio | 0.597 | |
| Equivalent Cross Slope | 0.139 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.250 | |
| Total Interception Length | 20.0 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#11

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 4 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 82.75 | % |
| Intercepted Flow | 3 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 9.7 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.0 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 4.0 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.084 | |
| Grate Flow Ratio | 0.465 | |
| Equivalent Cross Slope | 0.113 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.322 | |
| Total Interception Length | 15.5 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#12

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 4 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 82.75 | % |
| Intercepted Flow | 3 | cfs |
| Bypass Flow | 1 | cfs |
| Spread | 9.7 | ft |
| Depth | 0.3 | ft |
| Flow Area | 1.0 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 4.0 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.084 | |
| Grate Flow Ratio | 0.465 | |
| Equivalent Cross Slope | 0.113 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.322 | |
| Total Interception Length | 15.5 | ft |

Messages

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#14

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 1 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 100.00 | % |
| Intercepted Flow | 1 | cfs |
| Bypass Flow | 0 | cfs |
| Spread | 4.9 | ft |
| Depth | 0.2 | ft |
| Flow Area | 0.3 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 3.1 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.123 | |
| Grate Flow Ratio | 0.784 | |
| Equivalent Cross Slope | 0.177 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.754 | |
| Total Interception Length | 6.6 | ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

# Copy of Combination Inlet On Grade - SDDI#15

| Project Description | |
|---|---|
| Solve For | Efficiency |

| Input Data | | |
|---|---|---|
| Discharge | 1 | cfs |
| Slope | 0.024 | ft/ft |
| Gutter Width | 1.50 | ft |
| Gutter Cross Slope | 0.086 | ft/ft |
| Road Cross Slope | 0.020 | ft/ft |
| Roughness Coefficient | 0.016 | |
| Local Depression | 4.0 | in |
| Local Depression Width | 26.0 | in |
| Grate Width | 1.50 | ft |
| Grate Length | 5.0 | ft |
| Grate Type | Curved Vaned | |
| Clogging | 50.0 | % |
| Curb Opening Length | 7.5 | ft |

| Options | |
|---|---|
| Calculation Option | Use Both |
| Grate Flow Option | Exclude None |

| Results | | |
|---|---|---|
| Efficiency | 100.00 | % |
| Intercepted Flow | 1 | cfs |
| Bypass Flow | 0 | cfs |
| Spread | 4.9 | ft |
| Depth | 0.2 | ft |
| Flow Area | 0.3 | $ft^2$ |
| Gutter Depression | 1.2 | in |
| Total Depression | 5.2 | in |
| Velocity | 3.1 | ft/s |
| Splash Over Velocity | 6.6 | ft/s |
| Frontal Flow Factor | 1.000 | |
| Side Flow Factor | 0.123 | |
| Grate Flow Ratio | 0.784 | |
| Equivalent Cross Slope | 0.177 | ft/ft |
| Active Grate Length | 2.5 | ft |
| Length Factor | 0.754 | |
| Total Interception Length | 6.6 | ft |

| Messages |
|---|

| Messages | | |
|---|---|---|
| Messages | Grate Length should be within the defined range of HEC-22's Chart 5 (approx. 0.5-4.5 ft / 0.15-1.35 m). | |

**Street XS only Printed for where Ultimate condition Exceed Interim**

# Copy of Section 1E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 1 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.4 ft² |
| Wetted Perimeter | 4.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 4.63 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 2.7 ft/s |
| Velocity Head | 0.11 ft |
| Specific Energy | 0.36 ft |
| Froude Number | 1.654 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Copy of Section 1W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 1 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.4 ft² |
| Wetted Perimeter | 4.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 4.63 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 2.7 ft/s |
| Velocity Head | 0.11 ft |
| Specific Energy | 0.36 ft |
| Froude Number | 1.654 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Copy of Section 2a E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.09 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.4 ft/s |
| Velocity Head | 0.18 ft |
| Specific Energy | 0.54 ft |
| Froude Number | 1.753 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 2a W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.024 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.09 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.4 ft/s |
| Velocity Head | 0.18 ft |
| Specific Energy | 0.54 ft |
| Froude Number | 1.753 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.024 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 2b E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.7 ft² |
| Wetted Perimeter | 7.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 7.43 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.6 ft/s |
| Velocity Head | 0.49 ft |
| Specific Energy | 0.80 ft |
| Froude Number | 3.202 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

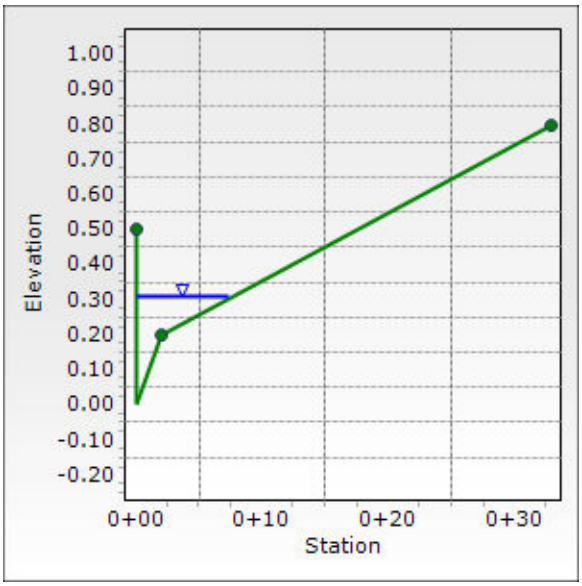
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Copy of Section 2b E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 4 cfs |



# Copy of Section 2b W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.7 ft² |
| Wetted Perimeter | 7.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 7.43 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.6 ft/s |
| Velocity Head | 0.49 ft |
| Specific Energy | 0.80 ft |
| Froude Number | 3.202 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

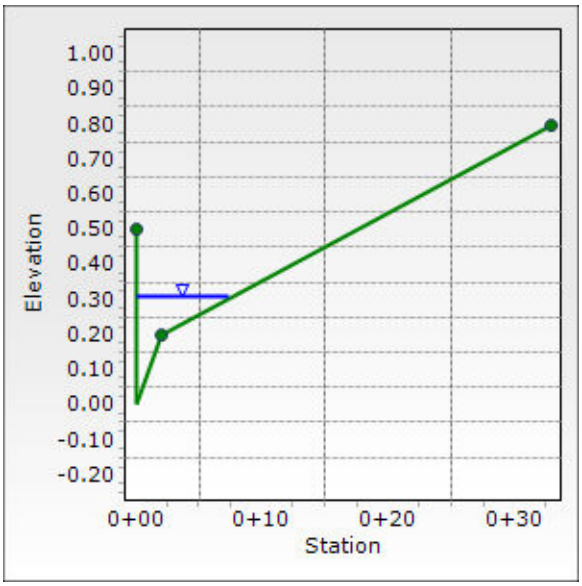
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Copy of Section 2b W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 4 cfs |



# Copy of Section 3S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 5 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.9 ft² |
| Wetted Perimeter | 8.6 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 8.31 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.9 ft/s |
| Velocity Head | 0.54 ft |
| Specific Energy | 0.86 ft |
| Froude Number | 3.239 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

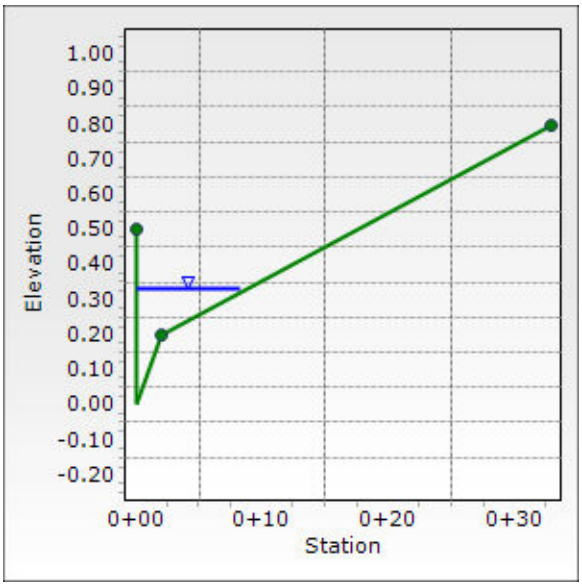
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Copy of Section 3S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 5 cfs |



# Copy of Section 3N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Discharge | 5 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.9 ft² |
| Wetted Perimeter | 8.6 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 8.31 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.9 ft/s |
| Velocity Head | 0.54 ft |
| Specific Energy | 0.86 ft |
| Froude Number | 3.239 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

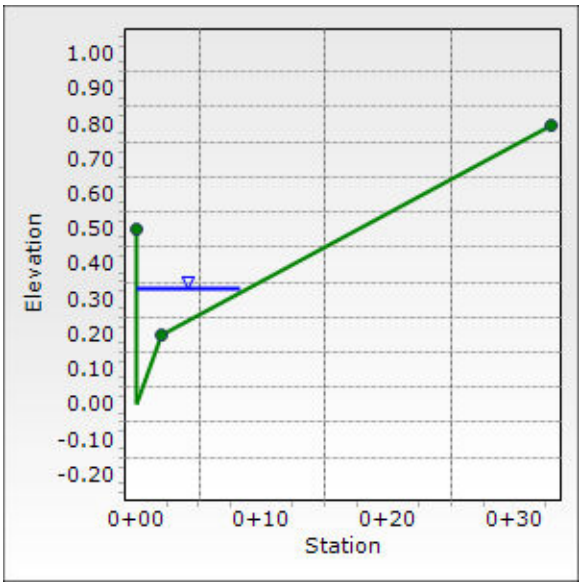
| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.085 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Cross Section for Copy of Section 3N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.085 ft/ft |
| Normal Depth | 0.3 ft |
| Discharge | 5 cfs |



# Copy of Section 4S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Discharge | 7 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.32 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.7 ft/s |
| Velocity Head | 0.51 ft |
| Specific Energy | 0.87 ft |
| Froude Number | 2.924 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.066 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 4N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.066 ft/ft |
| Discharge | 7 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.2 ft² |
| Wetted Perimeter | 10.7 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 10.32 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 5.7 ft/s |
| Velocity Head | 0.51 ft |
| Specific Energy | 0.87 ft |
| Froude Number | 2.924 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.066 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 5S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Discharge | 11 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.6 ft² |
| Wetted Perimeter | 12.5 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 12.11 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.6 ft |
| Critical Slope | 0.006 ft/ft |
| Velocity | 6.8 ft/s |
| Velocity Head | 0.71 ft |
| Specific Energy | 1.11 ft |
| Froude Number | 3.253 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.6 ft |
| Channel Slope | 0.079 ft/ft |
| Critical Slope | 0.006 ft/ft |

# Copy of Section 5N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.079 ft/ft |
| Discharge | 7 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 10.3 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.92 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 6.1 ft/s |
| Velocity Head | 0.58 ft |
| Specific Energy | 0.94 ft |
| Froude Number | 3.175 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.5 ft |
| Channel Slope | 0.079 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 6S

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Discharge | 4 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 9.9 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.57 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Critical Slope | 0.007 ft/ft |
| Velocity | 3.7 ft/s |
| Velocity Head | 0.21 ft |
| Specific Energy | 0.57 ft |
| Froude Number | 1.955 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.4 ft |
| Channel Slope | 0.030 ft/ft |
| Critical Slope | 0.007 ft/ft |

# Copy of Section 6N

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.030 ft/ft |
| Discharge | 2 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.3 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 0.6 ft² |
| Wetted Perimeter | 7.1 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 6.77 ft |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 3.2 ft/s |
| Velocity Head | 0.16 ft |
| Specific Energy | 0.46 ft |
| Froude Number | 1.885 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.3 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.030 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Copy of Section 0E

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.007 ft/ft |
| Discharge | 2 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 10.1 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.74 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 1.8 ft/s |
| Velocity Head | 0.05 ft |
| Specific Energy | 0.41 ft |
| Froude Number | 0.942 |
| Flow Type | Subcritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.007 ft/ft |
| Critical Slope | 0.008 ft/ft |

# Copy of Section 0W

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Channel Slope | 0.007 ft/ft |
| Discharge | 2 cfs |

## Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 0.50 |
| 0+00 | 0.00 |
| 0+02 | 0.20 |
| 0+33 | 0.82 |

## Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 0.50) | (0+02, 0.20) | 0.015 |
| (0+02, 0.20) | (0+33, 0.82) | 0.016 |

| Options | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

| Results | |
|---|---|
| Normal Depth | 0.4 ft |
| Elevation Range | 0.0 to 0.8 ft |
| Flow Area | 1.1 ft² |
| Wetted Perimeter | 10.1 ft |
| Hydraulic Radius | 0.1 ft |
| Top Width | 9.74 ft |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 1.8 ft/s |
| Velocity Head | 0.05 ft |
| Specific Energy | 0.41 ft |
| Froude Number | 0.942 |
| Flow Type | Subcritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |

| GVF Input Data | |
|---|---|
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 0.4 ft |
| Critical Depth | 0.3 ft |
| Channel Slope | 0.007 ft/ft |
| Critical Slope | 0.008 ft/ft |

## C.3. WSPG Models

INTERIM MODEL OUTPUT

The pipe bend loss equation was also used in WSPG to determine the deflection angle losses in a manhole. The equation itself can be theoretically applied to a bend angle at least up to 90 degrees. In fact, for a 90-degree bend, whether or not to break it into smaller segments should result in the exact same results. The maximum 15 degrees limitation is just a warning for pipe bends and doesn't apply to manholes.

```
************************************
Water Surface Profile Gradient (WSPG)
XP WSPG
Engine Version 3.1                19/04/2012
Innovyze                  www.innovyze.com
************************************

INPUT FILE
************************************
D:\Atkins\V27\PDT\UPDATE 1\HYDRAULICS\WSPG2018\V27_PDT_Main_Up1_INT.wsx
Computed 05/18/23 09:10:58

TITLE INFORMATION
************************************

WARNING SUMMARY
************************************
 WARNING 61: Angle point for closed channel Link11 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link12 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link18 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link19 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link21 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link22 outside proposed range of between 0 and 15 degrees.

RESULTS
************************************


============================================================
   Main Line
============================================================

 Composite Profile:
```

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Main Sys" | Outlet | 0.00 | 3700.25 | 3704.25 | 3702.625 | 2.375 | 88.00 | 1 | 11.32 | 1.99 | 3704.61 | 0.000 | 2.844 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 19.18 | 3700.44 | 2852.49 | *3702.846 | 2.405 | 88.00 | 1 | 11.15 | 1.93 | 3704.78 | 0.000 | 2.844 | 1.384 | 0.00995 | 2.266 | Circular Pipe |
| | "i.p." | 54.57 | 3700.79 | 1280.93 | *3703.297 | 2.504 | 88.00 | 1 | 10.63 | 1.75 | 3705.05 | 0.000 | 2.844 | 1.281 | 0.00995 | 2.266 | Circular Pipe |
| | "i.p." | 72.40 | 3700.97 | 489.20 | *3703.580 | 2.609 | 88.00 | 1 | 10.14 | 1.60 | 3705.17 | 0.000 | 2.844 | 1.183 | 0.00995 | 2.266 | Circular Pipe |
| | "i.p." | 80.95 | 3701.06 | 109.49 | *3703.777 | 2.722 | 88.00 | 1 | 9.66 | 1.45 | 3705.23 | 0.000 | 2.844 | 1.090 | 0.00995 | 2.266 | Circular Pipe |
| "Link22" | Reach | 83.41 | 3701.08 | 0.00 | *3703.923 | 2.843 | 88.00 | 1 | 9.21 | 1.32 | 3705.24 | 0.000 | 2.844 | 1.001 | 0.00995 | 2.266 | Circular Pipe |
| "SDMH14" | Drop | 83.41 | 3701.28 | 0.00 | *3705.241 | 3.961 | 88.00 | 1 | 12.45 | 2.41 | 3707.65 | 0.000 | 2.833 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 98.79 | 3703.19 | 0.00 | *3704.588 | 1.403 | 88.00 | 1 | 27.12 | 11.42 | 3716.01 | 0.000 | 2.833 | 4.591 | 0.12391 | 1.272 | Circular Pipe |
| "Link21" | Reach | 122.47 | 3706.12 | 0.00 | *3707.576 | 1.456 | 88.00 | 1 | 25.86 | 10.38 | 3717.96 | 0.000 | 2.833 | 4.278 | 0.12391 | 1.272 | Circular Pipe |
| | "i.p." | 168.98 | 3709.92 | 0.00 | *3711.396 | 1.473 | 88.00 | 1 | 25.48 | 10.08 | 3721.47 | 0.000 | 2.833 | 4.183 | 0.08175 | 1.431 | Circular Pipe |
| "Link20" | Reach | 239.78 | 3715.71 | 0.00 | *3717.240 | 1.530 | 88.00 | 1 | 24.29 | 9.16 | 3726.40 | 0.000 | 2.833 | 3.895 | 0.08175 | 1.431 | Circular Pipe |
| "SDMH12 (" | Join | 239.78 | 3715.71 | 3728.38 | 3717.072 | 1.362 | 82.00 | 1 | 26.29 | 10.73 | 3727.80 | 0.000 | 2.788 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| "Link17" | Reach | 374.25 | 3727.13 | 0.00 | *3728.503 | 1.373 | 82.00 | 1 | 26.00 | 10.50 | 3739.00 | 0.000 | 2.788 | 4.462 | 0.08493 | 1.360 | Circular Pipe |
| "Link16" | Reach | 516.11 | 3738.84 | 0.00 | *3740.228 | 1.388 | 82.00 | 1 | 25.64 | 10.21 | 3750.44 | 0.000 | 2.788 | 4.371 | 0.08255 | 1.371 | Circular Pipe |
| | "i.p." | 561.13 | 3742.62 | 0.00 | *3744.026 | 1.404 | 82.00 | 1 | 25.25 | 9.90 | 3753.93 | 0.000 | 2.788 | 4.272 | 0.08400 | 1.364 | Circular Pipe |
| "Link15" | Reach | 627.78 | 3748.22 | 0.00 | *3749.677 | 1.457 | 82.00 | 1 | 24.07 | 9.00 | 3758.68 | 0.000 | 2.788 | 3.981 | 0.08400 | 1.364 | Circular Pipe |
| | "i.p." | 668.12 | 3751.43 | 0.00 | *3752.933 | 1.504 | 82.00 | 1 | 23.11 | 8.30 | 3761.23 | 0.000 | 2.788 | 3.746 | 0.07954 | 1.385 | Circular Pipe |
| | "i.p." | 698.09 | 3753.81 | 0.00 | *3755.374 | 1.562 | 82.00 | 1 | 22.04 | 7.54 | 3762.92 | 0.000 | 2.788 | 3.486 | 0.07954 | 1.385 | Circular Pipe |
| | "i.p." | 718.98 | 3755.47 | 0.00 | *3757.097 | 1.623 | 82.00 | 1 | 21.01 | 6.86 | 3763.95 | 0.000 | 2.788 | 3.241 | 0.07954 | 1.385 | Circular Pipe |
| | "i.p." | 734.63 | 3756.72 | 0.00 | *3758.405 | 1.687 | 82.00 | 1 | 20.04 | 6.23 | 3764.64 | 0.000 | 2.788 | 3.011 | 0.07954 | 1.385 | Circular Pipe |
| "Link14" | Reach | 746.84 | 3757.69 | 0.00 | *3759.444 | 1.754 | 82.00 | 1 | 19.10 | 5.67 | 3765.11 | 0.000 | 2.788 | 2.794 | 0.07954 | 1.385 | Circular Pipe |
| | "i.p." | 801.32 | 3759.95 | 0.00 | *3761.761 | 1.814 | 82.00 | 1 | 18.35 | 5.23 | 3766.99 | 0.000 | 2.788 | 2.620 | 0.04143 | 1.682 | Circular Pipe |
| | "i.p." | 839.20 | 3761.52 | 0.00 | *3763.405 | 1.888 | 82.00 | 1 | 17.50 | 4.75 | 3768.16 | 0.000 | 2.788 | 2.425 | 0.04143 | 1.682 | Circular Pipe |
| | "i.p." | 864.26 | 3762.55 | 0.00 | *3764.523 | 1.968 | 82.00 | 1 | 16.68 | 4.32 | 3768.84 | 0.000 | 2.788 | 2.239 | 0.04143 | 1.682 | Circular Pipe |
| "Link13" | Reach | 882.24 | 3763.30 | 0.00 | *3765.353 | 2.053 | 82.00 | 1 | 15.91 | 3.93 | 3769.28 | 0.000 | 2.788 | 2.062 | 0.04143 | 1.682 | Circular Pipe |
| "SDMH7 (C" | Join | 882.24 | 3763.30 | 3777.07 | 3765.049 | 1.749 | 76.00 | 1 | 17.77 | 4.90 | 3769.95 | 0.000 | 2.730 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 904.32 | 3764.15 | 2731.98 | *3765.926 | 1.779 | 76.00 | 1 | 17.40 | 4.70 | 3770.63 | 0.000 | 2.730 | 2.519 | 0.03835 | 1.643 | Circular Pipe |
| | "i.p." | 938.91 | 3765.47 | 1094.98 | *3767.325 | 1.852 | 76.00 | 1 | 16.59 | 4.27 | 3771.60 | 0.000 | 2.730 | 2.333 | 0.03835 | 1.643 | Circular Pipe |
| "Link10" | Reach | 962.04 | 3766.36 | 0.00 | *3768.289 | 1.929 | 76.00 | 1 | 15.82 | 3.89 | 3772.17 | 0.000 | 2.730 | 2.156 | 0.03835 | 1.643 | Circular Pipe |
| "Link9" | Reach | 1092.35 | 3769.40 | 0.00 | *3771.323 | 1.923 | 76.00 | 1 | 15.88 | 3.92 | 3775.24 | 0.000 | 2.730 | 2.171 | 0.02333 | 1.931 | Circular Pipe |
| "Link8" | Reach | 1219.65 | 3772.41 | 0.00 | *3774.334 | 1.924 | 76.00 | 1 | 15.87 | 3.91 | 3778.24 | 0.000 | 2.730 | 2.167 | 0.02364 | 1.922 | Circular Pipe |
| | "i.p." | 1229.44 | 3772.66 | 0.00 | *3774.590 | 1.930 | 76.00 | 1 | 15.81 | 3.88 | 3778.47 | 0.000 | 2.730 | 2.155 | 0.02553 | 1.873 | Circular Pipe |
| | "i.p." | 1307.81 | 3774.66 | 0.00 | *3776.673 | 2.012 | 76.00 | 1 | 15.08 | 3.53 | 3780.20 | 0.000 | 2.730 | 1.988 | 0.02553 | 1.873 | Circular Pipe |
| "Link7" | Reach | 1347.32 | 3775.67 | 0.00 | *3777.770 | 2.100 | 76.00 | 1 | 14.38 | 3.21 | 3780.98 | 0.000 | 2.730 | 1.827 | 0.02553 | 1.873 | Circular Pipe |
| | "i.p." | 1400.26 | 3776.59 | 0.00 | *3778.653 | 2.066 | 76.00 | 1 | 14.64 | 3.33 | 3781.98 | 0.000 | 2.730 | 1.888 | 0.01733 | 2.155 | Circular Pipe |
| "Link6" | Reach | 1477.18 | 3777.92 | 0.00 | *3779.900 | 1.980 | 76.00 | 1 | 15.36 | 3.66 | 3783.56 | 0.000 | 2.730 | 2.051 | 0.01733 | 2.155 | Circular Pipe |
| | "i.p." | 1480.47 | 3777.95 | 0.00 | *3779.911 | 1.966 | 76.00 | 1 | 15.48 | 3.72 | 3783.63 | 0.000 | 2.730 | 2.080 | 0.00780 | 3.000 | Circular Pipe |
| | "i.p." | 1499.02 | 3778.09 | 0.00 | *3779.977 | 1.886 | 76.00 | 1 | 16.24 | 4.09 | 3784.07 | 0.000 | 2.730 | 2.252 | 0.00780 | 3.000 | Circular Pipe |
| | "i.p." | 1516.83 | 3778.23 | 0.00 | *3780.041 | 1.812 | 76.00 | 1 | 17.03 | 4.50 | 3784.54 | 0.000 | 2.730 | 2.434 | 0.00780 | 3.000 | Circular Pipe |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 1533.91 | 3778.36 | 0.00 | *3780.104 | 1.741 | 76.00 | 1 | 17.86 | 4.95 | 3785.06 | 0.000 | 2.730 | 2.626 | 0.00780 | 3.000 | Circular Pipe |
| "Link5" | Reach | 1550.28 | 3778.49 | 0.00 | *3780.165 | 1.675 | 76.00 | 1 | 18.73 | 5.45 | 3785.61 | 0.000 | 2.730 | 2.829 | 0.00780 | 3.000 | Circular Pipe |
| "SDMH1 (C" | Join | 1550.28 | 3778.49 | 3792.93 | 3780.144 | 1.654 | 75.50 | 1 | 18.89 | 5.54 | 3785.69 | 0.000 | 2.725 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 1552.39 | 3778.96 | 2888.48 | *3780.670 | 1.713 | 75.50 | 1 | 18.11 | 5.09 | 3785.76 | 0.000 | 2.725 | 2.693 | 0.22197 | 1.001 | Circular Pipe |
| | "i.p." | 1554.45 | 3779.42 | 2001.34 | *3781.197 | 1.781 | 75.50 | 1 | 17.26 | 4.63 | 3785.82 | 0.000 | 2.725 | 2.497 | 0.22197 | 1.001 | Circular Pipe |
| | "i.p." | 1556.24 | 3779.81 | 1232.41 | *3781.667 | 1.854 | 75.50 | 1 | 16.46 | 4.21 | 3785.87 | 0.000 | 2.725 | 2.312 | 0.22197 | 1.001 | Circular Pipe |
| | "i.p." | 1557.79 | 3780.16 | 568.87 | *3782.088 | 1.932 | 75.50 | 1 | 15.69 | 3.82 | 3785.91 | 0.000 | 2.725 | 2.137 | 0.22197 | 1.001 | Circular Pipe |
| "Link2" | Reach | 1559.11 | 3780.45 | 0.00 | *3782.464 | 2.014 | 75.50 | 1 | 14.96 | 3.48 | 3785.94 | 0.000 | 2.725 | 1.971 | 0.22197 | 1.001 | Circular Pipe |
| "SDDI14" | Junction | 1559.11 | 3780.45 | 3793.12 | 3782.433 | 1.983 | 75.00 | 1 | 15.13 | 3.55 | 3785.99 | 0.000 | 2.719 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 1566.38 | 3780.70 | 3235.82 | *3782.723 | 2.018 | 75.00 | 1 | 14.83 | 3.41 | 3786.14 | 0.000 | 2.719 | 1.949 | 0.03495 | 1.677 | Circular Pipe |
| | "i.p." | 1580.25 | 3781.19 | 2173.55 | *3783.296 | 2.107 | 75.00 | 1 | 14.14 | 3.10 | 3786.40 | 0.000 | 2.719 | 1.792 | 0.03495 | 1.677 | Circular Pipe |
| | "i.p." | 1590.58 | 3781.55 | 1382.00 | *3783.753 | 2.203 | 75.00 | 1 | 13.48 | 2.82 | 3786.57 | 0.000 | 2.719 | 1.639 | 0.03495 | 1.677 | Circular Pipe |
| | "i.p." | 1598.24 | 3781.82 | 794.65 | *3784.126 | 2.308 | 75.00 | 1 | 12.85 | 2.56 | 3786.69 | 0.000 | 2.719 | 1.491 | 0.03495 | 1.677 | Circular Pipe |
| | "i.p." | 1603.73 | 3782.01 | 374.09 | *3784.434 | 2.424 | 75.00 | 1 | 12.25 | 2.33 | 3786.77 | 0.000 | 2.719 | 1.342 | 0.03495 | 1.677 | Circular Pipe |
| | "i.p." | 1607.25 | 3782.13 | 104.66 | *3784.690 | 2.557 | 75.00 | 1 | 11.68 | 2.12 | 3786.81 | 0.000 | 2.719 | 1.186 | 0.03495 | 1.677 | Circular Pipe |
| "Link1" | Reach | 1608.61 | 3782.18 | 0.00 | *3784.898 | 2.718 | 75.00 | 1 | 11.14 | 1.93 | 3786.82 | 0.000 | 2.719 | 1.001 | 0.03495 | 1.677 | Circular Pipe |
| "SH" | Headwrk | 1608.61 | 3782.18 | 0.00 | *3784.899 | 2.719 | 75.00 | 1 | 11.14 | 1.93 | 3786.82 | 0.000 | 2.719 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

**============================================================**
SDMH1 **(**CP1.1**)**_Lateral1
**============================================================**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 1550.28 | 3778.69 | 3792.93 | 3780.154 | 1.464 | 0.50 | 1 | 0.20 | 0.00 | 3780.16 | 0.000 | 0.242 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 1555.88 | 3779.36 | 3039.61 | *3779.476 | 0.114 | 0.50 | 1 | 6.98 | 0.76 | 3780.23 | 0.000 | 0.242 | 4.432 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1561.85 | 3780.08 | 2235.09 | *3780.193 | 0.115 | 0.50 | 1 | 6.97 | 0.75 | 3780.95 | 0.000 | 0.242 | 4.417 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1569.33 | 3780.98 | 1228.32 | *3781.094 | 0.118 | 0.50 | 1 | 6.64 | 0.68 | 3781.78 | 0.000 | 0.242 | 4.143 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1571.87 | 3781.28 | 885.65 | *3781.403 | 0.122 | 0.50 | 1 | 6.33 | 0.62 | 3782.03 | 0.000 | 0.242 | 3.886 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1573.36 | 3781.46 | 685.29 | *3781.585 | 0.126 | 0.50 | 1 | 6.04 | 0.57 | 3782.15 | 0.000 | 0.242 | 3.646 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1574.39 | 3781.58 | 546.98 | *3781.713 | 0.130 | 0.50 | 1 | 5.76 | 0.51 | 3782.23 | 0.000 | 0.242 | 3.419 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1575.15 | 3781.67 | 444.36 | *3781.809 | 0.135 | 0.50 | 1 | 5.49 | 0.47 | 3782.28 | 0.000 | 0.242 | 3.208 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1575.75 | 3781.75 | 363.92 | *3781.885 | 0.139 | 0.50 | 1 | 5.23 | 0.43 | 3782.31 | 0.000 | 0.242 | 3.009 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.23 | 3781.80 | 299.18 | *3781.947 | 0.143 | 0.50 | 1 | 4.99 | 0.39 | 3782.33 | 0.000 | 0.242 | 2.822 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.62 | 3781.85 | 246.23 | *3781.999 | 0.148 | 0.50 | 1 | 4.76 | 0.35 | 3782.35 | 0.000 | 0.242 | 2.647 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.95 | 3781.89 | 202.17 | *3782.043 | 0.153 | 0.50 | 1 | 4.54 | 0.32 | 3782.36 | 0.000 | 0.242 | 2.483 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.23 | 3781.92 | 164.98 | *3782.081 | 0.158 | 0.50 | 1 | 4.33 | 0.29 | 3782.37 | 0.000 | 0.242 | 2.328 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.46 | 3781.95 | 133.90 | *3782.114 | 0.163 | 0.50 | 1 | 4.12 | 0.26 | 3782.38 | 0.000 | 0.242 | 2.184 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.65 | 3781.97 | 107.56 | *3782.143 | 0.169 | 0.50 | 1 | 3.93 | 0.24 | 3782.38 | 0.000 | 0.242 | 2.048 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.82 | 3781.99 | 85.22 | *3782.168 | 0.174 | 0.50 | 1 | 3.75 | 0.22 | 3782.39 | 0.000 | 0.242 | 1.921 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.96 | 3782.01 | 66.62 | *3782.191 | 0.180 | 0.50 | 1 | 3.57 | 0.20 | 3782.39 | 0.000 | 0.242 | 1.802 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.07 | 3782.02 | 50.79 | *3782.211 | 0.186 | 0.50 | 1 | 3.41 | 0.18 | 3782.39 | 0.000 | 0.242 | 1.690 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.17 | 3782.04 | 37.67 | *3782.228 | 0.192 | 0.50 | 1 | 3.25 | 0.16 | 3782.39 | 0.000 | 0.242 | 1.585 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.25 | 3782.05 | 26.95 | *3782.244 | 0.198 | 0.50 | 1 | 3.10 | 0.15 | 3782.39 | 0.000 | 0.242 | 1.486 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.32 | 3782.05 | 18.36 | *3782.258 | 0.205 | 0.50 | 1 | 2.95 | 0.14 | 3782.39 | 0.000 | 0.242 | 1.394 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.37 | 3782.06 | 11.53 | *3782.271 | 0.212 | 0.50 | 1 | 2.82 | 0.12 | 3782.39 | 0.000 | 0.242 | 1.307 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.40 | 3782.06 | 6.42 | *3782.283 | 0.219 | 0.50 | 1 | 2.69 | 0.11 | 3782.39 | 0.000 | 0.242 | 1.225 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.43 | 3782.07 | 3.00 | *3782.293 | 0.226 | 0.50 | 1 | 2.56 | 0.10 | 3782.39 | 0.000 | 0.242 | 1.149 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.45 | 3782.07 | 0.72 | *3782.303 | 0.233 | 0.50 | 1 | 2.44 | 0.09 | 3782.40 | 0.000 | 0.242 | 1.077 | 0.11999 | 0.114 | Circular Pipe |
| "Link4" | Reach | 1578.45 | 3782.07 | 0.00 | *3782.311 | 0.241 | 0.50 | 1 | 2.33 | 0.08 | 3782.40 | 0.000 | 0.242 | 1.010 | 0.11999 | 0.114 | Circular Pipe |
| "SDDI15" | Headwrk | 1578.45 | 3782.07 | 0.00 | *3782.312 | 0.242 | 0.50 | 1 | 2.31 | 0.08 | 3782.40 | 0.000 | 0.242 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

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SDMH7 **(**CP1.2**)**_Lateral1
**============================================================**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 882.24 | 3763.50 | 3777.07 | 3765.201 | 1.701 | 3.00 | 1 | 1.05 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| HYDRAULIC JUMP at 886.81 of **length** 0.03 | | | | | | | | | | | | | | | | | |
| | "i.p." | 882.82 | 3763.59 | 3537.12 | *3765.199 | 1.613 | 3.00 | 1 | 1.11 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.149 | 0.14945 | 0.254 | Circular Pipe |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 883.32 | 3763.66 | 3327.86 | *3765.198 | 1.536 | 3.00 | 1 | 1.16 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.165 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 883.78 | 3763.73 | 3140.14 | *3765.196 | 1.466 | 3.00 | 1 | 1.22 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.181 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 884.19 | 3763.79 | 2968.93 | *3765.193 | 1.402 | 3.00 | 1 | 1.27 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.198 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 884.57 | 3763.85 | 2811.92 | *3765.191 | 1.343 | 3.00 | 1 | 1.34 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.216 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 884.92 | 3763.90 | 2666.44 | *3765.188 | 1.288 | 3.00 | 1 | 1.40 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.234 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 885.24 | 3763.95 | 2531.21 | *3765.185 | 1.237 | 3.00 | 1 | 1.47 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.253 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 885.55 | 3763.99 | 2405.29 | *3765.182 | 1.188 | 3.00 | 1 | 1.54 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.273 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 885.83 | 3764.04 | 2287.74 | *3765.178 | 1.142 | 3.00 | 1 | 1.62 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.295 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.09 | 3764.08 | 2177.98 | *3765.175 | 1.099 | 3.00 | 1 | 1.70 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.317 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.34 | 3764.11 | 2075.43 | *3765.170 | 1.057 | 3.00 | 1 | 1.78 | 0.05 | 3765.22 | 0.000 | 0.604 | 0.341 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.57 | 3764.15 | 1979.70 | *3765.165 | 1.018 | 3.00 | 1 | 1.87 | 0.05 | 3765.22 | 0.000 | 0.604 | 0.367 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.79 | 3764.18 | 1890.39 | *3765.160 | 0.981 | 3.00 | 1 | 1.96 | 0.06 | 3765.22 | 0.000 | 0.604 | 0.394 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.81 | 3764.18 | 1881.61 | *3765.160 | 0.977 | 3.00 | 1 | 1.97 | 0.06 | 3765.22 | 0.000 | 0.604 | 0.397 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 886.81 | 3764.18 | 1881.61 | *3764.531 | 0.348 | 3.00 | 1 | 8.19 | 1.04 | 3765.57 | 0.000 | 0.604 | 2.936 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 887.10 | 3764.23 | 1761.04 | *3764.578 | 0.352 | 3.00 | 1 | 8.05 | 1.01 | 3765.58 | 0.000 | 0.604 | 2.868 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 887.80 | 3764.33 | 1469.64 | *3764.695 | 0.364 | 3.00 | 1 | 7.67 | 0.91 | 3765.61 | 0.000 | 0.604 | 2.688 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 888.40 | 3764.42 | 1220.47 | *3764.797 | 0.376 | 3.00 | 1 | 7.32 | 0.83 | 3765.63 | 0.000 | 0.604 | 2.518 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 888.92 | 3764.50 | 1006.39 | *3764.887 | 0.389 | 3.00 | 1 | 6.98 | 0.76 | 3765.64 | 0.000 | 0.604 | 2.360 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 889.36 | 3764.56 | 822.61 | *3764.966 | 0.402 | 3.00 | 1 | 6.65 | 0.69 | 3765.65 | 0.000 | 0.604 | 2.211 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 889.74 | 3764.62 | 664.53 | *3765.037 | 0.416 | 3.00 | 1 | 6.34 | 0.62 | 3765.66 | 0.000 | 0.604 | 2.071 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 890.07 | 3764.67 | 529.56 | *3765.099 | 0.430 | 3.00 | 1 | 6.05 | 0.57 | 3765.67 | 0.000 | 0.604 | 1.940 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 890.34 | 3764.71 | 414.51 | *3765.155 | 0.445 | 3.00 | 1 | 5.77 | 0.52 | 3765.67 | 0.000 | 0.604 | 1.817 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 890.58 | 3764.75 | 317.05 | *3765.206 | 0.460 | 3.00 | 1 | 5.50 | 0.47 | 3765.68 | 0.000 | 0.604 | 1.702 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 890.77 | 3764.78 | 235.60 | *3765.251 | 0.476 | 3.00 | 1 | 5.24 | 0.43 | 3765.68 | 0.000 | 0.604 | 1.594 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 890.94 | 3764.80 | 168.49 | *3765.291 | 0.492 | 3.00 | 1 | 5.00 | 0.39 | 3765.68 | 0.000 | 0.604 | 1.492 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 891.07 | 3764.82 | 113.92 | *3765.328 | 0.509 | 3.00 | 1 | 4.77 | 0.35 | 3765.68 | 0.000 | 0.604 | 1.397 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 891.17 | 3764.83 | 71.37 | *3765.361 | 0.526 | 3.00 | 1 | 4.54 | 0.32 | 3765.68 | 0.000 | 0.604 | 1.308 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 891.25 | 3764.85 | 39.41 | *3765.390 | 0.545 | 3.00 | 1 | 4.33 | 0.29 | 3765.68 | 0.000 | 0.604 | 1.224 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 891.30 | 3764.85 | 17.46 | *3765.417 | 0.563 | 3.00 | 1 | 4.13 | 0.26 | 3765.68 | 0.000 | 0.604 | 1.146 | 0.14945 | 0.254 | Circular Pipe |
| | "i.p." | 891.33 | 3764.86 | 4.32 | *3765.441 | 0.583 | 3.00 | 1 | 3.94 | 0.24 | 3765.68 | 0.000 | 0.604 | 1.072 | 0.14945 | 0.254 | Circular Pipe |
| "Link11" | Reach | 891.34 | 3764.86 | 0.00 | *3765.463 | 0.603 | 3.00 | 1 | 3.76 | 0.22 | 3765.68 | 0.000 | 0.604 | 1.003 | 0.14945 | 0.254 | Circular Pipe |
| "SDDI11" | Headwrk | 891.34 | 3764.86 | 0.00 | *3765.464 | 0.604 | 3.00 | 1 | 3.75 | 0.22 | 3765.68 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

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SDMH7 **(**CP1.2**)**_Lateral2

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Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 882.24 | 3763.50 | 3777.07 | 3765.201 | 1.701 | 3.00 | 1 | 1.05 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| HYDRAULIC JUMP at 887.26 of **length** 0.04 | | | | | | | | | | | | | | | | | |
| | "i.p." | 883.03 | 3763.59 | 3670.73 | *3765.199 | 1.613 | 3.00 | 1 | 1.11 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.149 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 883.71 | 3763.66 | 3577.98 | *3765.198 | 1.536 | 3.00 | 1 | 1.16 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.165 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 884.33 | 3763.73 | 3494.78 | *3765.196 | 1.466 | 3.00 | 1 | 1.22 | 0.02 | 3765.22 | 0.000 | 0.604 | 0.181 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 884.89 | 3763.79 | 3418.90 | *3765.193 | 1.402 | 3.00 | 1 | 1.27 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.198 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 885.40 | 3763.85 | 3349.29 | *3765.191 | 1.343 | 3.00 | 1 | 1.34 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.216 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 885.88 | 3763.90 | 3284.80 | *3765.188 | 1.288 | 3.00 | 1 | 1.40 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.234 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 886.32 | 3763.95 | 3224.85 | *3765.186 | 1.237 | 3.00 | 1 | 1.47 | 0.03 | 3765.22 | 0.000 | 0.604 | 0.253 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 886.74 | 3763.99 | 3169.01 | *3765.182 | 1.188 | 3.00 | 1 | 1.54 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.273 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 887.12 | 3764.04 | 3116.89 | *3765.179 | 1.142 | 3.00 | 1 | 1.62 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.295 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 887.26 | 3764.05 | 3097.95 | *3765.178 | 1.126 | 3.00 | 1 | 1.65 | 0.04 | 3765.22 | 0.000 | 0.604 | 0.303 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 887.26 | 3764.05 | 3097.95 | *3764.341 | 0.289 | 3.00 | 1 | 10.74 | 1.79 | 3766.13 | 0.000 | 0.604 | 4.245 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 887.69 | 3764.10 | 3039.62 | *3764.388 | 0.289 | 3.00 | 1 | 10.71 | 1.78 | 3766.17 | 0.000 | 0.604 | 4.232 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 893.00 | 3764.68 | 2321.43 | *3764.982 | 0.299 | 3.00 | 1 | 10.22 | 1.62 | 3766.60 | 0.000 | 0.604 | 3.966 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 896.52 | 3765.07 | 1845.37 | *3765.379 | 0.309 | 3.00 | 1 | 9.74 | 1.47 | 3766.85 | 0.000 | 0.604 | 3.718 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 899.09 | 3765.35 | 1497.27 | *3765.672 | 0.319 | 3.00 | 1 | 9.29 | 1.34 | 3767.01 | 0.000 | 0.604 | 3.485 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 901.08 | 3765.57 | 1228.18 | *3765.901 | 0.330 | 3.00 | 1 | 8.85 | 1.22 | 3767.12 | 0.000 | 0.604 | 3.266 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 902.67 | 3765.75 | 1013.43 | *3766.087 | 0.341 | 3.00 | 1 | 8.44 | 1.11 | 3767.19 | 0.000 | 0.604 | 3.061 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 903.97 | 3765.89 | 837.90 | *3766.241 | 0.352 | 3.00 | 1 | 8.05 | 1.01 | 3767.25 | 0.000 | 0.604 | 2.868 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 905.05 | 3766.01 | 692.18 | *3766.372 | 0.364 | 3.00 | 1 | 7.67 | 0.91 | 3767.29 | 0.000 | 0.604 | 2.688 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 905.95 | 3766.11 | 570.10 | *3766.483 | 0.376 | 3.00 | 1 | 7.32 | 0.83 | 3767.31 | 0.000 | 0.604 | 2.518 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 906.71 | 3766.19 | 466.91 | *3766.580 | 0.389 | 3.00 | 1 | 6.98 | 0.76 | 3767.34 | 0.000 | 0.604 | 2.360 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 907.36 | 3766.26 | 379.47 | *3766.664 | 0.402 | 3.00 | 1 | 6.65 | 0.69 | 3767.35 | 0.000 | 0.604 | 2.211 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 907.91 | 3766.32 | 305.08 | *3766.738 | 0.416 | 3.00 | 1 | 6.34 | 0.62 | 3767.36 | 0.000 | 0.604 | 2.071 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 908.37 | 3766.37 | 242.12 | *3766.803 | 0.430 | 3.00 | 1 | 6.05 | 0.57 | 3767.37 | 0.000 | 0.604 | 1.940 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 908.77 | 3766.42 | 188.85 | *3766.861 | 0.445 | 3.00 | 1 | 5.77 | 0.52 | 3767.38 | 0.000 | 0.604 | 1.817 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 909.10 | 3766.45 | 144.01 | *3766.913 | 0.460 | 3.00 | 1 | 5.50 | 0.47 | 3767.38 | 0.000 | 0.604 | 1.702 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 909.37 | 3766.48 | 106.74 | *3766.959 | 0.476 | 3.00 | 1 | 5.24 | 0.43 | 3767.39 | 0.000 | 0.604 | 1.594 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 909.60 | 3766.51 | 76.16 | *3767.000 | 0.492 | 3.00 | 1 | 5.00 | 0.39 | 3767.39 | 0.000 | 0.604 | 1.492 | 0.10996 | 0.273 | Circular Pipe |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 909.78 | 3766.53 | 51.39 | *3767.037 | 0.509 | 3.00 | 1 | 4.77 | 0.35 | 3767.39 | 0.000 | 0.604 | 1.397 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 909.92 | 3766.54 | 32.14 | *3767.070 | 0.526 | 3.00 | 1 | 4.54 | 0.32 | 3767.39 | 0.000 | 0.604 | 1.308 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 910.03 | 3766.56 | 17.72 | *3767.100 | 0.545 | 3.00 | 1 | 4.33 | 0.29 | 3767.39 | 0.000 | 0.604 | 1.224 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 910.10 | 3766.56 | 7.84 | *3767.127 | 0.563 | 3.00 | 1 | 4.13 | 0.26 | 3767.39 | 0.000 | 0.604 | 1.146 | 0.10996 | 0.273 | Circular Pipe |
| | "i.p." | 910.15 | 3766.57 | 1.94 | *3767.151 | 0.583 | 3.00 | 1 | 3.94 | 0.24 | 3767.39 | 0.000 | 0.604 | 1.072 | 0.10996 | 0.273 | Circular Pipe |
| "Link12" | Reach | 910.16 | 3766.57 | 0.00 | *3767.173 | 0.603 | 3.00 | 1 | 3.76 | 0.22 | 3767.39 | 0.000 | 0.604 | 1.003 | 0.10996 | 0.273 | Circular Pipe |
| "SDDI12" | Headwrk | 910.16 | 3766.57 | 0.00 | *3767.174 | 0.604 | 3.00 | 1 | 3.75 | 0.22 | 3767.39 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

*) in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV > GROUND ELEV
i.p. = intermediate point processing results for reaches

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SDMH12 (CP 1.3)_Lateral1
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Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 239.78 | 3715.91 | 3728.38 | 3717.156 | 1.246 | 3.00 | 1 | 1.46 | 0.03 | 3717.19 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| HYDRAULIC JUMP at 240.96 of length 0.04 | | | | | | | | | | | | | | | | | |
| | "i.p." | 240.09 | 3715.96 | 3599.73 | *3717.152 | 1.196 | 3.00 | 1 | 1.53 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.270 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 240.38 | 3716.00 | 3479.71 | *3717.149 | 1.150 | 3.00 | 1 | 1.60 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.291 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 240.64 | 3716.04 | 3367.54 | *3717.145 | 1.106 | 3.00 | 1 | 1.68 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.313 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 240.89 | 3716.08 | 3262.63 | *3717.141 | 1.065 | 3.00 | 1 | 1.76 | 0.05 | 3717.19 | 0.000 | 0.604 | 0.337 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 240.96 | 3716.09 | 3236.24 | *3717.140 | 1.054 | 3.00 | 1 | 1.79 | 0.05 | 3717.19 | 0.000 | 0.604 | 0.343 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 240.96 | 3716.09 | 3236.24 | *3716.401 | 0.315 | 3.00 | 1 | 9.45 | 1.39 | 3717.79 | 0.000 | 0.604 | 3.571 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 241.48 | 3716.16 | 3019.09 | *3716.482 | 0.319 | 3.00 | 1 | 9.29 | 1.34 | 3717.82 | 0.000 | 0.604 | 3.485 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 242.64 | 3716.34 | 2530.87 | *3716.667 | 0.330 | 3.00 | 1 | 8.85 | 1.22 | 3717.88 | 0.000 | 0.604 | 3.266 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 243.61 | 3716.48 | 2122.76 | *3716.824 | 0.341 | 3.00 | 1 | 8.44 | 1.11 | 3717.93 | 0.000 | 0.604 | 3.061 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 244.44 | 3716.61 | 1777.58 | *3716.958 | 0.352 | 3.00 | 1 | 8.05 | 1.01 | 3717.96 | 0.000 | 0.604 | 2.868 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 245.14 | 3716.71 | 1483.44 | *3717.075 | 0.364 | 3.00 | 1 | 7.67 | 0.91 | 3717.99 | 0.000 | 0.604 | 2.688 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 245.74 | 3716.80 | 1231.92 | *3717.177 | 0.376 | 3.00 | 1 | 7.32 | 0.83 | 3718.01 | 0.000 | 0.604 | 2.518 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 246.26 | 3716.88 | 1015.84 | *3717.267 | 0.389 | 3.00 | 1 | 6.98 | 0.76 | 3718.02 | 0.000 | 0.604 | 2.360 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 246.70 | 3716.94 | 830.33 | *3717.346 | 0.402 | 3.00 | 1 | 6.65 | 0.69 | 3718.03 | 0.000 | 0.604 | 2.211 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 247.08 | 3717.00 | 670.77 | *3717.417 | 0.416 | 3.00 | 1 | 6.34 | 0.62 | 3718.04 | 0.000 | 0.604 | 2.071 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 247.41 | 3717.05 | 534.53 | *3717.479 | 0.430 | 3.00 | 1 | 6.05 | 0.57 | 3718.05 | 0.000 | 0.604 | 1.940 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 247.68 | 3717.09 | 418.40 | *3717.535 | 0.445 | 3.00 | 1 | 5.77 | 0.52 | 3718.05 | 0.000 | 0.604 | 1.817 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 247.92 | 3717.13 | 320.03 | *3717.586 | 0.460 | 3.00 | 1 | 5.50 | 0.47 | 3718.06 | 0.000 | 0.604 | 1.702 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.11 | 3717.16 | 237.81 | *3717.631 | 0.476 | 3.00 | 1 | 5.24 | 0.43 | 3718.06 | 0.000 | 0.604 | 1.594 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.28 | 3717.18 | 170.07 | *3717.671 | 0.492 | 3.00 | 1 | 5.00 | 0.39 | 3718.06 | 0.000 | 0.604 | 1.492 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.41 | 3717.20 | 114.98 | *3717.708 | 0.509 | 3.00 | 1 | 4.77 | 0.35 | 3718.06 | 0.000 | 0.604 | 1.397 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.51 | 3717.21 | 72.04 | *3717.741 | 0.526 | 3.00 | 1 | 4.54 | 0.32 | 3718.06 | 0.000 | 0.604 | 1.308 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.59 | 3717.23 | 39.78 | *3717.770 | 0.545 | 3.00 | 1 | 4.33 | 0.29 | 3718.06 | 0.000 | 0.604 | 1.224 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.64 | 3717.23 | 17.62 | *3717.797 | 0.563 | 3.00 | 1 | 4.13 | 0.26 | 3718.06 | 0.000 | 0.604 | 1.146 | 0.14944 | 0.254 | Circular Pipe |
| | "i.p." | 248.67 | 3717.24 | 4.36 | *3717.821 | 0.583 | 3.00 | 1 | 3.94 | 0.24 | 3718.06 | 0.000 | 0.604 | 1.072 | 0.14944 | 0.254 | Circular Pipe |
| "Link18" | Reach | 248.68 | 3717.24 | 0.00 | *3717.843 | 0.603 | 3.00 | 1 | 3.76 | 0.22 | 3718.06 | 0.000 | 0.604 | 1.003 | 0.14944 | 0.254 | Circular Pipe |
| "SDDI9" | Headwrk | 248.68 | 3717.24 | 0.00 | *3717.844 | 0.604 | 3.00 | 1 | 3.75 | 0.22 | 3718.06 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

*) in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV > GROUND ELEV
i.p. = intermediate point processing results for reaches

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SDMH12 (CP 1.3)_Lateral2
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Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 239.78 | 3715.91 | 3728.38 | 3717.156 | 1.246 | 3.00 | 1 | 1.46 | 0.03 | 3717.19 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| HYDRAULIC JUMP at 241.79 of length 0.04 | | | | | | | | | | | | | | | | | |
| | "i.p." | 240.36 | 3715.96 | 3652.17 | *3717.152 | 1.196 | 3.00 | 1 | 1.53 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.270 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 240.89 | 3716.00 | 3581.05 | *3717.149 | 1.150 | 3.00 | 1 | 1.60 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.291 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 241.39 | 3716.04 | 3514.56 | *3717.145 | 1.106 | 3.00 | 1 | 1.68 | 0.04 | 3717.19 | 0.000 | 0.604 | 0.313 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 241.79 | 3716.07 | 3461.56 | *3717.142 | 1.071 | 3.00 | 1 | 1.75 | 0.05 | 3717.19 | 0.000 | 0.604 | 0.333 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 241.79 | 3716.07 | 3461.56 | *3716.380 | 0.309 | 3.00 | 1 | 9.74 | 1.47 | 3717.85 | 0.000 | 0.604 | 3.719 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 241.90 | 3716.08 | 3447.78 | *3716.388 | 0.309 | 3.00 | 1 | 9.74 | 1.47 | 3717.86 | 0.000 | 0.604 | 3.718 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 248.72 | 3716.63 | 2542.28 | *3716.945 | 0.319 | 3.00 | 1 | 9.29 | 1.34 | 3718.28 | 0.000 | 0.604 | 3.485 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 253.01 | 3716.97 | 1974.33 | *3717.298 | 0.330 | 3.00 | 1 | 8.85 | 1.22 | 3718.52 | 0.000 | 0.604 | 3.266 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 256.04 | 3717.21 | 1571.79 | *3717.552 | 0.341 | 3.00 | 1 | 8.44 | 1.11 | 3718.66 | 0.000 | 0.604 | 3.061 | 0.08004 | 0.295 | Circular Pipe |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 258.34 | 3717.40 | 1266.97 | *3717.748 | 0.352 | 3.00 | 1 | 8.05 | 1.01 | 3718.75 | 0.000 | 0.604 | 2.868 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 260.15 | 3717.54 | 1026.98 | *3717.904 | 0.364 | 3.00 | 1 | 7.67 | 0.91 | 3718.82 | 0.000 | 0.604 | 2.688 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 261.61 | 3717.66 | 833.55 | *3718.033 | 0.376 | 3.00 | 1 | 7.32 | 0.83 | 3718.86 | 0.000 | 0.604 | 2.518 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 262.80 | 3717.75 | 674.77 | *3718.142 | 0.389 | 3.00 | 1 | 6.98 | 0.76 | 3718.90 | 0.000 | 0.604 | 2.360 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 263.80 | 3717.83 | 543.27 | *3718.234 | 0.402 | 3.00 | 1 | 6.65 | 0.69 | 3718.92 | 0.000 | 0.604 | 2.211 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 264.62 | 3717.90 | 433.38 | *3718.314 | 0.416 | 3.00 | 1 | 6.34 | 0.62 | 3718.94 | 0.000 | 0.604 | 2.071 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 265.32 | 3717.95 | 341.72 | *3718.384 | 0.430 | 3.00 | 1 | 6.05 | 0.57 | 3718.95 | 0.000 | 0.604 | 1.940 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 265.89 | 3718.00 | 265.09 | *3718.445 | 0.445 | 3.00 | 1 | 5.77 | 0.52 | 3718.96 | 0.000 | 0.604 | 1.817 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 266.37 | 3718.04 | 201.21 | *3718.498 | 0.460 | 3.00 | 1 | 5.50 | 0.47 | 3718.97 | 0.000 | 0.604 | 1.702 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 266.77 | 3718.07 | 148.53 | *3718.546 | 0.476 | 3.00 | 1 | 5.24 | 0.43 | 3718.97 | 0.000 | 0.604 | 1.594 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.10 | 3718.10 | 105.61 | *3718.588 | 0.492 | 3.00 | 1 | 5.00 | 0.39 | 3718.98 | 0.000 | 0.604 | 1.492 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.36 | 3718.12 | 71.05 | *3718.626 | 0.509 | 3.00 | 1 | 4.77 | 0.35 | 3718.98 | 0.000 | 0.604 | 1.397 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.56 | 3718.13 | 44.32 | *3718.660 | 0.526 | 3.00 | 1 | 4.54 | 0.32 | 3718.98 | 0.000 | 0.604 | 1.308 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.71 | 3718.15 | 24.38 | *3718.690 | 0.545 | 3.00 | 1 | 4.33 | 0.29 | 3718.98 | 0.000 | 0.604 | 1.224 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.81 | 3718.15 | 10.76 | *3718.717 | 0.563 | 3.00 | 1 | 4.13 | 0.26 | 3718.98 | 0.000 | 0.604 | 1.146 | 0.08004 | 0.295 | Circular Pipe |
| | "i.p." | 267.87 | 3718.16 | 2.66 | *3718.741 | 0.583 | 3.00 | 1 | 3.94 | 0.24 | 3718.98 | 0.000 | 0.604 | 1.072 | 0.08004 | 0.295 | Circular Pipe |
| "Link19" | Reach | 267.89 | 3718.16 | 0.00 | *3718.763 | 0.603 | 3.00 | 1 | 3.76 | 0.22 | 3718.98 | 0.000 | 0.604 | 1.003 | 0.08004 | 0.295 | Circular Pipe |
| "SDDI10" | Headwrk | 267.89 | 3718.16 | 0.00 | *3718.764 | 0.604 | 3.00 | 1 | 3.75 | 0.22 | 3718.98 | 0.000 | 0.604 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV

i.p. **=** intermediate point processing results for reaches

INTERIM MODEL INPUT

```
[TITLE]
 
 
 

[REPORT]
COMPOSITE_ONLY

[NETWORK]
**TYPE          NAME
**-----         -------
Outlet          "Main System Outlet"
Reach           "Link22"
Drop            "SDMH14"
Reach           "Link21"
Reach           "Link20"
Join            "SDMH12 (CP 1.3)"
Reach           "Link17"
Reach           "Link16"
Reach           "Link15"
Reach           "Link14"
Reach           "Link13"
Join            "SDMH7 (CP1.2)"
Reach           "Link10"
Reach           "Link9"
Reach           "Link8"
Reach           "Link7"
Reach           "Link6"
Reach           "Link5"
Join            "SDMH1 (CP1.1)"
Reach           "Link2"
Junction        "SDDI14"
Reach           "Link1"
Headwork        "SH"

**BRANCH DEFINITIONS


"SDMH1 (CP1.1)_Lateral1"
Join            "SDMH1 (CP1.1)"
Reach           "Link4"
Headwork        "SDDI15"


"SDMH7 (CP1.2)_Lateral1"
Join            "SDMH7 (CP1.2)"
Reach           "Link11"
Headwork        "SDDI11"


"SDMH7 (CP1.2)_Lateral2"
Join            "SDMH7 (CP1.2)"
Reach           "Link12"
Headwork        "SDDI12"


"SDMH12 (CP 1.3)_Lateral1"
Join            "SDMH12 (CP 1.3)"
Reach           "Link18"
Headwork        "SDDI9"


"SDMH12 (CP 1.3)_Lateral2"
Join            "SDMH12 (CP 1.3)"
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Reach            "Link19"
Headwork         "SDDI10"

[OUTLET]
**NAME             STATION    INVERT     GROUND     CHANNEL    WATER SURFACE
**                            ELEV       ELEV       ID         ELEV (opt.)
**-------------    ---------  ---------- ---------- ---------- ----------
"Main System Outlet"0          3700.25    3704.25    "48"       0

[HEADWORK]
**NAME             INVERT     GROUND     CHANNEL    FLOW       WATER SURFACE
**                 ELEV       ELEV       ID                    ELEV (opt.)
**-------------    ---------  ---------- ---------- ---------- ----------
"SH"               3782.18    3790.52    "36"       75         0
"SDDI15"           3782.07    3793.12    "24"       0.5        0
"SDDI11"           3764.86    0          "24"       3          0
"SDDI12"           3766.57    0          "24"       3          0
"SDDI9"            3717.24    0          "24"       3          0
"SDDI10"           3718.16    0          "24"       3          0

[WALLENTRANCE]
**NAME             INVERT     GROUND     CHANNEL    LOSS
**                 ELEV       ELEV       ID         COEFFICIENT(opt.)
**-------------    ---------  ---------- ---------- --------------

[WALLEXIT]
**NAME             INVERT     GROUND     CHANNEL    LOSS
**                 ELEV       ELEV       ID         COEFFICIENT(opt.)
**-------------    ---------  ---------- ---------- --------------

[BRIDGEENTRANCE]
**NAME             INVERT     GROUND     CHANNEL    REDUCTION
**                 ELEV       ELEV       ID         FACTOR(opt.)
**-------------    ---------  ---------- ---------- --------------

[BRIDGEEXIT]
**NAME             INVERT     GROUND     CHANNEL    REDUCTION
**                 ELEV       ELEV       ID         FACTOR(opt.)
**-------------    ---------  ---------- ---------- --------------

[JOIN]
**NAME             INVERT     GROUND     CHANNEL    LENGTH     MANNINGS n NUMBER OF  CONFLUENCE
**                 ELEV       ELEV       ID                               BRANCHES  ANGLE
**-------------    ---------  ---------- ---------- ---------- ---------- ---------- ----------
"SDMH1 (CP1.1)"    3778.49    3792.93    "36"       0          0.013      1
"SDMH1 (CP1.1)_Lateral1"3778.69           "24"                                      90

"SDMH7 (CP1.2)"    3763.3     3777.07    "36"       0          0.013      2
"SDMH7 (CP1.2)_Lateral1"3763.5            "24"                                      90
"SDMH7 (CP1.2)_Lateral2"3763.5            "24"                                      -90

"SDMH12 (CP 1.3)"  3715.71    3728.38    "36"       0          0.013      2
"SDMH12 (CP 1.3)_Lateral1"3715.91         "24"                                      90
"SDMH12 (CP 1.3)_Lateral2"3715.91         "24"                                      -90


[JUNCTION]
**Name             INVERT     GROUND     CHANNEL    LENGTH     MANNINGS n NUMBER OF  CONFLUENCE FLOW
**                 ELEV       ELEV       ID                               LATERALS  ANGLE
**-------------    ---------  ---------- ---------- ---------- ---------- ---------- ---------- ----------
"SDDI14"           3780.45    3793.12    "36"       0          0.013      1
"SDDI14_Lateral1"  3780.65               "36"                                      0          0.5


```

# ULTIMATE MODEL OUTPUT

The pipe bend loss equation was also used in WSPG to determine the deflection angle losses in a manhole. The equation itself can be theoretically applied to a bend angle at least up to 90 degrees. In fact, for a 90-degree bend, whether or not to break it into smaller segments should result in the exact same results. The maximum 15 degrees limitation is just a warning for pipe bends and doesn't apply to manholes.

```
************************************
Water Surface Profile Gradient (WSPG)
XP WSPG
Engine Version 3.1                19/04/2012
Innovyze                  www.innovyze.com
************************************

INPUT FILE
************************************
D:\Atkins\V27\PDT\UPDATE 1\HYDRAULICS\WSPG2018\V27_PDT_Main_Up1_ULT.wsx
Computed 05/18/23 09:10:35

TITLE INFORMATION
************************************

WARNING SUMMARY
************************************
 WARNING 61: Angle point for closed channel Link11 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link12 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link18 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link19 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link21 outside proposed range of between 0 and 15 degrees.
 WARNING 61: Angle point for closed channel Link22 outside proposed range of between 0 and 15 degrees.

RESULTS
************************************


============================================================
   Main Line
============================================================

 Composite Profile:
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| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Main Sys" | Outlet | 0.00 | 3700.25 | 3704.25 | 3701.949 | 1.699 | 50.00 | 1 | 9.84 | 1.50 | 3703.45 | 0.000 | 2.121 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 39.19 | 3700.64 | 1963.76 | *3702.401 | 1.761 | 50.00 | 1 | 9.38 | 1.37 | 3703.77 | 0.000 | 2.121 | 1.427 | 0.00995 | 1.631 | Circular Pipe |
| | "i.p." | 59.79 | 3700.84 | 1049.05 | *3702.671 | 1.826 | 50.00 | 1 | 8.95 | 1.24 | 3703.91 | 0.000 | 2.121 | 1.331 | 0.00995 | 1.631 | Circular Pipe |
| | "i.p." | 71.79 | 3700.96 | 515.96 | *3702.859 | 1.895 | 50.00 | 1 | 8.53 | 1.13 | 3703.99 | 0.000 | 2.121 | 1.241 | 0.00995 | 1.631 | Circular Pipe |
| | "i.p." | 78.76 | 3701.03 | 206.68 | *3703.000 | 1.966 | 50.00 | 1 | 8.13 | 1.03 | 3704.03 | 0.000 | 2.121 | 1.156 | 0.00995 | 1.631 | Circular Pipe |
| | "i.p." | 82.34 | 3701.07 | 47.63 | *3703.111 | 2.041 | 50.00 | 1 | 7.75 | 0.93 | 3704.04 | 0.000 | 2.121 | 1.076 | 0.00995 | 1.631 | Circular Pipe |
| "Link22" | Reach | 83.41 | 3701.08 | 0.00 | *3703.200 | 2.120 | 50.00 | 1 | 7.39 | 0.85 | 3704.05 | 0.000 | 2.121 | 1.001 | 0.00995 | 1.631 | Circular Pipe |
| "SDMH14" | Drop | 83.41 | 3701.28 | 0.00 | *3704.049 | 2.769 | 50.00 | 1 | 7.33 | 0.84 | 3704.88 | 0.000 | 2.301 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 105.88 | 3704.06 | 0.00 | *3705.099 | 1.035 | 50.00 | 1 | 23.13 | 8.31 | 3713.41 | 0.000 | 2.301 | 4.683 | 0.12391 | 0.940 | Circular Pipe |
| "Link21" | Reach | 122.47 | 3706.12 | 0.00 | *3707.192 | 1.072 | 50.00 | 1 | 22.06 | 7.55 | 3714.75 | 0.000 | 2.301 | 4.378 | 0.12391 | 0.940 | Circular Pipe |
| | "i.p." | 163.19 | 3709.45 | 0.00 | *3710.541 | 1.093 | 50.00 | 1 | 21.48 | 7.16 | 3717.70 | 0.000 | 2.301 | 4.215 | 0.08175 | 1.048 | Circular Pipe |
| | "i.p." | 201.14 | 3712.55 | 0.00 | *3713.683 | 1.132 | 50.00 | 1 | 20.48 | 6.51 | 3720.19 | 0.000 | 2.301 | 3.938 | 0.08175 | 1.048 | Circular Pipe |
| | "i.p." | 223.92 | 3714.41 | 0.00 | *3715.586 | 1.173 | 50.00 | 1 | 19.52 | 5.92 | 3721.51 | 0.000 | 2.301 | 3.679 | 0.08175 | 1.048 | Circular Pipe |
| "Link20" | Reach | 239.78 | 3715.71 | 0.00 | *3716.926 | 1.216 | 50.00 | 1 | 18.61 | 5.38 | 3722.31 | 0.000 | 2.301 | 3.435 | 0.08175 | 1.048 | Circular Pipe |
| "SDMH12 (" | Join | 239.78 | 3715.71 | 3728.38 | 3716.669 | 0.959 | 43.00 | 1 | 22.09 | 7.58 | 3724.25 | 0.000 | 2.136 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 250.70 | 3716.64 | 3425.62 | *3717.596 | 0.959 | 43.00 | 1 | 22.09 | 7.58 | 3725.17 | 0.000 | 2.136 | 4.667 | 0.08493 | 0.959 | Circular Pipe |
| "Link17" | Reach | 374.25 | 3727.13 | 0.00 | *3728.096 | 0.966 | 43.00 | 1 | 21.87 | 7.42 | 3735.52 | 0.000 | 2.136 | 4.601 | 0.08493 | 0.959 | Circular Pipe |
| | "i.p." | 396.50 | 3728.97 | 0.00 | *3729.933 | 0.966 | 43.00 | 1 | 21.87 | 7.42 | 3737.36 | 0.000 | 2.136 | 4.601 | 0.08255 | 0.966 | Circular Pipe |
| "Link16" | Reach | 516.11 | 3738.84 | 0.00 | *3739.805 | 0.965 | 43.00 | 1 | 21.91 | 7.45 | 3747.26 | 0.000 | 2.136 | 4.614 | 0.08255 | 0.966 | Circular Pipe |
| | "i.p." | 525.45 | 3739.62 | 0.00 | *3740.589 | 0.965 | 43.00 | 1 | 21.89 | 7.44 | 3748.03 | 0.000 | 2.136 | 4.609 | 0.08400 | 0.962 | Circular Pipe |
| "Link15" | Reach | 627.78 | 3748.22 | 0.00 | *3749.219 | 0.999 | 43.00 | 1 | 20.88 | 6.77 | 3755.99 | 0.000 | 2.136 | 4.310 | 0.08400 | 0.962 | Circular Pipe |
| | "i.p." | 642.22 | 3749.37 | 0.00 | *3750.374 | 1.006 | 43.00 | 1 | 20.69 | 6.65 | 3757.02 | 0.000 | 2.136 | 4.256 | 0.07954 | 0.975 | Circular Pipe |
| | "i.p." | 685.56 | 3752.82 | 0.00 | *3753.857 | 1.041 | 43.00 | 1 | 19.73 | 6.04 | 3759.90 | 0.000 | 2.136 | 3.979 | 0.07954 | 0.975 | Circular Pipe |
| | "i.p." | 709.58 | 3754.73 | 0.00 | *3755.804 | 1.078 | 43.00 | 1 | 18.81 | 5.49 | 3761.30 | 0.000 | 2.136 | 3.719 | 0.07954 | 0.975 | Circular Pipe |
| | "i.p." | 725.74 | 3756.01 | 0.00 | *3757.129 | 1.117 | 43.00 | 1 | 17.93 | 4.99 | 3762.12 | 0.000 | 2.136 | 3.476 | 0.07954 | 0.975 | Circular Pipe |
| | "i.p." | 737.64 | 3756.96 | 0.00 | *3758.115 | 1.157 | 43.00 | 1 | 17.10 | 4.54 | 3762.65 | 0.000 | 2.136 | 3.247 | 0.07954 | 0.975 | Circular Pipe |
| "Link14" | Reach | 746.84 | 3757.69 | 0.00 | *3758.889 | 1.199 | 43.00 | 1 | 16.30 | 4.13 | 3763.02 | 0.000 | 2.136 | 3.033 | 0.07954 | 0.975 | Circular Pipe |
| | "i.p." | 771.46 | 3758.71 | 0.00 | *3759.926 | 1.217 | 43.00 | 1 | 15.99 | 3.97 | 3763.90 | 0.000 | 2.136 | 2.949 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 807.59 | 3760.21 | 0.00 | *3761.468 | 1.261 | 43.00 | 1 | 15.24 | 3.61 | 3765.08 | 0.000 | 2.136 | 2.753 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 829.70 | 3761.12 | 0.00 | *3762.431 | 1.308 | 43.00 | 1 | 14.53 | 3.28 | 3765.71 | 0.000 | 2.136 | 2.569 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 845.10 | 3761.76 | 0.00 | *3763.117 | 1.356 | 43.00 | 1 | 13.86 | 2.98 | 3766.10 | 0.000 | 2.136 | 2.396 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 856.54 | 3762.24 | 0.00 | *3763.642 | 1.407 | 43.00 | 1 | 13.21 | 2.71 | 3766.35 | 0.000 | 2.136 | 2.234 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 865.36 | 3762.60 | 0.00 | *3764.060 | 1.460 | 43.00 | 1 | 12.60 | 2.46 | 3766.52 | 0.000 | 2.136 | 2.081 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 872.31 | 3762.89 | 0.00 | *3764.404 | 1.515 | 43.00 | 1 | 12.01 | 2.24 | 3766.64 | 0.000 | 2.136 | 1.938 | 0.04143 | 1.160 | Circular Pipe |
| | "i.p." | 877.83 | 3763.12 | 0.00 | *3764.691 | 1.573 | 43.00 | 1 | 11.45 | 2.04 | 3766.73 | 0.000 | 2.136 | 1.803 | 0.04143 | 1.160 | Circular Pipe |
| "Link13" | Reach | 882.24 | 3763.30 | 0.00 | *3764.935 | 1.635 | 43.00 | 1 | 10.92 | 1.85 | 3766.79 | 0.000 | 2.136 | 1.676 | 0.04143 | 1.160 | Circular Pipe |
| "SDMH7 (C" | Join | 882.24 | 3763.30 | 3777.07 | 3764.396 | 1.096 | 35.00 | 1 | 14.97 | 3.48 | 3767.88 | 0.000 | 1.923 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 920.02 | 3764.75 | 1989.12 | *3765.878 | 1.129 | 35.00 | 1 | 14.38 | 3.21 | 3769.09 | 0.000 | 1.923 | 2.769 | 0.03835 | 1.061 | Circular Pipe |
| | "i.p." | 945.39 | 3765.72 | 788.15 | *3766.892 | 1.170 | 35.00 | 1 | 13.71 | 2.92 | 3769.81 | 0.000 | 1.923 | 2.587 | 0.03835 | 1.061 | Circular Pipe |

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Link10" | Reach | 962.04 | 3766.36 | 0.00 | *3767.573 | 1.213 | 35.00 | 1 | 13.07 | 2.65 | 3770.23 | 0.000 | 1.923 | 2.416 | 0.03835 | 1.061 | Circular Pipe |
| "Link9" | Reach | 1092.35 | 3769.40 | 0.00 | *3770.608 | 1.208 | 35.00 | 1 | 13.14 | 2.68 | 3773.29 | 0.000 | 1.923 | 2.434 | 0.02333 | 1.213 | Circular Pipe |
| "Link8" | Reach | 1219.65 | 3772.41 | 0.00 | *3773.609 | 1.199 | 35.00 | 1 | 13.28 | 2.74 | 3776.35 | 0.000 | 1.923 | 2.471 | 0.02364 | 1.208 | Circular Pipe |
| | "i.p." | 1279.33 | 3773.93 | 0.00 | *3775.158 | 1.224 | 35.00 | 1 | 12.91 | 2.59 | 3777.75 | 0.000 | 1.923 | 2.373 | 0.02553 | 1.183 | Circular Pipe |
| | "i.p." | 1323.18 | 3775.05 | 0.00 | *3776.322 | 1.269 | 35.00 | 1 | 12.31 | 2.35 | 3778.68 | 0.000 | 1.923 | 2.215 | 0.02553 | 1.183 | Circular Pipe |
| "Link7" | Reach | 1347.32 | 3775.67 | 0.00 | *3776.985 | 1.315 | 35.00 | 1 | 11.74 | 2.14 | 3779.12 | 0.000 | 1.923 | 2.067 | 0.02553 | 1.183 | Circular Pipe |
| "Link6" | Reach | 1477.18 | 3777.92 | 0.00 | *3779.192 | 1.272 | 35.00 | 1 | 12.27 | 2.34 | 3781.53 | 0.000 | 1.923 | 2.204 | 0.01733 | 1.317 | Circular Pipe |
| | "i.p." | 1491.47 | 3778.03 | 0.00 | *3779.259 | 1.227 | 35.00 | 1 | 12.86 | 2.57 | 3781.83 | 0.000 | 1.923 | 2.361 | 0.00780 | 1.665 | Circular Pipe |
| | "i.p." | 1504.76 | 3778.14 | 0.00 | *3779.319 | 1.184 | 35.00 | 1 | 13.49 | 2.83 | 3782.15 | 0.000 | 1.923 | 2.528 | 0.00780 | 1.665 | Circular Pipe |
| | "i.p." | 1517.18 | 3778.23 | 0.00 | *3779.375 | 1.143 | 35.00 | 1 | 14.15 | 3.11 | 3782.48 | 0.000 | 1.923 | 2.707 | 0.00780 | 1.665 | Circular Pipe |
| | "i.p." | 1528.85 | 3778.32 | 0.00 | *3779.426 | 1.103 | 35.00 | 1 | 14.84 | 3.42 | 3782.85 | 0.000 | 1.923 | 2.897 | 0.00780 | 1.665 | Circular Pipe |
| | "i.p." | 1539.86 | 3778.41 | 0.00 | *3779.474 | 1.065 | 35.00 | 1 | 15.57 | 3.76 | 3783.24 | 0.000 | 1.923 | 3.100 | 0.00780 | 1.665 | Circular Pipe |
| "Link5" | Reach | 1550.28 | 3778.49 | 0.00 | *3779.519 | 1.029 | 35.00 | 1 | 16.33 | 4.14 | 3783.66 | 0.000 | 1.923 | 3.316 | 0.00780 | 1.665 | Circular Pipe |
| "SDMH1 (C" | Join | 1550.28 | 3778.49 | 3792.93 | 3779.495 | 1.005 | 34.50 | 1 | 16.61 | 4.28 | 3783.78 | 0.000 | 1.908 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 1550.76 | 3778.60 | 3588.15 | *3779.609 | 1.013 | 34.50 | 1 | 16.42 | 4.19 | 3783.80 | 0.000 | 1.908 | 3.364 | 0.22197 | 0.671 | Circular Pipe |
| | "i.p." | 1552.67 | 3779.02 | 2767.43 | *3780.069 | 1.049 | 34.50 | 1 | 15.66 | 3.81 | 3783.88 | 0.000 | 1.908 | 3.145 | 0.22197 | 0.671 | Circular Pipe |
| | "i.p." | 1554.33 | 3779.39 | 2052.78 | *3780.476 | 1.087 | 34.50 | 1 | 14.93 | 3.46 | 3783.94 | 0.000 | 1.908 | 2.939 | 0.22197 | 0.671 | Circular Pipe |
| | "i.p." | 1555.78 | 3779.71 | 1429.74 | *3780.837 | 1.126 | 34.50 | 1 | 14.24 | 3.15 | 3783.98 | 0.000 | 1.908 | 2.747 | 0.22197 | 0.671 | Circular Pipe |
| | "i.p." | 1557.05 | 3779.99 | 886.09 | *3781.158 | 1.166 | 34.50 | 1 | 13.57 | 2.86 | 3784.02 | 0.000 | 1.908 | 2.566 | 0.22197 | 0.671 | Circular Pipe |
| | "i.p." | 1558.15 | 3780.24 | 412.25 | *3781.446 | 1.209 | 34.50 | 1 | 12.94 | 2.60 | 3784.05 | 0.000 | 1.908 | 2.396 | 0.22197 | 0.671 | Circular Pipe |
| "Link2" | Reach | 1559.11 | 3780.45 | 0.00 | *3781.703 | 1.253 | 34.50 | 1 | 12.34 | 2.36 | 3784.07 | 0.000 | 1.908 | 2.237 | 0.22197 | 0.671 | Circular Pipe |
| "SDDI14" | Junction | 1559.11 | 3780.45 | 3793.12 | 3781.670 | 1.220 | 34.00 | 1 | 12.60 | 2.47 | 3784.14 | 0.000 | 1.894 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 1567.46 | 3780.74 | 3153.69 | *3781.990 | 1.248 | 34.00 | 1 | 12.22 | 2.32 | 3784.31 | 0.000 | 1.894 | 2.221 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1577.57 | 3781.10 | 2378.64 | *3782.389 | 1.294 | 34.00 | 1 | 11.65 | 2.11 | 3784.50 | 0.000 | 1.894 | 2.072 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1585.31 | 3781.37 | 1785.53 | *3782.707 | 1.342 | 34.00 | 1 | 11.11 | 1.92 | 3784.62 | 0.000 | 1.894 | 1.933 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1591.35 | 3781.58 | 1322.50 | *3782.968 | 1.392 | 34.00 | 1 | 10.59 | 1.74 | 3784.71 | 0.000 | 1.894 | 1.803 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1596.11 | 3781.74 | 957.93 | *3783.187 | 1.444 | 34.00 | 1 | 10.10 | 1.58 | 3784.77 | 0.000 | 1.894 | 1.680 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1599.86 | 3781.87 | 670.74 | *3783.373 | 1.499 | 34.00 | 1 | 9.63 | 1.44 | 3784.81 | 0.000 | 1.894 | 1.564 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1602.78 | 3781.98 | 446.98 | *3783.532 | 1.556 | 34.00 | 1 | 9.18 | 1.31 | 3784.84 | 0.000 | 1.894 | 1.456 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1605.01 | 3782.05 | 276.06 | *3783.671 | 1.617 | 34.00 | 1 | 8.75 | 1.19 | 3784.86 | 0.000 | 1.894 | 1.354 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1606.65 | 3782.11 | 150.70 | *3783.791 | 1.680 | 34.00 | 1 | 8.35 | 1.08 | 3784.87 | 0.000 | 1.894 | 1.258 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1607.76 | 3782.15 | 65.45 | *3783.897 | 1.747 | 34.00 | 1 | 7.96 | 0.98 | 3784.88 | 0.000 | 1.894 | 1.167 | 0.03495 | 1.070 | Circular Pipe |
| | "i.p." | 1608.40 | 3782.17 | 16.17 | *3783.990 | 1.818 | 34.00 | 1 | 7.59 | 0.89 | 3784.88 | 0.000 | 1.894 | 1.082 | 0.03495 | 1.070 | Circular Pipe |
| "Link1" | Reach | 1608.61 | 3782.18 | 0.00 | *3784.073 | 1.893 | 34.00 | 1 | 7.24 | 0.81 | 3784.89 | 0.000 | 1.894 | 1.001 | 0.03495 | 1.070 | Circular Pipe |
| "SH" | Headwrk | 1608.61 | 3782.18 | 0.00 | *3784.074 | 1.894 | 34.00 | 1 | 7.23 | 0.81 | 3784.89 | 0.000 | 1.894 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

*) in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV > GROUND ELEV
i.p. = intermediate point processing results for reaches

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SDMH1 (CP1.1)_Lateral1

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Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE LN | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 1550.28 | 3778.69 | 3792.93 | 3779.507 | 0.817 | 0.50 | 1 | 0.41 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| HYDRAULIC JUMP at 1553.26 of length 0.02 | | | | | | | | | | | | | | | | | |
| | "i.p." | 1550.52 | 3778.72 | 3761.06 | *3779.507 | 0.788 | 0.50 | 1 | 0.43 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.100 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1550.75 | 3778.75 | 3730.56 | *3779.506 | 0.761 | 0.50 | 1 | 0.46 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.107 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1550.96 | 3778.77 | 3701.32 | *3779.506 | 0.734 | 0.50 | 1 | 0.48 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.114 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1551.17 | 3778.80 | 3673.21 | *3779.506 | 0.709 | 0.50 | 1 | 0.50 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.122 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1551.37 | 3778.82 | 3646.37 | *3779.505 | 0.685 | 0.50 | 1 | 0.53 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.131 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1551.56 | 3778.84 | 3620.54 | *3779.505 | 0.661 | 0.50 | 1 | 0.55 | 0.00 | 3779.51 | 0.000 | 0.242 | 0.140 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1551.75 | 3778.87 | 3595.70 | *3779.505 | 0.639 | 0.50 | 1 | 0.58 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.150 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1551.92 | 3778.89 | 3572.02 | *3779.504 | 0.617 | 0.50 | 1 | 0.61 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.160 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.09 | 3778.91 | 3549.21 | *3779.503 | 0.596 | 0.50 | 1 | 0.64 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.171 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.25 | 3778.93 | 3527.29 | *3779.503 | 0.576 | 0.50 | 1 | 0.67 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.183 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.41 | 3778.95 | 3506.40 | *3779.502 | 0.557 | 0.50 | 1 | 0.70 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.195 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.56 | 3778.96 | 3486.26 | *3779.501 | 0.538 | 0.50 | 1 | 0.73 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.209 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.70 | 3778.98 | 3467.03 | *3779.501 | 0.520 | 0.50 | 1 | 0.77 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.223 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.84 | 3779.00 | 3448.57 | *3779.500 | 0.503 | 0.50 | 1 | 0.81 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.238 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1552.97 | 3779.01 | 3430.90 | *3779.499 | 0.486 | 0.50 | 1 | 0.85 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.254 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1553.10 | 3779.03 | 3414.03 | *3779.498 | 0.470 | 0.50 | 1 | 0.89 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.272 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1553.22 | 3779.04 | 3397.96 | *3779.497 | 0.455 | 0.50 | 1 | 0.93 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.290 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1553.26 | 3779.05 | 3392.40 | *3779.496 | 0.449 | 0.50 | 1 | 0.95 | 0.01 | 3779.51 | 0.000 | 0.242 | 0.297 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1553.26 | 3779.05 | 3392.40 | *3779.161 | 0.114 | 0.50 | 1 | 6.98 | 0.76 | 3779.92 | 0.000 | 0.242 | 4.432 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1555.88 | 3779.36 | 3039.61 | *3779.476 | 0.114 | 0.50 | 1 | 6.98 | 0.76 | 3780.23 | 0.000 | 0.242 | 4.432 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1561.85 | 3780.08 | 2235.09 | *3780.193 | 0.115 | 0.50 | 1 | 6.97 | 0.75 | 3780.95 | 0.000 | 0.242 | 4.417 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1569.33 | 3780.98 | 1228.32 | *3781.094 | 0.118 | 0.50 | 1 | 6.64 | 0.68 | 3781.78 | 0.000 | 0.242 | 4.143 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1571.87 | 3781.28 | 885.65 | *3781.403 | 0.122 | 0.50 | 1 | 6.33 | 0.62 | 3782.03 | 0.000 | 0.242 | 3.886 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1573.36 | 3781.46 | 685.29 | *3781.585 | 0.126 | 0.50 | 1 | 6.04 | 0.57 | 3782.15 | 0.000 | 0.242 | 3.646 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1574.39 | 3781.58 | 546.98 | *3781.713 | 0.130 | 0.50 | 1 | 5.76 | 0.51 | 3782.23 | 0.000 | 0.242 | 3.419 | 0.11999 | 0.114 | Circular Pipe |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 1575.15 | 3781.67 | 444.36 | *3781.809 | 0.135 | 0.50 | 1 | 5.49 | 0.47 | 3782.28 | 0.000 | 0.242 | 3.208 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1575.75 | 3781.75 | 363.92 | *3781.885 | 0.139 | 0.50 | 1 | 5.23 | 0.43 | 3782.31 | 0.000 | 0.242 | 3.009 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.23 | 3781.80 | 299.18 | *3781.947 | 0.143 | 0.50 | 1 | 4.99 | 0.39 | 3782.33 | 0.000 | 0.242 | 2.822 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.62 | 3781.85 | 246.23 | *3781.999 | 0.148 | 0.50 | 1 | 4.76 | 0.35 | 3782.35 | 0.000 | 0.242 | 2.647 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1576.95 | 3781.89 | 202.17 | *3782.043 | 0.153 | 0.50 | 1 | 4.54 | 0.32 | 3782.36 | 0.000 | 0.242 | 2.483 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.23 | 3781.92 | 164.98 | *3782.081 | 0.158 | 0.50 | 1 | 4.33 | 0.29 | 3782.37 | 0.000 | 0.242 | 2.328 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.46 | 3781.95 | 133.90 | *3782.114 | 0.163 | 0.50 | 1 | 4.12 | 0.26 | 3782.38 | 0.000 | 0.242 | 2.184 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.65 | 3781.97 | 107.56 | *3782.143 | 0.169 | 0.50 | 1 | 3.93 | 0.24 | 3782.38 | 0.000 | 0.242 | 2.048 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.82 | 3781.99 | 85.22 | *3782.168 | 0.174 | 0.50 | 1 | 3.75 | 0.22 | 3782.39 | 0.000 | 0.242 | 1.921 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1577.96 | 3782.01 | 66.62 | *3782.191 | 0.180 | 0.50 | 1 | 3.57 | 0.20 | 3782.39 | 0.000 | 0.242 | 1.802 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.07 | 3782.02 | 50.79 | *3782.211 | 0.186 | 0.50 | 1 | 3.41 | 0.18 | 3782.39 | 0.000 | 0.242 | 1.690 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.17 | 3782.04 | 37.67 | *3782.228 | 0.192 | 0.50 | 1 | 3.25 | 0.16 | 3782.39 | 0.000 | 0.242 | 1.585 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.25 | 3782.05 | 26.95 | *3782.244 | 0.198 | 0.50 | 1 | 3.10 | 0.15 | 3782.39 | 0.000 | 0.242 | 1.486 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.32 | 3782.05 | 18.36 | *3782.258 | 0.205 | 0.50 | 1 | 2.95 | 0.14 | 3782.39 | 0.000 | 0.242 | 1.394 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.37 | 3782.06 | 11.53 | *3782.271 | 0.212 | 0.50 | 1 | 2.82 | 0.12 | 3782.39 | 0.000 | 0.242 | 1.307 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.40 | 3782.06 | 6.42 | *3782.283 | 0.219 | 0.50 | 1 | 2.69 | 0.11 | 3782.39 | 0.000 | 0.242 | 1.225 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.43 | 3782.07 | 3.00 | *3782.293 | 0.226 | 0.50 | 1 | 2.56 | 0.10 | 3782.39 | 0.000 | 0.242 | 1.149 | 0.11999 | 0.114 | Circular Pipe |
| | "i.p." | 1578.45 | 3782.07 | 0.72 | *3782.303 | 0.233 | 0.50 | 1 | 2.44 | 0.09 | 3782.40 | 0.000 | 0.242 | 1.077 | 0.11999 | 0.114 | Circular Pipe |
| "Link4" | Reach | 1578.45 | 3782.07 | 0.00 | *3782.311 | 0.241 | 0.50 | 1 | 2.33 | 0.08 | 3782.40 | 0.000 | 0.242 | 1.010 | 0.11999 | 0.114 | Circular Pipe |
| "SDDI15" | Headwrk | 1578.45 | 3782.07 | 0.00 | *3782.312 | 0.242 | 0.50 | 1 | 2.31 | 0.08 | 3782.40 | 0.000 | 0.242 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

**==========**
SDMH7 **(**CP1.2**)**_Lateral1
**==========**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 882.24 | 3763.50 | 3777.07 | 3763.863 | 0.363 | 4.00 | 1 | 10.27 | 1.64 | 3765.50 | 0.000 | 0.701 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 882.83 | 3763.59 | 3534.30 | *3763.955 | 0.368 | 4.00 | 1 | 10.09 | 1.58 | 3765.54 | 0.000 | 0.701 | 3.515 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 884.20 | 3763.79 | 2965.13 | *3764.172 | 0.380 | 4.00 | 1 | 9.62 | 1.44 | 3765.61 | 0.000 | 0.701 | 3.293 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 885.35 | 3763.96 | 2488.06 | *3764.357 | 0.393 | 4.00 | 1 | 9.17 | 1.31 | 3765.66 | 0.000 | 0.701 | 3.086 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 886.32 | 3764.11 | 2084.40 | *3764.516 | 0.406 | 4.00 | 1 | 8.74 | 1.19 | 3765.70 | 0.000 | 0.701 | 2.891 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 887.15 | 3764.23 | 1740.37 | *3764.653 | 0.420 | 4.00 | 1 | 8.34 | 1.08 | 3765.73 | 0.000 | 0.701 | 2.708 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 887.86 | 3764.34 | 1445.69 | *3764.774 | 0.434 | 4.00 | 1 | 7.95 | 0.98 | 3765.76 | 0.000 | 0.701 | 2.536 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 888.47 | 3764.43 | 1192.96 | *3764.880 | 0.449 | 4.00 | 1 | 7.58 | 0.89 | 3765.77 | 0.000 | 0.701 | 2.376 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 888.99 | 3764.51 | 975.19 | *3764.973 | 0.464 | 4.00 | 1 | 7.23 | 0.81 | 3765.78 | 0.000 | 0.701 | 2.225 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 889.44 | 3764.58 | 788.51 | *3765.056 | 0.480 | 4.00 | 1 | 6.89 | 0.74 | 3765.79 | 0.000 | 0.701 | 2.084 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 889.83 | 3764.63 | 628.72 | *3765.131 | 0.497 | 4.00 | 1 | 6.57 | 0.67 | 3765.80 | 0.000 | 0.701 | 1.951 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 890.16 | 3764.68 | 492.33 | *3765.197 | 0.514 | 4.00 | 1 | 6.26 | 0.61 | 3765.81 | 0.000 | 0.701 | 1.827 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 890.43 | 3764.72 | 376.82 | *3765.256 | 0.532 | 4.00 | 1 | 5.97 | 0.55 | 3765.81 | 0.000 | 0.701 | 1.710 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 890.67 | 3764.76 | 280.23 | *3765.309 | 0.550 | 4.00 | 1 | 5.69 | 0.50 | 3765.81 | 0.000 | 0.701 | 1.600 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 890.86 | 3764.79 | 200.23 | *3765.357 | 0.569 | 4.00 | 1 | 5.43 | 0.46 | 3765.81 | 0.000 | 0.701 | 1.498 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 891.02 | 3764.81 | 135.49 | *3765.400 | 0.589 | 4.00 | 1 | 5.18 | 0.42 | 3765.82 | 0.000 | 0.701 | 1.402 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 891.14 | 3764.83 | 84.93 | *3765.439 | 0.610 | 4.00 | 1 | 4.94 | 0.38 | 3765.82 | 0.000 | 0.701 | 1.311 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 891.23 | 3764.84 | 46.90 | *3765.474 | 0.631 | 4.00 | 1 | 4.71 | 0.34 | 3765.82 | 0.000 | 0.701 | 1.227 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 891.29 | 3764.85 | 20.65 | *3765.506 | 0.653 | 4.00 | 1 | 4.49 | 0.31 | 3765.82 | 0.000 | 0.701 | 1.147 | 0.14945 | 0.291 | Circular Pipe |
| | "i.p." | 891.33 | 3764.86 | 5.20 | *3765.534 | 0.676 | 4.00 | 1 | 4.28 | 0.28 | 3765.82 | 0.000 | 0.701 | 1.073 | 0.14945 | 0.291 | Circular Pipe |
| "Link11" | Reach | 891.34 | 3764.86 | 0.00 | *3765.560 | 0.700 | 4.00 | 1 | 4.08 | 0.26 | 3765.82 | 0.000 | 0.701 | 1.003 | 0.14945 | 0.291 | Circular Pipe |
| "SDDI11" | Headwrk | 891.34 | 3764.86 | 0.00 | *3765.561 | 0.701 | 4.00 | 1 | 4.07 | 0.26 | 3765.82 | 0.000 | 0.701 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

**==========**
SDMH7 **(**CP1.2**)**_Lateral2
**==========**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 882.24 | 3763.50 | 3777.07 | 3763.831 | 0.331 | 4.00 | 1 | 11.74 | 2.14 | 3765.97 | 0.000 | 0.701 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 883.83 | 3763.67 | 3562.53 | *3764.007 | 0.333 | 4.00 | 1 | 11.64 | 2.10 | 3766.11 | 0.000 | 0.701 | 4.271 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 889.97 | 3764.35 | 2731.20 | *3764.694 | 0.344 | 4.00 | 1 | 11.10 | 1.91 | 3766.61 | 0.000 | 0.701 | 4.003 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 894.08 | 3764.80 | 2175.18 | *3765.158 | 0.356 | 4.00 | 1 | 10.58 | 1.74 | 3766.90 | 0.000 | 0.701 | 3.751 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 897.10 | 3765.13 | 1767.10 | *3765.501 | 0.368 | 4.00 | 1 | 10.09 | 1.58 | 3767.08 | 0.000 | 0.701 | 3.515 | 0.10996 | 0.314 | Circular Pipe |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 899.43 | 3765.39 | 1451.25 | *3765.771 | 0.380 | 4.00 | 1 | 9.62 | 1.44 | 3767.21 | 0.000 | 0.701 | 3.293 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 901.30 | 3765.60 | 1198.28 | *3765.989 | 0.393 | 4.00 | 1 | 9.17 | 1.31 | 3767.30 | 0.000 | 0.701 | 3.086 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 902.83 | 3765.76 | 991.33 | *3766.170 | 0.406 | 4.00 | 1 | 8.74 | 1.19 | 3767.36 | 0.000 | 0.701 | 2.891 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 904.10 | 3765.90 | 819.44 | *3766.324 | 0.420 | 4.00 | 1 | 8.34 | 1.08 | 3767.40 | 0.000 | 0.701 | 2.708 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 905.17 | 3766.02 | 675.15 | *3766.456 | 0.434 | 4.00 | 1 | 7.95 | 0.98 | 3767.44 | 0.000 | 0.701 | 2.536 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 906.07 | 3766.12 | 553.38 | *3766.569 | 0.449 | 4.00 | 1 | 7.58 | 0.89 | 3767.46 | 0.000 | 0.701 | 2.376 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 906.84 | 3766.20 | 449.81 | *3766.669 | 0.464 | 4.00 | 1 | 7.23 | 0.81 | 3767.48 | 0.000 | 0.701 | 2.225 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 907.49 | 3766.28 | 361.97 | *3766.756 | 0.480 | 4.00 | 1 | 6.89 | 0.74 | 3767.49 | 0.000 | 0.701 | 2.084 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 908.04 | 3766.34 | 287.45 | *3766.833 | 0.497 | 4.00 | 1 | 6.57 | 0.67 | 3767.50 | 0.000 | 0.701 | 1.951 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 908.50 | 3766.39 | 224.31 | *3766.902 | 0.514 | 4.00 | 1 | 6.26 | 0.61 | 3767.51 | 0.000 | 0.701 | 1.827 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 908.90 | 3766.43 | 171.16 | *3766.963 | 0.532 | 4.00 | 1 | 5.97 | 0.55 | 3767.52 | 0.000 | 0.701 | 1.710 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 909.22 | 3766.47 | 126.96 | *3767.017 | 0.550 | 4.00 | 1 | 5.69 | 0.50 | 3767.52 | 0.000 | 0.701 | 1.600 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 909.49 | 3766.50 | 90.51 | *3767.066 | 0.569 | 4.00 | 1 | 5.43 | 0.46 | 3767.52 | 0.000 | 0.701 | 1.498 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 909.71 | 3766.52 | 61.12 | *3767.109 | 0.589 | 4.00 | 1 | 5.18 | 0.42 | 3767.53 | 0.000 | 0.701 | 1.402 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 909.88 | 3766.54 | 38.24 | *3767.149 | 0.610 | 4.00 | 1 | 4.94 | 0.38 | 3767.53 | 0.000 | 0.701 | 1.311 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 910.01 | 3766.55 | 21.09 | *3767.184 | 0.631 | 4.00 | 1 | 4.71 | 0.34 | 3767.53 | 0.000 | 0.701 | 1.227 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 910.09 | 3766.56 | 9.27 | *3767.216 | 0.653 | 4.00 | 1 | 4.49 | 0.31 | 3767.53 | 0.000 | 0.701 | 1.147 | 0.10996 | 0.314 | Circular Pipe |
| | "i.p." | 910.14 | 3766.57 | 2.33 | *3767.244 | 0.676 | 4.00 | 1 | 4.28 | 0.28 | 3767.53 | 0.000 | 0.701 | 1.073 | 0.10996 | 0.314 | Circular Pipe |
| "Link12" | Reach | 910.16 | 3766.57 | 0.00 | *3767.270 | 0.700 | 4.00 | 1 | 4.08 | 0.26 | 3767.53 | 0.000 | 0.701 | 1.003 | 0.10996 | 0.314 | Circular Pipe |
| "SDDI12" | Headwrk | 910.16 | 3766.57 | 0.00 | *3767.271 | 0.701 | 4.00 | 1 | 4.07 | 0.26 | 3767.53 | 0.000 | 0.701 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

**==========**
SDMH12 **(**CP 1.3**)**_Lateral1
**==========**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 239.78 | 3715.91 | 3728.38 | 3716.247 | 0.337 | 3.50 | 1 | 10.03 | 1.56 | 3717.81 | 0.000 | 0.654 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 240.80 | 3716.06 | 3300.96 | *3716.407 | 0.344 | 3.50 | 1 | 9.71 | 1.46 | 3717.87 | 0.000 | 0.654 | 3.501 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 242.07 | 3716.25 | 2768.58 | *3716.608 | 0.356 | 3.50 | 1 | 9.26 | 1.33 | 3717.94 | 0.000 | 0.654 | 3.281 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 243.14 | 3716.41 | 2322.65 | *3716.779 | 0.368 | 3.50 | 1 | 8.83 | 1.21 | 3717.99 | 0.000 | 0.654 | 3.074 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 244.04 | 3716.55 | 1945.62 | *3716.926 | 0.380 | 3.50 | 1 | 8.41 | 1.10 | 3718.03 | 0.000 | 0.654 | 2.880 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 244.81 | 3716.66 | 1624.08 | *3717.054 | 0.393 | 3.50 | 1 | 8.02 | 1.00 | 3718.05 | 0.000 | 0.654 | 2.699 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 245.46 | 3716.76 | 1348.87 | *3717.165 | 0.406 | 3.50 | 1 | 7.65 | 0.91 | 3718.07 | 0.000 | 0.654 | 2.528 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 246.03 | 3716.84 | 1112.63 | *3717.263 | 0.420 | 3.50 | 1 | 7.29 | 0.83 | 3718.09 | 0.000 | 0.654 | 2.368 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 246.51 | 3716.92 | 909.60 | *3717.350 | 0.434 | 3.50 | 1 | 6.95 | 0.75 | 3718.10 | 0.000 | 0.654 | 2.218 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 246.93 | 3716.98 | 735.19 | *3717.427 | 0.449 | 3.50 | 1 | 6.63 | 0.68 | 3718.11 | 0.000 | 0.654 | 2.078 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 247.28 | 3717.03 | 586.06 | *3717.496 | 0.465 | 3.50 | 1 | 6.32 | 0.62 | 3718.12 | 0.000 | 0.654 | 1.946 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 247.59 | 3717.08 | 458.76 | *3717.557 | 0.480 | 3.50 | 1 | 6.03 | 0.56 | 3718.12 | 0.000 | 0.654 | 1.822 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 247.84 | 3717.11 | 351.09 | *3717.612 | 0.497 | 3.50 | 1 | 5.75 | 0.51 | 3718.12 | 0.000 | 0.654 | 1.706 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.06 | 3717.15 | 261.09 | *3717.661 | 0.514 | 3.50 | 1 | 5.48 | 0.47 | 3718.13 | 0.000 | 0.654 | 1.598 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.24 | 3717.17 | 186.73 | *3717.705 | 0.532 | 3.50 | 1 | 5.22 | 0.42 | 3718.13 | 0.000 | 0.654 | 1.495 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.38 | 3717.19 | 126.61 | *3717.745 | 0.550 | 3.50 | 1 | 4.98 | 0.39 | 3718.13 | 0.000 | 0.654 | 1.400 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.49 | 3717.21 | 79.19 | *3717.781 | 0.569 | 3.50 | 1 | 4.75 | 0.35 | 3718.13 | 0.000 | 0.654 | 1.310 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.58 | 3717.22 | 43.65 | *3717.814 | 0.589 | 3.50 | 1 | 4.53 | 0.32 | 3718.13 | 0.000 | 0.654 | 1.226 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.64 | 3717.23 | 19.30 | *3717.843 | 0.610 | 3.50 | 1 | 4.32 | 0.29 | 3718.13 | 0.000 | 0.654 | 1.147 | 0.14944 | 0.273 | Circular Pipe |
| | "i.p." | 248.67 | 3717.24 | 4.87 | *3717.869 | 0.631 | 3.50 | 1 | 4.12 | 0.26 | 3718.13 | 0.000 | 0.654 | 1.073 | 0.14944 | 0.273 | Circular Pipe |
| "Link18" | Reach | 248.68 | 3717.24 | 0.00 | *3717.893 | 0.653 | 3.50 | 1 | 3.93 | 0.24 | 3718.13 | 0.000 | 0.654 | 1.003 | 0.14944 | 0.273 | Circular Pipe |
| "SDDI9" | Headwrk | 248.68 | 3717.24 | 0.00 | *3717.894 | 0.654 | 3.50 | 1 | 3.92 | 0.24 | 3718.13 | 0.000 | 0.654 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

**==========**
SDMH12 **(**CP 1.3**)**_Lateral2
**==========**

Composite Profile:

| ELEMENT NAME | TYPE | STATION | INVERT ELEV | GROUND ELEV | W.S. ELEV | DEPTH | Q | BARREL | VELOC. | VELOC. HEAD | ENERGY GRADE **LN** | SUPER ELEV | CRITICAL DEPTH | FROUDE NUMBER | SLOPE | NORMAL DEPTH | CROSS SECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ### | | | | | | | | | | | | | | | | | |
| "Outlet/S" | Outlet | 239.78 | 3715.91 | 3728.38 | 3716.243 | 0.333 | 3.50 | 1 | 10.17 | 1.61 | 3717.85 | 0.000 | 0.654 | 0.000 | 0.00000 | 0.000 | Circular Pipe |
| | "i.p." | 246.99 | 3716.49 | 2771.90 | *3716.831 | 0.344 | 3.50 | 1 | 9.71 | 1.46 | 3718.29 | 0.000 | 0.654 | 3.501 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 251.64 | 3716.86 | 2156.13 | *3717.215 | 0.356 | 3.50 | 1 | 9.26 | 1.33 | 3718.54 | 0.000 | 0.654 | 3.281 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 254.94 | 3717.12 | 1717.81 | *3717.491 | 0.368 | 3.50 | 1 | 8.83 | 1.21 | 3718.70 | 0.000 | 0.654 | 3.074 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 257.45 | 3717.32 | 1385.62 | *3717.704 | 0.380 | 3.50 | 1 | 8.41 | 1.10 | 3718.80 | 0.000 | 0.654 | 2.880 | 0.08004 | 0.318 | Circular Pipe |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | "i.p." | 259.42 | 3717.48 | 1123.69 | *3717.875 | 0.393 | 3.50 | 1 | 8.02 | 1.00 | 3718.87 | 0.000 | 0.654 | 2.699 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 261.01 | 3717.61 | 912.28 | *3718.016 | 0.406 | 3.50 | 1 | 7.65 | 0.91 | 3718.92 | 0.000 | 0.654 | 2.528 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 262.32 | 3717.71 | 738.83 | *3718.134 | 0.420 | 3.50 | 1 | 7.29 | 0.83 | 3718.96 | 0.000 | 0.654 | 2.368 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 263.41 | 3717.80 | 594.99 | *3718.235 | 0.434 | 3.50 | 1 | 6.95 | 0.75 | 3718.99 | 0.000 | 0.654 | 2.218 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 264.31 | 3717.87 | 474.93 | *3718.323 | 0.449 | 3.50 | 1 | 6.63 | 0.68 | 3719.01 | 0.000 | 0.654 | 2.078 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 265.07 | 3717.93 | 374.63 | *3718.399 | 0.465 | 3.50 | 1 | 6.32 | 0.62 | 3719.02 | 0.000 | 0.654 | 1.946 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 265.70 | 3717.98 | 290.64 | *3718.465 | 0.480 | 3.50 | 1 | 6.03 | 0.56 | 3719.03 | 0.000 | 0.654 | 1.822 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 266.23 | 3718.03 | 220.73 | *3718.524 | 0.497 | 3.50 | 1 | 5.75 | 0.51 | 3719.04 | 0.000 | 0.654 | 1.706 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 266.66 | 3718.06 | 163.07 | *3718.576 | 0.514 | 3.50 | 1 | 5.48 | 0.47 | 3719.04 | 0.000 | 0.654 | 1.598 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.02 | 3718.09 | 115.96 | *3718.622 | 0.532 | 3.50 | 1 | 5.22 | 0.42 | 3719.05 | 0.000 | 0.654 | 1.495 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.30 | 3718.11 | 78.23 | *3718.663 | 0.550 | 3.50 | 1 | 4.98 | 0.39 | 3719.05 | 0.000 | 0.654 | 1.400 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.52 | 3718.13 | 48.72 | *3718.700 | 0.569 | 3.50 | 1 | 4.75 | 0.35 | 3719.05 | 0.000 | 0.654 | 1.310 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.69 | 3718.14 | 26.75 | *3718.733 | 0.589 | 3.50 | 1 | 4.53 | 0.32 | 3719.05 | 0.000 | 0.654 | 1.226 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.80 | 3718.15 | 11.79 | *3718.763 | 0.610 | 3.50 | 1 | 4.32 | 0.29 | 3719.05 | 0.000 | 0.654 | 1.147 | 0.08004 | 0.318 | Circular Pipe |
| | "i.p." | 267.87 | 3718.16 | 2.97 | *3718.789 | 0.631 | 3.50 | 1 | 4.12 | 0.26 | 3719.05 | 0.000 | 0.654 | 1.073 | 0.08004 | 0.318 | Circular Pipe |
| "Link19" | Reach | 267.89 | 3718.16 | 0.00 | *3718.813 | 0.653 | 3.50 | 1 | 3.93 | 0.24 | 3719.05 | 0.000 | 0.654 | 1.003 | 0.08004 | 0.318 | Circular Pipe |
| "SDDI10" | Headwrk | 267.89 | 3718.16 | 0.00 | *3718.814 | 0.654 | 3.50 | 1 | 3.92 | 0.24 | 3719.05 | 0.000 | 0.654 | 0.000 | 0.00000 | 0.000 | Circular Pipe |

***)** in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV **>** GROUND ELEV
i.p. **=** intermediate point processing results for reaches

# ULTIMATE MODEL INPUT

```
[TITLE]
;
;
;

[REPORT]
COMPOSITE_ONLY

[NETWORK]
**TYPE          NAME
**------------  -------
Outlet          "Main System Outlet"
Reach           "Link22"
Drop            "SDMH14"
Reach           "Link21"
Reach           "Link20"
Join            "SDMH12 (CP 1.3)"
Reach           "Link17"
Reach           "Link16"
Reach           "Link15"
Reach           "Link14"
Reach           "Link13"
Join            "SDMH7 (CP1.2)"
Reach           "Link10"
Reach           "Link9"
Reach           "Link8"
Reach           "Link7"
Reach           "Link6"
Reach           "Link5"
Join            "SDMH1 (CP1.1)"
Reach           "Link2"
Junction        "SDDI14"
Reach           "Link1"
Headwork        "SH"

**BRANCH DEFINITIONS


"SDMH1 (CP1.1)_Lateral1"
Join            "SDMH1 (CP1.1)"
Reach           "Link4"
Headwork        "SDDI15"


"SDMH7 (CP1.2)_Lateral1"
Join            "SDMH7 (CP1.2)"
Reach           "Link11"
Headwork        "SDDI11"


"SDMH7 (CP1.2)_Lateral2"
Join            "SDMH7 (CP1.2)"
Reach           "Link12"
Headwork        "SDDI12"


"SDMH12 (CP 1.3)_Lateral1"
Join            "SDMH12 (CP 1.3)"
Reach           "Link18"
Headwork        "SDDI9"


"SDMH12 (CP 1.3)_Lateral2"
Join            "SDMH12 (CP 1.3)"
```

```
Reach           "Link19"
Headwork        "SDDI10"

[OUTLET]
**NAME          STATION    INVERT     GROUND     CHANNEL    WATER SURFACE
**                         ELEV       ELEV       ID         ELEV (opt.)
**------------  ---------  ---------- ---------- ---------- ----------
"Main System Outlet"0         3700.25    3704.25    "48"       0

[HEADWORK]
**NAME          INVERT     GROUND     CHANNEL    FLOW       WATER SURFACE
**              ELEV       ELEV       ID                    ELEV (opt.)
**------------  ---------  ---------- ---------- ---------- ----------
"SH"            3782.18    3790.52    "36"       34         0
"SDDI15"        3782.07    3793.12    "24"       0.5        0
"SDDI11"        3764.86    0          "24"       4          0
"SDDI12"        3766.57    0          "24"       4          0
"SDDI9"         3717.24    0          "24"       3.5        0
"SDDI10"        3718.16    0          "24"       3.5        0

[WALLENTRANCE]
**NAME          INVERT     GROUND     CHANNEL    LOSS
**              ELEV       ELEV       ID         COEFFICIENT(opt.)
**------------  ---------  ---------- ---------- --------------

[WALLEXIT]
**NAME          INVERT     GROUND     CHANNEL    LOSS
**              ELEV       ELEV       ID         COEFFICIENT(opt.)
**------------  ---------  ---------- ---------- --------------

[BRIDGEENTRANCE]
**NAME          INVERT     GROUND     CHANNEL    REDUCTION
**              ELEV       ELEV       ID         FACTOR(opt.)
**------------  ---------  ---------- ---------- --------------

[BRIDGEEXIT]
**NAME          INVERT     GROUND     CHANNEL    REDUCTION
**              ELEV       ELEV       ID         FACTOR(opt.)
**------------  ---------  ---------- ---------- --------------

[JOIN]
**NAME          INVERT     GROUND     CHANNEL    LENGTH     MANNINGS n NUMBER OF  CONFLUENCE
**              ELEV       ELEV       ID                               BRANCHES  ANGLE
**------------  ---------  ---------- ---------- ---------- ---------- ---------- ----------
"SDMH1 (CP1.1)"    3778.49    3792.93    "36"       0          0.013      1
"SDMH1 (CP1.1)_Lateral1"3778.69              "24"                                  90

"SDMH7 (CP1.2)"    3763.3     3777.07    "36"       0          0.013      2
"SDMH7 (CP1.2)_Lateral1"3763.5               "24"                                  90
"SDMH7 (CP1.2)_Lateral2"3763.5               "24"                                  -90

"SDMH12 (CP 1.3)"  3715.71    3728.38    "36"       0          0.013      2
"SDMH12 (CP 1.3)_Lateral1"3715.91            "24"                                  90
"SDMH12 (CP 1.3)_Lateral2"3715.91            "24"                                  -90


[JUNCTION]
**Name          INVERT     GROUND     CHANNEL    LENGTH     MANNINGS n NUMBER OF  CONFLUENCE FLOW
**              ELEV       ELEV       ID                               LATERALS  ANGLE
**------------  ---------  ---------- ---------- ---------- ---------- ---------- ---------- ----------
"SDDI14"        3780.45    3793.12    "36"       0          0.013      1
"SDDI14_Lateral1"  3780.65              "36"                                  0          0.5


```

[TRANSITION]

| **NAME | INVERT ELEV | GROUND ELEV | CHANNEL ID | LENGTH | MANNINGS n |
|---|---|---|---|---|---|

[REACH]

| **NAME | INVERT ELEV | GROUND ELEV | CHANNEL ID | LENGTH | MANNINGS n | CURVE (opt) | ANGLE POINT(opt) | NUMBER MANHOLES(opt) |
|---|---|---|---|---|---|---|---|---|
| "Link1" | 3782.18 | 0 | "36" | 49.5 | 0.013 | 0 | 0 | 1 |
| "Link2" | 3780.45 | 0 | "36" | 8.83 | 0.013 | 0 | 0 | 1 |
| "Link4" | 3782.07 | 0 | "24" | 28.17 | 0.013 | 0 | 0 | 0 |
| "Link5" | 3778.49 | 0 | "36" | 73.1 | 0.013 | 0 | 9 | 1 |
| "Link6" | 3777.92 | 0 | "36" | 129.86 | 0.013 | 0 | 9 | 1 |
| "Link7" | 3775.67 | 0 | "36" | 127.67 | 0.013 | 0 | 9 | 1 |
| "Link8" | 3772.41 | 0 | "36" | 127.3 | 0.013 | 0 | 9 | 1 |
| "Link9" | 3769.4 | 0 | "36" | 130.31 | 0.013 | 0 | 9 | 1 |
| "Link10" | 3766.36 | 0 | "36" | 79.8 | 0.013 | 0 | 9 | 1 |
| "Link11" | 3764.86 | 0 | "24" | 9.1 | 0.013 | 0 | 90 | 1 |
| "Link12" | 3766.57 | 0 | "24" | 27.92 | 0.013 | 0 | 90 | 1 |
| "Link13" | 3763.3 | 0 | "36" | 135.4 | 0.013 | 0 | 5 | 1 |
| "Link14" | 3757.69 | 0 | "36" | 119.06 | 0.013 | 0 | 10 | 1 |
| "Link15" | 3748.22 | 0 | "36" | 111.67 | 0.013 | 0 | 8 | 1 |
| "Link16" | 3738.84 | 0 | "36" | 141.86 | 0.013 | 0 | 9 | 1 |
| "Link17" | 3727.13 | 0 | "36" | 134.47 | 0.013 | 0 | 11 | 1 |
| "Link18" | 3717.24 | 0 | "24" | 8.9 | 0.013 | 0 | 90 | 1 |
| "Link19" | 3718.16 | 0 | "24" | 28.11 | 0.013 | 0 | 90 | 1 |
| "Link20" | 3715.71 | 0 | "36" | 117.31 | 0.013 | 0 | 3 | 1 |
| "Link21" | 3706.12 | 0 | "36" | 39.06 | 0.013 | 0 | 86 | 1 |
| "Link22" | 3701.08 | 0 | "48" | 83.412 | 0.013 | 0 | 54 | 1 |

[DROP]

| **Name | INVERT ELEV | GROUND ELEV | CHANNEL ID | LOSS COEFFICIENT |
|---|---|---|---|---|
| "SDMH14" | 3701.28 | 0 | "36" | 0 |

[CHANNEL]

**REGULAR TYPES 1-4 7-8

| **ID | TYPE | HEIGHT | WIDTH | LEFT SLOPE | RIGHT SLOPE | NUMBER PIERS | AVG PIER WIDTH | INVERT CROSS FALL | NUM OF BARRELS |
|---|---|---|---|---|---|---|---|---|---|
| "48" | 4 | 4 | | | | | | | 1 |
| "36" | 4 | 3 | | | | | | | 1 |
| "24" | 4 | 2 | | | | | | | 1 |

**IRREGULAR TYPES 5-6

| **ID | TYPE | NUMBER PIERS | AVG PIER WIDTH | PIER1 ELEV | PIER2 ELEV | PIER3 ELEV | PIER4 ELEV | PIER5 ELEV | PIER6 ELEV | PIER7 ELEV | PIER8 ELEV | PIER9 ELEV | PIER10 ELEV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

[POINT]

| **ID | XCOORD | YCOORD |
|---|---|---|

```
T1 SUMMERLIN WEST VILLAGE 27                                                0
T2 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard) UPDATE #1
T3 ATKINS - 100 YEAR Interim Condition (SDDI#3-SDDI#2-SDDI#1-OUT)
SO      0.00 3448.39  42
REM****SDDI#1
R     145.31 3449.68  42     .013                          .000  21.0 0
JX    151.31 3449.88  42      .013    11.0     0.0  3449.68           0.0       00.000
REM****SDDI#2
JX    202.05 3450.11  42 42   .013    20.0     0.0  3450.31           0.0       00.000 0.00
REM****SDDI#3
SH    235.28 3450.84  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q          51.0
```

FILE: A_Stub_int.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time:11:33: 7

SUMMERLIN WEST VILLAGE 25

Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard)

ATKINS - 100 YEAR Interim Condition (SDDI#3-SDDI#2-SDDI#1-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3448.390 | 2.524 | 3450.914 | 82.00 | 11.04 | 1.89 | 3452.81 | .03 | 2.83 | 3.14 | 3.500 | .000 | .00 | 0 .0 |
| 86.276 | .0089 | | | | | .0086 | .74 | 2.55 | 1.26 | 2.51 | .013 | .00 | .00 | PIPE |
| 86.276 | 3449.156 | 2.567 | 3451.723 | 82.00 | 10.84 | 1.83 | 3453.55 | .03 | 2.83 | 3.10 | 3.500 | .000 | .00 | 0 .0 |
| 49.748 | .0089 | | | | | .0080 | .40 | 2.60 | 1.22 | 2.51 | .013 | .00 | .00 | PIPE |
| 136.023 | 3449.597 | 2.689 | 3452.286 | 82.00 | 10.34 | 1.66 | 3453.95 | .02 | 2.83 | 2.95 | 3.500 | .000 | .00 | 0 .0 |
| 9.287 | .0089 | | | | | .0072 | .07 | 2.71 | 1.11 | 2.51 | .013 | .00 | .00 | PIPE |
| 145.310 | 3449.680 | 2.825 | 3452.505 | 82.00 | 9.85 | 1.51 | 3454.01 | .00 | 2.83 | 2.76 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | | .0059 | .04 | 2.85 | 1.00 | | .013 | .00 | .00 | PIPE |
| 151.310 | 3449.880 | 3.644 | 3453.524 | 71.00 | 7.38 | .85 | 3454.37 | .00 | 2.64 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0045 | | | | | .0038 | .19 | 3.64 | .00 | | .013 | .00 | .00 | PIPE |
| 202.050 | 3450.110 | 4.290 | 3454.400 | 51.00 | 5.30 | .44 | 3454.84 | .00 | 2.23 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0045 | | | | | .0037 | .00 | 4.29 | .00 | | .013 | .00 | .00 | PIPE |
| 235.280 | 3450.840 | 4.290 | 3455.130 | 51.00 | 5.30 | .44 | 3455.57 | .00 | 2.23 | .00 | 3.500 | .000 | .00 | 0 .0 |

```
T1 SUMMERLIN WEST VILLAGE 27                                                0
T2 Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard) UPDATE #1
T3 ATKINS - 100 YEAR Interim Condition (SDDI#3-SDDI#2-SDDI#1-OUT)
SO      0.00 3448.39  42
REM****SDDI#1
R     145.31 3449.68  42     .013                          .000  21.0 0
JX    151.31 3449.88  42      .013    07.0     0.0  3449.68           0.0       00.000
REM****SDDI#2
JX    202.05 3450.11  42 42   .013    11.0     0.0  3450.31           0.0       00.000 0.00
REM****SDDI#3
SH    235.28 3450.84  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q          73.0
```

FILE: A_Stub_ult.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time: 3:54:25

SUMMERLIN WEST VILLAGE 27

Park Drift Trail (Sunset Run Drive to Lake Mead Boulevard) UPDATE #1

ATKINS - 100 YEAR Interim Condition (SDDI#3-SDDI#2-SDDI#1-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3448.390 | 2.750 | 3451.140 | 91.00 | 11.22 | 1.95 | 3453.09 | .03 | 2.96 | 2.87 | 3.500 | .000 | .00 | 0 .0 |
| 13.284 | .0089 | | | | | .0089 | .12 | 2.78 | 1.18 | 2.75 | .013 | .00 | .00 | PIPE |
| 13.284 | 3448.508 | 2.750 | 3451.258 | 91.00 | 11.22 | 1.95 | 3453.21 | .03 | 2.96 | 2.87 | 3.500 | .000 | .00 | 0 .0 |
| 104.094 | .0089 | | | | | .0087 | .91 | 2.78 | 1.18 | 2.75 | .013 | .00 | .00 | PIPE |
| 117.378 | 3449.432 | 2.804 | 3452.236 | 91.00 | 11.01 | 1.88 | 3454.12 | .03 | 2.96 | 2.79 | 3.500 | .000 | .00 | 0 .0 |
| 27.932 | .0089 | | | | | .0082 | .23 | 2.83 | 1.13 | 2.75 | .013 | .00 | .00 | PIPE |
| 145.310 | 3449.680 | 2.957 | 3452.636 | 91.00 | 10.50 | 1.71 | 3454.35 | .00 | 2.96 | 2.54 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | | .0074 | .04 | 2.98 | 1.00 | | .013 | .00 | .00 | PIPE |
| 151.310 | 3449.880 | 3.554 | 3453.434 | 84.00 | 8.73 | 1.18 | 3454.62 | .00 | 2.86 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0045 | | | | | .0061 | .31 | 3.55 | .00 | | .013 | .00 | .00 | PIPE |
| 202.050 | 3450.110 | 4.173 | 3454.283 | 73.00 | 7.59 | .89 | 3455.18 | .00 | 2.68 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0045 | | | | | .0057 | .00 | 4.17 | .00 | | .013 | .00 | .00 | PIPE |
| 235.280 | 3450.840 | 4.173 | 3455.013 | 73.00 | 7.59 | .89 | 3455.91 | .00 | 2.68 | .00 | 3.500 | .000 | .00 | 0 .0 |

```
T1 SUMMERLIN WEST VILLAGE 27                                                0
T2 Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)
T3 ATKINS - 100 YEAR Interim Condition (SDDI#6-SDDI#5-SDDI#4-OUT)
SO      0.00 3557.82  42
REM****SDDI#4
JX     99.83 3558.43  42      .013     7.0     0.0  3558.43           0.0       34.000
REM****SDDI#5
R     144.24 3558.99  42     .013                          .000  34.0 0
JX    150.24 3559.19  42 42   .013     7.0     0.0  3558.99            0.0       06.000
REM****SDDI#6
SH    201.50 3559.94  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q          82.0
```

FILE: B_Stub_int.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time:11:33:22

SUMMERLIN WEST VILLAGE 27

Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)

ATKINS - 100 YEAR Interim Condition (SDDI#6-SDDI#5-SDDI#4-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3557.820 | 3.022 | 3560.842 | 96.00 | 10.87 | 1.84 | 3562.68 | .05 | 3.02 | 2.40 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0061 | | | | .0081 | .81 | 3.07 | 1.00 | | | .013 | .00 | .00 | PIPE |
| 99.830 | 3558.430 | 3.963 | 3562.393 | 89.00 | 9.25 | 1.33 | 3563.72 | .00 | 2.93 | .00 | 3.500 | .000 | .00 | 0 .0 |
| 44.410 | .0126 | | | | .0078 | .35 | .00 | .00 | 2.34 | .013 | .00 | .00 | PIPE | |
| 144.240 | 3558.990 | 3.914 | 3562.904 | 89.00 | 9.25 | 1.33 | 3564.23 | .00 | 2.93 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | .0072 | .04 | .00 | .00 | | | .013 | .00 | .00 | PIPE |
| 150.240 | 3559.190 | 4.142 | 3563.332 | 82.00 | 8.52 | 1.13 | 3564.46 | .00 | 2.83 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | .0067 | .00 | .00 | .00 | | | .013 | .00 | .00 | PIPE |
| 201.500 | 3559.940 | 4.142 | 3564.082 | 82.00 | 8.52 | 1.13 | 3565.21 | .00 | 2.83 | .00 | 3.500 | .000 | .00 | 0 .0 |

```
T1 SUMMERLIN WEST VILLAGE 27                                                    0
T2 Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)
T3 ATKINS - 100 YEAR Interim Condition (SDDI#6-SDDI#5-SDDI#4-OUT)
SO      0.00 3557.82  42
REM****SDDI#4
JX     99.83 3558.43  42      .013     7.0     0.0  3558.43           0.0       34.000
REM****SDDI#5
R     144.24 3558.99  42     .013                          .000  34.0 0
JX    150.24 3559.19  42 42   .013     7.0     0.0  3558.99            0.0       06.000
REM****SDDI#6
SH    201.50 3559.94  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q         115.0
```

FILE: B_Stub_ult.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time: 3:54:38

SUMMERLIN WEST VILLAGE 27
Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)
ATKINS - 100 YEAR Interim Condition (SDDI#6-SDDI#5-SDDI#4-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3557.820 | 3.304 | 3561.124 | 129.00 | 13.71 | 2.92 | 3564.04 | .06 | 3.30 | 1.61 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0061 | | | | .0145 | 1.44 | 3.36 | 1.00 | | .013 | .00 | .00 | PIPE | |
| 99.830 | 3558.430 | 4.861 | 3563.291 | 122.00 | 12.68 | 2.50 | 3565.79 | .00 | 3.26 | .00 | 3.500 | .000 | .00 | 0 .0 |
| 44.410 | .0126 | | | | .0147 | .65 | .00 | .00 | 3.50 | .013 | .00 | .00 | PIPE | |
| 144.240 | 3558.990 | 5.261 | 3564.251 | 122.00 | 12.68 | 2.50 | 3566.75 | .00 | 3.26 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | .0139 | .08 | .00 | .00 | | .013 | .00 | .00 | PIPE | |
| 150.240 | 3559.190 | 5.685 | 3564.875 | 115.00 | 11.95 | 2.22 | 3567.09 | .00 | 3.21 | .00 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0333 | | | | .0122 | .00 | .00 | .00 | | .013 | .00 | .00 | PIPE | |
| 201.500 | 3559.940 | 5.685 | 3565.625 | 115.00 | 11.95 | 2.22 | 3567.84 | .00 | 3.21 | .00 | 3.500 | .000 | .00 | 0 .0 |

```
T1 SUMMERLIN WEST VILLAGE 27                                                0
T2 Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)
T3 ATKINS - 100 YEAR Interim Condition (StubC-SDDI#8-SDDI#7-OUT)
SO      0.00 3642.80  42
REM****SDDI#7
JX     64.11 3645.53  42 42   .013     4.0     0.0  3645.53           0.0       00.000
REM****SDDI#8
JX    101.11 3647.30  42 42   .013     4.0     0.0  3647.30           0.0       20.000
SH    148.09 3650.32  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q           87.0
```

FILE: C_Stub_int.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time:11:33:36

SUMMERLIN WEST VILLAGE 27

Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)

ATKINS - 100 YEAR Interim Condition (StubC-SDDI#8-SDDI#7-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3642.800 | 1.944 | 3644.744 | 95.00 | 17.31 | 4.65 | 3649.39 | .31 | 3.01 | 3.48 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0426 | | | | .0209 | 1.34 | 2.25 | 2.43 | | .013 | | .00 | .00 | PIPE |
| 64.110 | 3645.530 | 2.160 | 3647.690 | 91.00 | 14.60 | 3.31 | 3651.00 | .21 | 2.96 | 3.40 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0478 | | | | .0120 | .44 | 2.37 | 1.90 | | .013 | | .00 | .00 | PIPE |
| 101.110 | 3647.300 | 2.901 | 3650.201 | 87.00 | 10.20 | 1.62 | 3651.82 | .08 | 2.90 | 2.64 | 3.500 | .000 | .00 | 0 .0 |
| 148.090 | 3650.320 | 2.901 | 3653.221 | 87.00 | 10.20 | 1.62 | 3654.84 | .08 | 2.90 | 2.64 | 3.500 | .000 | .00 | 0 .0 |

```
T1 SUMMERLIN WEST VILLAGE 27                                                0
T2 Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)
T3 ATKINS - 100 YEAR Ultimate Condition (StubC-SDDI#8-SDDI#7-OUT)
SO      0.00 3642.80  42
REM****SDDI#7
JX     64.11 3645.53  42 42   .013     5.0     0.0  3645.53           0.0       00.000
REM****SDDI#8
JX    101.11 3647.30  42 42   .013     5.0     0.0  3647.30           0.0       20.000
SH    148.09 3650.32  42
CD  24  4    1    .000  2.0       .000  .000  .000   .00
CD  30  4    1    .000  2.5       .000  .000  .000   .00
CD  42  4    1    .000  3.5       .000  .000  .000   .00
Q          115.0
```

FILE: C_Stub_ult.WSW W S P G W - CIVILDESIGN Version 14.08 PAGE 1

Program Package Serial Number: 7271

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time: 3:55: 1

SUMMERLIN WEST VILLAGE 27

Park Drift Trail UPDATE #1 (Sunset Run Drive to Lake Mead Boulevard)

ATKINS - 100 YEAR Ultimate Condition (StubC-SDDI#8-SDDI#7-OUT)

| Station | Invert Elev | Depth (FT) | Water Elev | Q (CFS) | Vel (FPS) | Vel Head | Energy Grd.El. | Super Elev | Critical Depth | Flow Top Width | Height/ Dia.-FT | Base Wt or I.D. | ZL | No Wth Prs/Pip |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L/Elem | Ch Slope | | | | SF Ave | HF | SE Dpth | Froude N | Norm Dp | "N" | X-Fall | ZR | Type Ch | |
| .000 | 3642.800 | 2.366 | 3645.166 | 125.00 | 18.06 | 5.06 | 3650.23 | .31 | 3.28 | 3.28 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0426 | | | | .0205 | 1.31 | 2.68 | 2.19 | | .013 | | .00 | .00 | PIPE |
| 64.110 | 3645.530 | 2.644 | 3648.174 | 120.00 | 15.39 | 3.68 | 3651.85 | .21 | 3.25 | 3.01 | 3.500 | .000 | .00 | 0 .0 |
| JUNCT STR | .0478 | | | | .0141 | .52 | 2.85 | 1.69 | | .013 | | .00 | .00 | PIPE |
| 101.110 | 3647.300 | 3.212 | 3650.512 | 115.00 | 12.44 | 2.40 | 3652.91 | .09 | 3.21 | 1.92 | 3.500 | .000 | .00 | 0 .0 |
| 148.090 | 3650.320 | 3.212 | 3653.532 | 115.00 | 12.44 | 2.40 | 3655.93 | .09 | 3.21 | 1.92 | 3.500 | .000 | .00 | 0 .0 |

# Appendix D. Plans

## SHEET INDEX


| | | |
|---|---|---|
| 1 | COVER SHEET | |
| 2 | LEGEND AND ABBREVIATIONS | |
| 3 | GENERAL NOTES | |
| 4 | HORIZONTAL CONTROL PLAN | BEGIN TO STA 358+00 |
| 5 | HORIZONTAL CONTROL PLAN | STA 358+00 TO END |
| 6 | MASTER DRAINAGE PLAN | BEGIN TO STA 358+00 |
| 7 | MASTER DRAINAGE PLAN | STA 358+00 TO END |
| 8 | MASTER WATER PLAN | |
| 9 | MASTER WATER PLAN | BEGIN TO STA 358+00 |
| 10 | MASTER WATER PLAN | STA 358+00 TO END |
| 11 | MASTER SEWER PLAN | BEGIN TO STA 358+00 |
| 12 | MASTER SEWER PLAN | STA 358+00 TO END |
| 13 | ROADWAY PLAN AND PROFILE | |
| 14 | ROADWAY PLAN AND PROFILE | |
| 15 | ROADWAY GRADING PLAN | BEGIN TO STA 320+00 |
| 16 | ROADWAY PLAN AND PROFILE | BEGIN TO STA 320+00 |
| 17 | ROADWAY GRADING PLAN | STA 320+00 TO STA 324+00 |
| 18 | ROADWAY PLAN AND PROFILE | STA 320+00 TO STA 324+00 |
| 19 | ROADWAY GRADING PLAN | STA 324+00 TO STA 328+00 |
| 20 | ROADWAY PLAN AND PROFILE | STA 324+00 TO STA 328+00 |
| 21 | ROADWAY GRADING PLAN | STA 328+00 TO STA 332+00 |
| 22 | ROADWAY PLAN AND PROFILE | STA 328+00 TO STA 332+00 |
| 23 | ROADWAY GRADING PLAN | STA 332+00 TO STA 336+00 |
| 24 | ROADWAY PLAN AND PROFILE | STA 332+00 TO STA 336+00 |
| 25 | ROADWAY GRADING PLAN | STA 336+00 TO STA 340+00 |
| 26 | ROADWAY PLAN AND PROFILE | STA 336+00 TO STA 340+00 |
| 27 | ROADWAY GRADING PLAN | STA 340+00 TO STA 344+00 |
| 28 | ROADWAY PLAN AND PROFILE | STA 340+00 TO STA 344+00 |
| 29 | ROADWAY GRADING PLAN | STA 344+00 TO STA 348+25 |
| 30 | ROADWAY PLAN AND PROFILE | STA 344+00 TO STA 348+25 |
| 31 | ROADWAY GRADING PLAN | STA 348+25 TO STA 352+00 |
| 32 | ROADWAY PLAN AND PROFILE | STA 348+25 TO STA 352+00 |
| 33 | ROADWAY GRADING PLAN | STA 352+00 TO STA 356+00 |
| 34 | ROADWAY PLAN AND PROFILE | STA 352+00 TO STA 356+00 |
| 35 | ROADWAY GRADING PLAN | STA 356+00 TO STA 360+00 |
| 36 | ROADWAY PLAN AND PROFILE | STA 356+00 TO STA 360+00 |
| 37 | ROADWAY GRADING PLAN | STA 360+00 TO STA 364+00 |
| 38 | ROADWAY PLAN AND PROFILE | STA 360+00 TO STA 364+00 |
| 39 | ROADWAY GRADING PLAN | STA 364+00 TO STA 368+00 |
| 40 | ROADWAY PLAN AND PROFILE | STA 364+00 TO STA 368+00 |
| 41 | ROADWAY GRADING PLAN | STA 368+00 TO STA 372+00 |
| 42 | ROADWAY PLAN AND PROFILE | STA 368+00 TO STA 372+00 |
| 43 | ROADWAY GRADING PLAN | STA 372+00 TO STA 376+00 |
| 44 | ROADWAY PLAN AND PROFILE | STA 372+00 TO STA 376+00 |
| 45 | ROADWAY GRADING PLAN | STA 376+00 TO END |
| 46 | ROADWAY PLAN AND PROFILE | STA 376+00 TO END |
| 47 | ROADWAY GRADING PLAN | PARCEL A BERM |
| 48 | WATERLINE PLAN AND PROFILE | BEGIN TO STA 4+00 |
| 49 | WATERLINE PLAN AND PROFILE | STA 4+00 TO STA 8+00 |
| 50 | WATERLINE PLAN AND PROFILE | STA 8+00 TO END |
| 51 | STORM DRAIN LATERALS | |
| 52 | STORM DRAIN LATERALS | |
| 53 | WATER LATERALS | |
| 54 | WATER LATERALS | |
| 55 | WATER LATERALS | |
| 56 | WATER LATERALS | |
| 57 | WATER LATERALS | |
| 58 | SANITARY SEWER LATERALS | |
| 59 | CUTOFF WALL PLAN AND PROFILE | END TO STA 44+00 |
| 60 | CUTOFF WALL PLAN AND PROFILE | STA 44+00 TO STA 40+00 |
| 61 | CUTOFF WALL PLAN AND PROFILE | STA 40+00 TO STA 36+00 |
| 62 | CUTOFF WALL PLAN AND PROFILE | STA 36+00 TO STA 32+00 |
| 63 | CUTOFF WALL PLAN AND PROFILE | STA 32+00 TO STA 28+00 |
| 64 | CUTOFF WALL PLAN AND PROFILE | STA 28+00 TO BEGIN |
| 65 | STREETLIGHT PLAN | BEGIN TO STA 328+50 |
| 66 | STREETLIGHT PLAN | STA 328+50 TO STA 340+50 |
| 67 | STREETLIGHT PLAN | STA 340+50 TO STA 352+00 |
| 68 | STREETLIGHT PLAN | STA 352+00 TO STA 364+00 |
| 69 | STREETLIGHT PLAN | STA 364+00 TO STA 375+00 |
| 70 | STREETLIGHT PLAN | STA 375+00 TO END |
| 71 | TRAFFIC CONTROL PLAN | BEGIN TO STA 328+50 |
| 72 | TRAFFIC CONTROL PLAN | STA 328+50 TO STA 340+50 |
| 73 | TRAFFIC CONTROL PLAN | STA 340+50 TO STA 352+00 |
| 74 | TRAFFIC CONTROL PLAN | STA 352+00 TO STA 364+00 |
| 75 | TRAFFIC CONTROL PLAN | STA 364+00 TO STA 375+00 |
| 76 | TRAFFIC CONTROL PLAN | STA 375+00 TO END |
| 77 | TYPICAL SECTIONS | |
| 78 | TYPICAL SECTIONS | |
| 79 | STORM DRAIN DETAILS | |
| 80 | STORM DRAIN DETAILS | |
| 81 | WATER DETAILS | |
| 82 | WATER DETAILS | |
| 83 | SEWER DETAILS | |
| 84 | STREETLIGHT DETAILS | |
| 85 | FLOOD WALL PLAN AND ELEVATION SHEET 1 OF 8 | |
| 86 | FLOOD WALL PLAN AND ELEVATION SHEET 2 OF 8 | |
| 87 | FLOOD WALL PLAN AND ELEVATION SHEET 3 OF 8 | |
| 88 | FLOOD WALL PLAN AND ELEVATION SHEET 4 OF 8 | |
| 89 | FLOOD WALL PLAN AND ELEVATION SHEET 5 OF 8 | |
| 90 | FLOODWALL GENERAL NOTES SHEET 6 OF 8 | |
| 91 | FLOOD WALL STRUCTURAL DETAIL SHEET 7 OF 8 | |
| 92 | FLOOD WALL TYPICAL SECTION SHEET 8 OF 8 | |
| 93 | CD1 – PRV PLAN AND PROFILE | |
| 94 | CD2 – PRV DETAIL | |
| 95 | CD3 – PRV NOTES | |
| 96 | WATER VAULT DETAILS | |
| 97 | WATER VAULT DETAILS II | |


# SUMMERLIN VILLAGE 27 IMPROVEMENT PLANS FOR: PARK DRIFT TRAIL

## V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

## FUTURE SID PROJECT

APN 137-15-401-003

SUMMERLIN®

### OWNER /DEVELOPER

CONTACT: BRIAN WALSH, P.E.
THE HOWARD HUGHES COMPANY LLC, A DELAWARE LIMITED LIABILITY COMPANY
10845 GRIFFITH PEAK DRIVE, SUITE 160
LAS VEGAS, NV 89135

BRIAN WALSH, P.E., VICE PRESIDENT DATE

### ENGINEER / CONSULTANT

CIVIL

CONTACT: TONY ORTIZ, P.E.
ATKINS
2270 CORPORATE CIRCLE SUITE 200
HENDERSON, NEVADA 89074
(702) 263-7275

### UTILITY NOTE

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

**CALL BEFORE YOU DIG: 1-800-642-2444**

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE) PRESSURE REDUCING VALVES BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY AND WILL NOTE BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF THE LAS VEGAS VALLEY WATER DISTRICT FACILITIES.

### NOTICE OF INTENT NOTE

NOTE: ALL LAND SURFACE AREA DISTURBANCES OVER 1 ACRE REQUIRE A STORMWATER DISCHARGE PERMIT ISSUED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP). A PHASED CONSTRUCTION UNIT IN A CONTIGUOUS SUBDIVISION IS CONSIDERED UNDER CONSTRUCTION UNTIL ALL STRIPPED SURFACE AREAS HAVE BEEN COVERED BY PAVING, BUILDING CONSTRUCTION OR PLANTING. A STORMWATER DISCHARGE PERMIT APPLICATION AND ASSOCIATED INFORMATION MAY BE DOWNLOADED FROM THE WEB SITE: HTTP://WWW.STATE.NV.US/BWPC/STORM01.HTM PROJECTS THAT DISTURB MORE THAN ONE ACRE OF LAND MUST SUBMIT TO NDEP A "NOTICE OF INTENT" FOR INCLUSION UNDER STORMWATER PERMIT NO. NVR100000 ALONG WITH APPROPRIATE FILLING FEE.

### NPDES PERMIT NOTE

THE ENGINEER SHOULD CONTACT THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) TO OBTAIN A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PRIOR TO CONSTRUCTION. ALL CONSTRUCTION PROJECTS ONE ACRE OR LARGER MUST APPLY FOR THE PERMIT THROUGH NDEP. ALL QUESTIONS REGARDING THE NPDES PERMIT REQUIREMENTS SHOULD BE DIRECTED TO THE NDEP AT (775) 687-9429.

### FEMA FLOOD ZONE INFORMATION

THE PROJECT SITE IS LOCATED WITHIN A FEMA DESIGNATED ZONE X (UNSHADED) AS DEPICTED ON FLOOD INSURANCE RATE MAP (FIRM) PANEL 32003C2150E, DATED 9/27/2002. A ZONE X (UNSHADED) IS DESCRIBED AS AN AREA DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN.

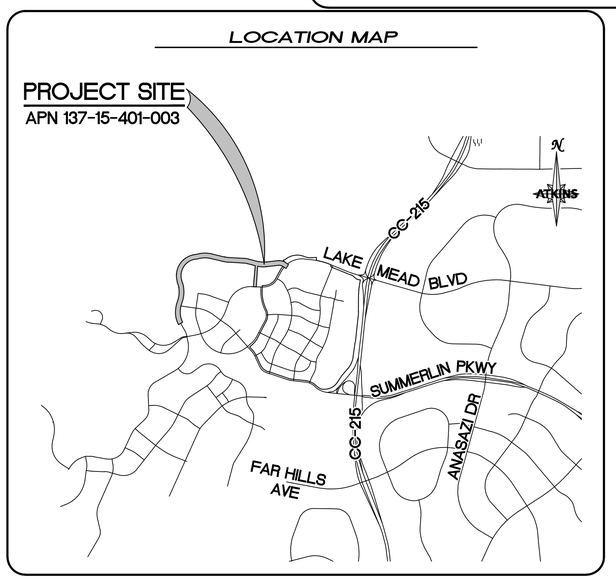
PROPOSED RIGHT-OF-WAY ACREAGE
5.06 AC.

PROPOSED DISTURBED AREA ACREAGE
11.26 AC.

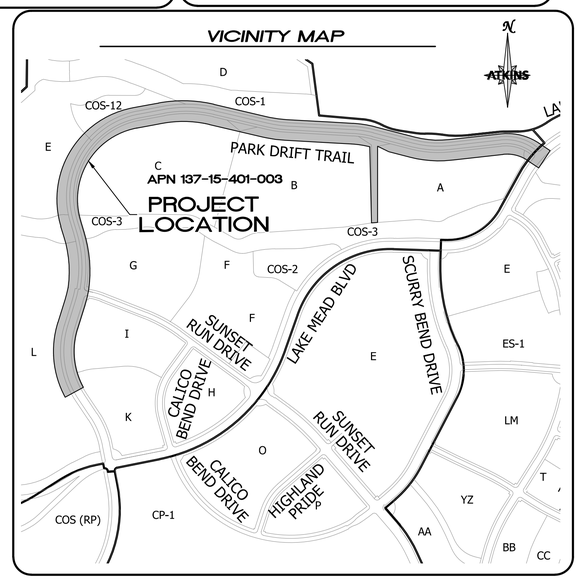
GEOTECHNICAL ENGINEER
PREPARED BY: NOVA GEOTECHNICAL & INSPECTION SERVICES
4480 W. HACIENDA AVE. SUITE 104, LAS VEGAS, NV 89118
PHONE: 702-873-3478
PROJECT NO.: G-20-059
DATED: OCTOBER 7, 2020 AND SUBSEQUENT UPDATE LETTER DATED: JUNE 16, 2022

PUBLIC EARTHWORK QUANTITIES (RAW)
CUT: 2,700 CY
FILL: 7,300 CY

### LOCATION MAP




### VICINITY MAP




## APPROVALS

CITY OF LAS VEGAS

DEPARTMENT OF COMMUNITY DEVELOPMENT

NOTE:
THIS PLAN CONFORMS TO THE APPLICABLE STANDARDS OF THE COMMUNITY DEVELOPMENT DEPARTMENT.

LAS VEGAS FIRE AND RESCUE

CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK DATE

THE AFFIXED CENTRAL TELEPHONE COMPANY d/b/a CENTURYLINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES, AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

SHEETS: 1-3, 6-14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48-64, 81, 82, 93-97

NV ENERGY DATE

NV ENERGY HAS ACKNOWLEDGED WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NV ENERGY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA UTILITY COMMISSION'S RULES AND REGULATIONS.

SW GAS UI-###-###-##
PLANNER NAME:
DATE: ##-##-####

SOUTHWEST GAS CORPORATION

COX COMMUNICATIONS OF LAS VEGAS, INC DATE

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

LINEAR UNIT: US SURVEY FOOT (FTUS)
DATUM (REFERENCE FRAME): NAD 83 (2011) EPOCH 2010.00
SYSTEM: NEVADA COORDINATE REFERENCE SYSTEM (NCRS)
ZONE: LAS VEGAS HIGH ELEVATION ZONE
PROJECTION: TRANSVERSE MERCATOR STANDARD PARALLEL (AND LATITUDE OF GRID ORIGIN): 36°15'00"N
LONGITUDE OF CENTRAL MERIDIAN: 114°58'00"W
NORTHING AT GRID OF ORIGIN: 400,000.00 M (1,312,333.3333 FTUS)
EASTING AT CENTRAL MERIDIAN: 300,000 M (984,250.0000 FTUS)
SCALE FACTOR ON CENTRAL MERIDIAN: 1.000135 (EXACT)

NOTES:
1. ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED SUCH THAT PROJECTED (GRID) DISTANCES ARE EQUIVALENT TO "GROUND" DISTANCES IN THE PROJECTED AREA
2. GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

### BENCHMARK

PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

### LEGAL DESCRIPTION

BEING A PORTION OF LOT 4 AS SHOWN ON THE MAP THEREOF IN BOOK 126 OF PLATS, PAGE 16, OFFICIAL RECORDS, CITY OF LAS VEGAS CLARK COUNTY, NEVADA

Call before you Dig
FREE SERVICE TO LOCATE UNDERGROUND UTILITY LINES IN THE AREA
Call 811
OR
1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

PROFESSIONAL ENGINEER, STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 12-31-23
CIVIL
No. 18949
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074
+1.702.263.7275 telephone:
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**COVER SHEET**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| DATE: | May 2023 |
| DRAWING NO. | 1 / 97 |
| HORIZ.: | NONE |
| VERT.: | NONE |
| 107V9664 | |
| L22-01955 | |
| JOB NO. | 100069316 |

C:\pw_work\atkinsnv01\dms54862\69316-01-TITL.dwg LAYOUT: 1 COVER SHEET May 10, 2023 - 3:07PM

| | |
|---|---|
| @ | AT |
| # | NUMBER |
| AB | ABANDONED |
| AC | ASPHALTIC CONCRETE |
| ACP | ASBESTOS CEMENT PIPE |
| AGG | AGGREGATE |
| AIP | ABANDON IN PLACE |
| ALT | ALTERNATE |
| AP | ANGLE POINT |
| APPROX | APPROXIMATE |
| ASTM | AMERICAN SOCIETY FOR TESTING AND MATERIALS INTERNATIONAL |
| AV/AR | AIR VACUUM AIR RELIEF VALVE |
| BC | BACK OF CURB |
| BCR | BACK OF CURB RETURN |
| BLK | BLOCK |
| BLVD | BOULEVARD |
| BM | BENCHMARK |
| BO | BLOW OFF |
| BP | BOTTOM OF PIPE |
| BSW | BACK OF SIDEWALK |
| BVC | BEGIN VERTICAL CURVE |
| BVCE | BEGINNING OF VERTICAL CURVE ELEVATION |
| BVCS | BEGINNING OF VERTICAL CURVE STATION |
| BW | BOTTOM WIDTH |
| C&G | CURB AND GUTTER |
| C–C | CENTER TO CENTER |
| CATV | CABLE TELEVISION |
| CCAUSD | CLARK COUNTY AREA UNIFORM STANDARD DRAWING |
| CCRFCD | CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT |
| CCWRD | CLARK COUNTY WATER RECLAMATION DISTRICT |
| CF | CUBIC FOOT |
| CIP | CAST IRON PIPE OR CAST IN PLACE |
| CL | CENTERLINE |
| CLR | CLEAR |
| CLV | CITY OF LAS VEGAS |
| CM | CONSTRUCTION MANAGER |
| CMP | CORRUGATED METAL PIPE |
| CMU | CONCRETE MASONRY UNIT |
| CNDT | CONDUIT |
| CNLV | CITY OF NORTH LAS VEGAS |
| CO | CLEANOUT |
| COH | CITY OF HENDERSON |
| COL | COLUMN |
| CON'T | CONTINUATION |
| CONC | CONCRETE |
| CONST | CONSTRUCT OR CONSTRUCTION |
| COR | CORNER |
| COS | COMMUNITY OPEN SPACE |
| CPP | CORRUGATED PLASTIC PIPE |
| CSP | CORRUGATED STEEL PIPE |
| CU | CUBIC |
| CULV | CULVERT |
| CW | CUT–OFF WALL |
| CY | CUBIC YARD |
| D | DEPTH |
| DCSWCS | DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS |
| DET, DTL | DETAIL |
| DEPT | DEPARTMENT |
| DG | DESIGN GRADE |
| DI | DROP INLET |
| DIA | DIAMETER |
| DIAG | DIAGONAL |
| DIP | DUCTILE IRON PIPE |
| DOC | DOCUMENT |
| DW | DRIVEWAY |
| DWG | DRAWING |
| E | EAST |
| EA | EACH |
| EB | EASTBOUND |
| EC | END OF CURVE |
| ECR | END CURB RETURN |
| EF | EACH FACE |
| EG | EXISTING GROUND |
| ELEC | ELECTRICAL |
| ELEV | ELEVATION |
| EMBK | EMBANKMENT |
| EOP | EDGE OF PAVEMENT |
| EP | EDGE OF PAVEMENT ALIGNMENT END |
| EQ | EQUAL |
| ESMT | EASEMENT |
| EVC | END VERTICAL CURVE |
| EVCS | END VERTICAL CURVE STATION |
| EW | EACH WAY |
| EX, EXST | EXISTING |
| EXP, JT | EXPANSION JOINT |
| FA | FIRE ALARM |
| FC | FACE OF CURB |
| FF | FINISHED FLOOR ELEVATION |
| FH | FIRE HYDRANT |
| FL | FLOW LINE |
| FO | FIBER OPTIC |
| FT | FOOT OR FEET |
| G | GAS LINE |
| GALV | GALVANIZED |
| GB | GRADE BREAK |
| GL | GRATE LENGTH |
| GM | GAS METER |
| GUT | GUTTER |
| GV | GATE VALVE |
| H | HEIGHT |
| HDPE | HIGH DENSITY POLYETHYLENE PIPE |
| HDWL | HEADWALL |
| HE | HORIZONTAL ELLIPTICAL |
| HGL | HYDRAULIC GRADE LINE |
| HOA | HOMEOWNER'S ASSOCIATION |
| HOR | HORIZONTAL |
| HP | HIGH POINT |
| ID | INSIDE DIAMETER |
| IN | INCH(ES) |
| INT | INTERSECTION |
| INV | INVERT |
| IQAC | INTERAGENCY QUALITY ASSURANCE COMMITTEE |
| IRR | IRRIGATION |
| ISL | ISLAND |
| JB | JUNCTION BOX |
| JCT | JUNCTION |
| JT | JOINT |
| K | VERTICAL CURVE K VALUE |
| L | LENGTH |
| LB | POUND(S) |
| LF | LINEAR FEET |
| LIN | LINEAR |
| LIN # | CCWRD MANHOLE NUMBER |
| LOC | LENGTH OF CURVE |
| LOL | LAYOUT LINE |
| LP | LOW POINT |
| LS | LANDSCAPE |
| LT | LEFT |
| LVC | LENGTH OF VERTICAL CURVE |
| LVVWD | LAS VEGAS VALLEY WATER DISTRICT |
| MAS | MASONRY |
| MAX | MAXIMUM |
| MH | MANHOLE |
| MIN | MINIMUM |
| MON | MONOLITHIC, MONUMENT |
| MTL | MATERIAL |
| ME | MATCH EXISTING |
| MUE | MUNICIPAL UTILITY EASEMENT |
| N | NORTH |
| NAP | NOT A PART |
| NDOT | NEVADA DEPARTMENT OF TRANSPORTATION |
| NF | NEAR FACE |
| NG | NUMBER OF GRATES, NATURAL GRADE |
| NIC | NOT IN CONTRACT |
| No. | NUMBER |
| NTS | NOT TO SCALE |
| NVE | NV ENERGY |
| OC | ON CENTER |
| OD | OUTSIDE DIAMETER |
| OG | OPEN GRADE |
| OH | OVERHEAD |
| OHP | OVERHEAD POWER |
| OS | OFFSET |
| P | POWER |
| PB | PULL BOX |
| PBS | PLANTMIX BITUMINOUS SURFACE |
| PC | POINT OF CURVATURE |
| PCC | PORTLAND CEMENT CONCRETE OR POINT OF COMPOUND CURVATURE |
| PE | POLYETHYLENE |
| PG | PROPOSED GRADE |
| PGL | PROFILE GRADE LINE |
| PH | POT HOLE |
| PI | POINT OF INTERSECTION |
| PIP | PROTECT IN PLACE |
| PL | PROPERTY LINE |
| PLCS | PLACES |
| PMF | PAVEMENT MARKING FILM |
| POC | POINT OF CONNECTION |
| PP | POWER POLE |
| PRC | POINT OF REVERSE CURVATURE |
| PROP | PROPOSED |
| PSI | POUNDS PER SQUARE INCH |
| PT | POINT, POINT OF TANGENCY |
| PUE | PUBLIC UTILITY EASEMENT |
| PVC | POLYVINYL CHLORIDE |
| PVI | POINT OF VERTICAL INTERSECTION |
| PVMT | PAVEMENT |
| QTY | QUANTITY |
| (R) | RADIAL |
| R/W,ROW | RIGHT OF WAY |
| R | RADIUS |
| RC | REINFORCED CONCRETE |
| RCB | REINFORCED CONCRETE BOX |
| RCC | ROLLER COMPACTED CONCRETE |
| RCP | REINFORCED CONCRETE PIPE |
| RD | ROAD |
| REINF | REINFORCED OR REINFORCEMENT |
| RELOC | RELOCATE |
| REV | REVISION |
| RG | ROUGH GRADE |
| RP | RADIUS POINT |
| RPM | RAISED PAVEMENT MARKER |
| RR | RAILROAD |
| RT | RIGHT |
| SCHED | SCHEDULE |
| SD | STORM DRAIN |
| SDCP | STORM DRAIN CAP |
| SDMH | STORM DRAIN MANHOLE |
| SF | SQUARE FOOT/SQUARE FEET |
| SHLD | SHOULDER |
| SHT | SHEET |
| SHP | STEEL HIGH PRESSURE PIPE |
| SMFO | SINGLE MODE FIBER OPTIC |
| SNWA | SOUTHERN NEVADA WATER AUTHORITY |
| SQ | SQUARE |
| SS | SANITARY SEWER OR SIDE SLOPE |
| SSCP | SANITARY SEWER CAP |
| SSD | SUMMERLIN STANDARD DRAWING |
| SSMH | SANITARY SEWER MANHOLE |
| SST | STAINLESS STEEL |
| ST | STREET |
| STA | STATION |
| STD | STANDARD |
| STL | STEEL |
| STLT | STREETLIGHT |
| SDHW | STORM DRAIN HEADWALL |
| STRUCT | STRUCTURAL OR STRUCTURE |
| SUM # | CCWRD MANHOLE NUMBER |
| SURV | SURVEY |
| SVZ | SIGHT VISIBILITY ZONE |
| SW | SIDEWALK |
| SY | SQUARE YARD |
| T | TELEPHONE LINE |
| TAN | TANGENT |
| TB | TOP OF BOX |
| TBA | TO BE ADJUSTED |
| TBC | TOP OF BACK OF CURB |
| TBR | TO BE REMOVED |
| TC | TOP OF CURB |
| TCD | TRAFFIC CONTROL DEVICE |
| TDS | TECHNICAL DRAINAGE STUDY |
| TEL | TELEPHONE |
| TEMP | TEMPORARY |
| TF | TOP OF FOOTING |
| THK | THICK |
| THR | THRUST |
| THW | TOP OF HEADWALL |
| TOF | TOP OF FACE |
| TW/TOW | TOP OF WALL |
| TP | TOP OF PIPE |
| TRANS | TRANSITION |
| TS | TRAFFIC SIGNAL |
| TSI | TRAFFIC SIGNAL INTERCONNECT |
| TW | TOP OF WALL |
| TYP | TYPICAL |
| UDACS | UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS |
| UG | UNDERGROUND |
| UGP | UNDERGROUND POWER |
| UIE | UPPER INVERT ELEVATION |
| UNO | UNLESS NOTED OTHERWISE |
| UPRR | UNION PACIFIC RAILROAD |
| USD | UNIFORM STANDARD DRAWING |
| UTACS | ULTRA THIN ASPHALT CONCRETE SURFACE |
| USTCDE | UTILITY, STREETLIGHT, TRAFFIC CONTROL DEVICE EASEMENT |
| V | VOLT |
| VAR | VARIABLE |
| VC | VERTICAL CURVE |
| VCP | VITRIFIED CLAY PIPE |
| VERT | VERTICAL |
| VG | VALLEY GUTTER |
| W | WEST, WATER |
| W/ | WITH |
| WB | WEST BOUND |
| WL | WATER LINE |
| WM | WATER METER |
| W/O | WITHOUT |
| WPJ | WEAKENED PLANE JOINT |
| WV | WATER VALVE |
| WW | WING WALL |
| YD | YARD(S) |

| | EXISTING | PROPOSED |
|---|---|---|
| DAYLIGHT LINE | | |
| FLOWLINE | | |
| CENTERLINE | | |
| PARCEL LINE | | |
| RIGHT OF WAY | | |
| PAVEMENT STRIPING | | |
| OVERHEAD POWER | —OHP— — —OHP— — — | |
| UNDERGROUND POWER | —UGP— — —UGP— — — | |
| SANITARY SEWER | —S— — —S— — —S— — — | 15" SS |
| WATER | | 24"W (3550) |
| STORM DRAIN | | |
| GAS | —G— — —G— — —G— — — | |
| CABLE T.V. | —CATV— — —CATV— — — | |
| TELEPHONE | —T— — —T— — —T— — — | |
| STREETLIGHT CONDUIT | —STLT— — —STLT— — — | STLT |
| STOP BAR | | |
| CONCRETE ENCASEMENT | | |
| FENCE | | |
| BLOCK WALL | | |
| RETAINING WALL | | |
| SAWCUT PAVEMENT | | |
| CONTOUR | —(3005)— — — | 3005 |
| SPOT ELEVATION | x 3011.6 | x 3011.6 |
| CURB AND GUTTER | | |
| EDGE OF PAVEMENT | | |
| EASEMENT | | |
| MATCHLINE | | |
| SIGN | | |
| DOUBLE POST SIGN | | |
| STORM DRAIN MANHOLE | SD | |
| STORM DRAIN STRUCTURE | | |
| DROP INLET | | |
| BEEHIVE INLET | | |
| SEWER MANHOLE | S | S |
| FIRE HYDRANT | | |
| CAP AND BLOWOFF | | |
| GATE VALVE | | |
| REDUCER | | |
| STREETLIGHT | OR | |
| PULLBOX | | |
| SIGNAL POLE | | |
| ELEVATION | (00.0) FG | 00.0 FG |
| WATER PRESSURE ZONE BOUNDARY | | |
| WATER PRESSURE ZONE | | 3550 |
| SIGHT VISIBILITY ZONE | | |
| SIDEWALK | | |
| FUTURE | | |

## CITY OF LAS VEGAS STORM WATER MANAGEMENT NOTES

1. STANDARD NOTE NO. 1: THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. STANDARD NOTE NO. 2: ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE LVMC 14.18.130 AND CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICTS HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL SECTION 1500 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. STANDARD NOTE NO. 3: TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. STANDARD NOTE NO. 4: AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS, AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. STANDARD NOTE NO. 5: ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY
6. HAS BEEN REDUCED BY 50 PERCENT OR MORE.

REVISED 06/04/2018

## NOTE TO CONTRACTOR

- QUANTITIES SHOWN ARE ESTIMATES ONLY AND ARE INTENDED TO ILLUSTRATE SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE EXACT QUANTITIES INVOLVED.

### ROADWAY ALIGNMENT DESIGNATIONS

"PDT" = PARK DRIFT TRAIL
"LMB" = LAKE MEAD BOULEVARD
"SRD" = SUNSET RUN DRIVE

### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

### BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING, HITTING OR DAMAGING UTILITY LINES. IT'S COURTESY.
Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COURTESY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY A. ORTIZ
EXP. 6-30-25
CIVIL
No. 18949
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**LEGEND AND ABBREVIATIONS**

DESIGNED BY: B. WOCHYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: NONE
VERT.: NONE

107Y9664
L22–01955
DATE: May 2023
DRAWING NO. 2 / 97
JOB NO. 100069316

C:\pw_work\atkronn01\dms54862\69316-02-LGND.dwg LAYOUT: 2 LEGEND & ABBREVIATIONS May 10, 2023 – 2:17PM

## CITY OF LAS VEGAS GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "SUMMERLIN IMPROVEMENT STANDARDS" FOR WORK IN THE SUMMERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE AVAILABLE RECORDS. EXISTING UTILITIES AS SHOWN FROM CLV PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS MAY NOT BE SHOWN ON THE THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE'S WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO THEM. THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CITY ENGINEER AND OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS, ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF–SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGNS TO BE APPROVED BY THE CITY, PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT–OF–WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. EXPANSION JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTRUDED–TYPE CURB.
8. AC PAVEMENT TO BE ONE–HALF INCH (½") ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS AND CROSS GUTTERS.
9. CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY OF LAS VEGAS SHALL BE REMOVED AND REPLACED PER STANDARD DRAWING 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED IN EACH QUADRANT OF AN INTERSECTION PER STANDARD DRAWING 235. EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY INSPECTOR.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF THE TRANSITIONS TO BE AS SHOWN ON PLANS.
12. ALL GRADING WORK SHALL CONFORM TO THE SOILS REPORT AS PREPARED BY THE (COMPANY, REPORT #, DATE ) APPROVED BY THE CITY ENGINEER, AND AS SHOWN ON THESE PLANS.
13. EXACT LOCATION OF ALL SAWCUT LINES MAY BE ADJUSTED OR DETERMINED IN THE FIELD BY A CITY OF LAS VEGAS ENGINEER IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
14. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED AND ADJUSTED PER AVAILABLE RECORDS IN ACCORDANCE WITH STATUTE NO. 625.380 & CITY OF LAS VEGAS TITLE 18, APPENDIX D.
15. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND CROSS GUTTERS UNLESS WRITTEN APPROVAL IS GRANTED BY THE UTILITY COMPANY AND THE CITY ENGINEER.

WALL NOTES:

16. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVIL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. NEW WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE BUILDING DEPARTMENT.
17. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHT OF WAY.
18. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
19. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT OR THE CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
20. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC, THE CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION TO OFFSITE INSPECTION AND TESTING CERTIFYING THAT ALL DEVICES HAVE BEEN PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
21. ~~AFTER PAVING AND PRIOR TO BACKFILL OPERATIONS WHICH WOULD COVER SANITARY SEWER AND STORM DRAIN FACILITIES, CONTRACTOR IS REQUIRED TO SCHEDULE CLV OPEN TRENCH UTILITY SURVEY APPOINTMENT FOR DETERMINATION OF FINAL LOCATION. FACILITIES TO BE LOCATED BY CLV SHALL INCLUDE AT A MINIMUM THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES; STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET; THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT–OF–WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS.~~

   SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S) SHALL BE PROVIDED TO THE CITY AND APPROVED PRIOR TO ACCEPTANCE OF FACILITY VIDEO INSPECTION. THE MAP(S) SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MANHOLES, STORM DRAIN MANHOLES AND TRANSITION STRUCTURES; STORM DRAIN LATERALS AT THE CONNECTION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET; THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERALS EXIT THE PUBLIC RIGHT–OF–WAY, SEWER AND STORM DRAIN MAIN ALIGNMENT, INCLUDING DEFLECTION POINTS. THE LOCATION SHALL BE DESCRIBED BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS. FINAL LOCATION MAPS MUST BE SEALED AND CERTIFIED BY A NEVADA PROFESSIONAL LAND SURVEYOR TO HAVE POSITIONAL CERTAINTIES OF ± 0.09 METERS (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMA DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO ACCOMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION MAP(S).
22. CCTV VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO INSPECTIONS NEED TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST EDITION.
23. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

*REVISED 06/04/2018*

## CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF–SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

| | HORIZONTAL | VERTICAL | COMPACTION |
|---|---|---|---|
| A. PAVEMENT AREA SUBGRADE | 0.1'+ | +0.0' TO –0.1' | SEE SOILS REPORT |
| B. ENGINEERED FILL | 0.5'+ | +0.1' TO –0.1' | SEE SOILS REPORT |

   COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT–OF–WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, THE OWNER AGREES TO PROVIDE AND INSTALL SUCH ITEM AT HIS OWN EXPENSE AND AT THE DIRECTION OF THE CITY ENGINEER. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

*REVISED 04/15/10*

## CONSTRUCTION CONCURRENCY NOTE

*THE FOLLOWING SEPARATE VILLAGE 22 ROADWAY IMPROVEMENT PLANS ARE ASSUMED TO BE CONSTRUCTED CONCURRENTLY AND ARE SHOWN AS FUTURE (BY OTHERS):*

1. *LAKE MEAD BOULEVARD (DESERT FOOTHILLS DRIVE TO STREET N)*
2. *LAKE MEAD BOULEVARD (PARK DRIFT TRAIL TO 4125 ZONE)*

## DEVIATIONS FROM STANDARDS

*NONE.*

## CITY OF LAS VEGAS FIRE DEPARTMENT NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6631 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. ONLY FIRE HYDRANTS THAT ARE ON THE LAS VEGAS VALLEY WATER DISTRICT'S APPROVED PRODUCTS LIST ARE ALLOWED TO BE INSTALLED.
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON–SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. IFC § 105.6.15
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. IFC § 3310, § 3312
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. IFC § 507.5.7.3
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. IFC § 106.3
7. ALL ON–SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. IFC § 507.2.1, NFPA 24
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. IFC § 507
9. PRIVATE HYDRANTS SHALL BE PAINTED RED. IFC § 507.5.7.1
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. IFC § 507
11. FIRE HYDRANT SPACING SHALL BE AS FOLLOWS: IFC § C102
    - RESIDENTIAL – 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    - COMMERCIAL – 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE THE WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM OF 1000 FT SPACING, TO PROVIDE FOR FUTURE TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FT ON AN ALTERNATING BASIS. IFC § C102.8
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF A CUL–DE–SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL–DE–SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FT OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. IFC § C102.10
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE–TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § 102.4
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. IFC § C102.7
17. THE MAXIMUM DISTANCE FROM A HYDRANT TO THE END OF A DEAD–END STREET SHALL NOT EXCEED 200 FT. IFC § C102.6
18. TWO (2) SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE IS 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD–INS ARE INSTALLED ON A SINGLE SYSTEM. FOR SYSTEMS REQUIRED TO HAVE TWO (2) SOURCES OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD–INS CAN BE LOST SERVICE DUE TO A SERVICE INTERRUPTION. FOR SYSTEMS PERMITTED TO HAVE ONE SOURCE OF WATER SUPPLY, SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 3 FIRE HYDRANTS AND/OR FIRE SPRINKLER LEAD–IN CAN BE OUT OF SERVICE DUE TO A SERVICE INTERRUPTION. IFC § 1104
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL–WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. IFC § 503.2.3
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12% ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FT PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6% IFC § 503.2.7, 503.2.8
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. IFC § 503.2.4
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13FT 6 INS. IFC § 503.2.1
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 33 FT WITH PARKING ON BOTH SIDES MEASURED TO FACE OF CURB. NOT LESS THAN 28 FT WIDE WITH PARKING RESTRICTED TO ONE SIDE MEASURED TO FACE OF CURB. NOT LESS THAN 24 FT WIDE WITH NO PARKING ON EITHER SIDE MEASURED TO FACE OF CURB. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. IFC § 503.2.1.1
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. IFC § 503.1.1
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 200 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD–ENDS OR A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. CLV REGULATION AND MOU
26. ALL DEAD–END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. CLV REGULATION
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS OF 100 FT ALONG THE DESIGNATED FIRE LANE. SIGNS SHALL BOTH SIDE OF AN ACCESS ROADWAY OR AS NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM THE ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. IFC § 503.3
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. IFC § 503.6
29. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS, OR HAVING FOUR OR MORE TRAVEL LANES AND A TRAFFIC COUNT OF MORE THAN 30,000 VEHICLES PER DAY, ALL HYDRANTS BEINGS UTILIZED TO DELIVER FIRE FLOW TO THE PROPOSED LOCATION SHALL BE LOCATED ON THE SAME SIDE OF THE STREET AS THE PROPOSED DEVELOPMENT. CLV REGULATION

*REVISED FEBRUARY 4, 2019*

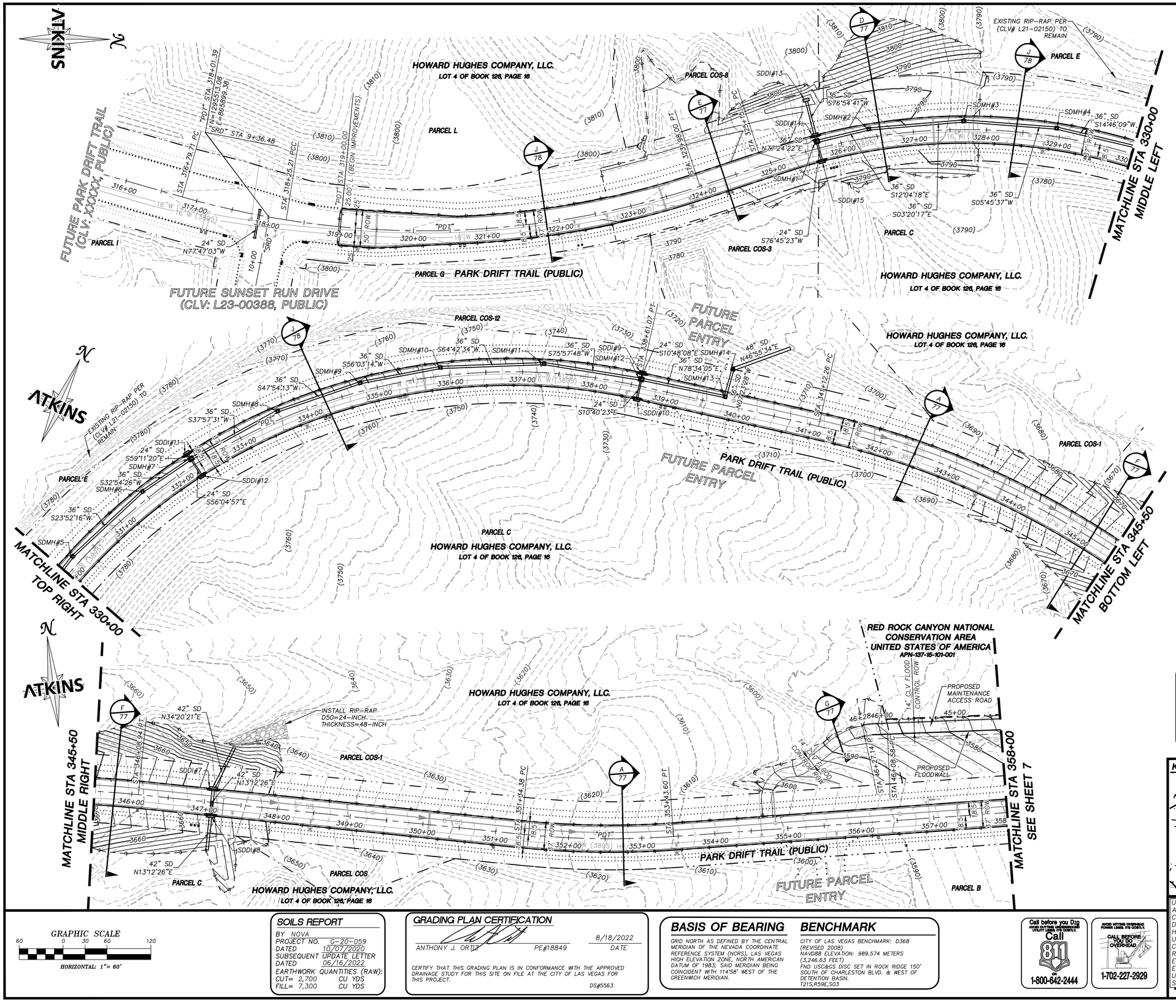
## CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT–OF–WAY, THE CONTRACTOR SHALL INSTALL ALL ADVANCE WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SUGGESTED ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW TRAFFIC SIGNS SHALL UTILIZE TYPE XI RETROREFLECTIVE SHEETING IN ACCORDANCE WITH CGAUSS 627 AND 716 AND SHALL HAVE AN ANTI–GRAFFITI PROTECTIVE OVERLAY FILM THAT IS A MATCHING COMPONENT TO, AND OF THE SAME MANUFACTURER AS THE RETROREFLECTIVE SHEETING TO WHICH IT IS APPLIED. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF–SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND/OR REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT OF WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA (RTC). IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828–3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. THE CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

*REVISED JUNE 4, 2018*

## CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF–SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D–3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y"'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C–900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.
11. SEWER SERVICES AS APPROVED ON THIS PLAN, ARE INTENDED SPECIFICALLY FOR THE LOT AND USE SHOWN, AND ARE NOT INTENDED TO SERVE ADDITIONAL PARCELS OR STRUCTURES WHICH MAY BE CREATED IN THE FUTURE. IN THE EVENT THAT THE PARCEL AND/OR LOTS SHOWN ON THIS PLAN ARE FURTHER DIVIDED TO CREATE ADDITIONAL PARCELS OR LOTS, THE OWNER I




## SUMMARY OF QUANTITIES

| DESCRIPTION | QUANTITY | UNIT |
|---|---|---|
| DRAINAGE | | |
| 7.5' TYPE CM2 DROP INLET | 6 | EA |
| 12.5' TYPE CM2 DROP INLET | 6 | EA |
| TYPE III MANHOLE | 11 | EA |
| TYPE II MANHOLE | 3 | EA |
| 4'X8' NDOT TYPE 2 DROP INLET | 3 | EA |
| 24" RCP CLASS III | 40 | LF |
| 30" RCP CLASS III | 105 | LF |
| 36" RCP CLASS III | 1800 | LF |
| 42" RCP CLASS III | 590 | LF |
| 48" RCP CLASS III | 85 | LF |
| RIP RAP (D50=24") | 233 | CY |

### MASTER PLAN NOTE

THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

### STORM DRAIN NOTES

1. SEE ROADWAY PLAN AND PROFILE SHEETS FOR CONSTRUCTION DETAILS AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (I.D.) AND DROP INLET LENGTHS (CURB OPENING).
2. ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES.
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.
4. ROUGH GRADING SHOWN AS EXISTING PER CLV L21-02150, PUBLIC.

GRAPHIC SCALE
60 0 30 60 120
HORIZONTAL: 1"= 60'

### SOILS REPORT

BY NOVA
PROJECT NO. G-20-059
DATED 10/07/2020
SUBSEQUENT UPDATE LETTER
DATED 06/16/2022
EARTHWORK QUANTITIES (RAW):
CUT= 2,700 CU YDS
FILL= 7,300 CU YDS

### GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022
DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#5563

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

### BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING HAZARDOUS UTILITY LINES. IT'S QUICK!
Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S QUICK!
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

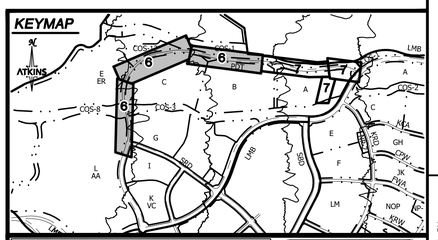
### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW _____ GPM AT 20 PSI RESIDUAL

KEYMAP



UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-23
CIVIL
No. 18649
5/17/2023

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

REVISIONS


ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200


SUMMERLIN

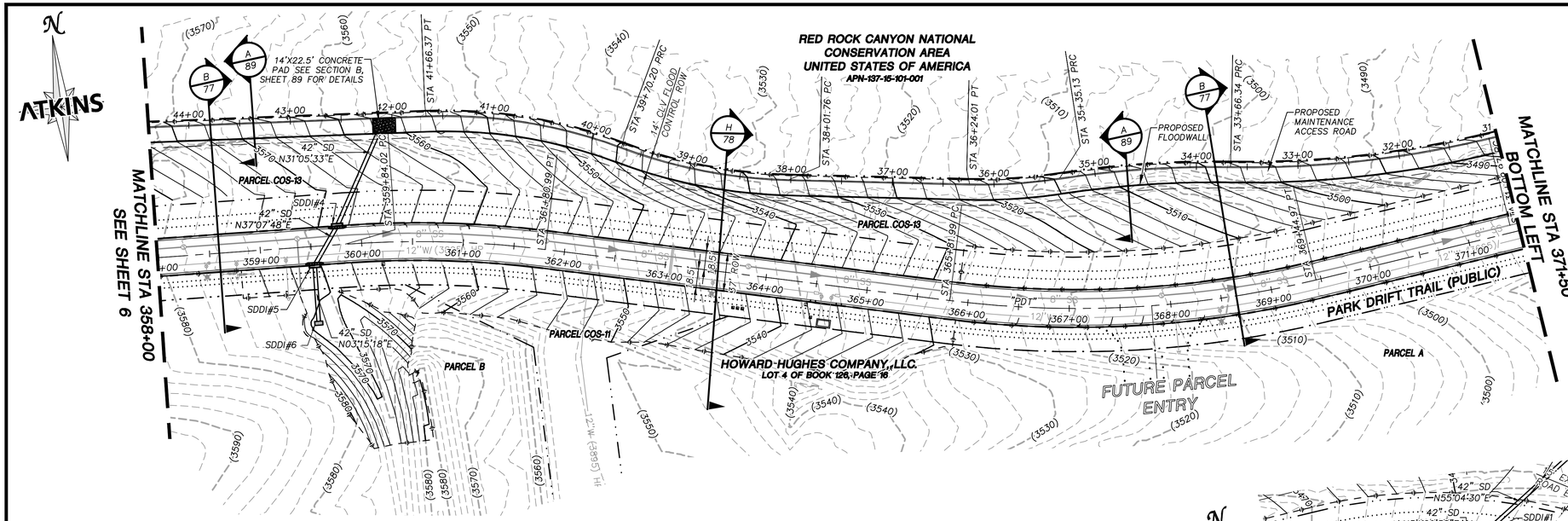
SUMMERLIN WEST VILLAGE 27
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

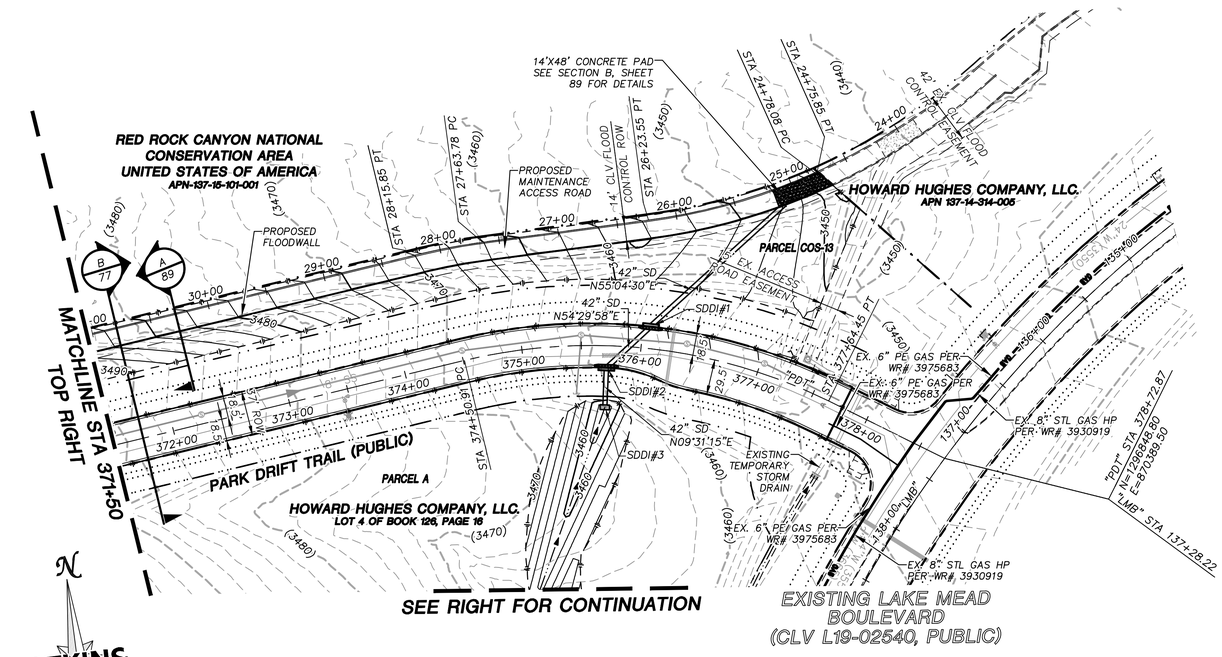
MASTER DRAINAGE PLAN
BEGIN TO STA 358+00

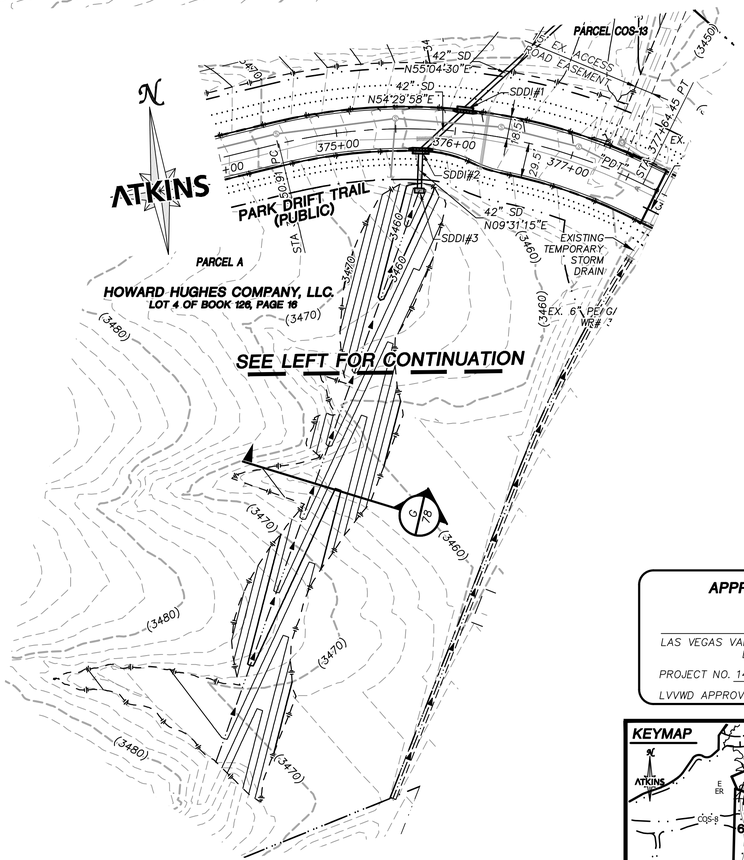
| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=60' |
| VERT.: | NONE |
| DATE: | May 2023 |
| DRAWING NO. | 6 /97 |
| JOB NO. | 100069316 |

107V9664
L22-01955

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## MASTER PLAN NOTE

THIS SHEET IS FOR INFORMATIONAL PURPOSES ONLY. IT IS AN OVERALL REPRESENTATION OF THE UTILITY FOR REVIEW AND COORDINATION WITH OTHER PROJECT DETAILS WITHIN THIS PLAN SET.

## STORM DRAIN NOTES

1. SEE ROADWAY PLAN AND PROFILE SHEETS FOR CONSTRUCTION DETAILS AND INFORMATION RELATED TO PIPE SIZE (INNER DIAMETER), MANHOLE BASE SIZE (I.D.) AND DROP INLET LENGTHS (CURB OPENING).
2. ALL STORM DRAIN MATERIAL TO BE CLASS III REINFORCED CONCRETE PIPE, UNLESS OTHERWISE NOTED IN PROFILES.
3. CONTRACTOR TO PROVIDE 6" MINIMUM OF CLEARANCE BETWEEN OUTSIDE OF PIPE TO INSIDE WALL OF STORM DRAIN STRUCTURES.
4. ROUGH GRADING SHOWN AS EXISTING PER CLV XXX–XXXXX, PUBLIC.

## CAUTION: HIGH PRESSURE GAS!

CALL SOUTHWEST GAS AT 702–278–8451 FOR STANDBY WHEN EXCAVATING (INCLUDING SAW CUTTING AND PAVEMENT REMOVAL) OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION.

GRAPHIC SCALE
60 0 30 60 120
HORIZONTAL: 1"= 60'

## SOILS REPORT

BY NOVA
PROJECT NO. G-20-059
DATED 10/07/2020
SUBSEQUENT UPDATE LETTER
DATED 06/16/2022
EARTHWORK QUANTITIES (RAW):
CUT= 2,700 CU YDS
FILL= 7,300 CU YDS

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH, AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

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(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
1215,859E,503

Call before you Dig AVOID CUTTING, DISTURBING OR UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

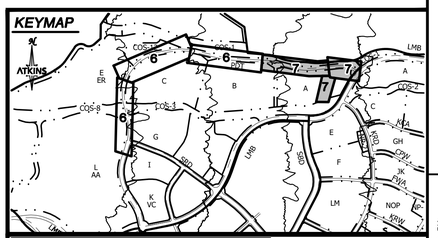
## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW _____ GPM AT 20 PSI RESIDUAL

KEYMAP



UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE. ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-SITE/CIVIL — ANTHONY J. ORTIZ — EXP. 6-30-23 — No. 18849 — 5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

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2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

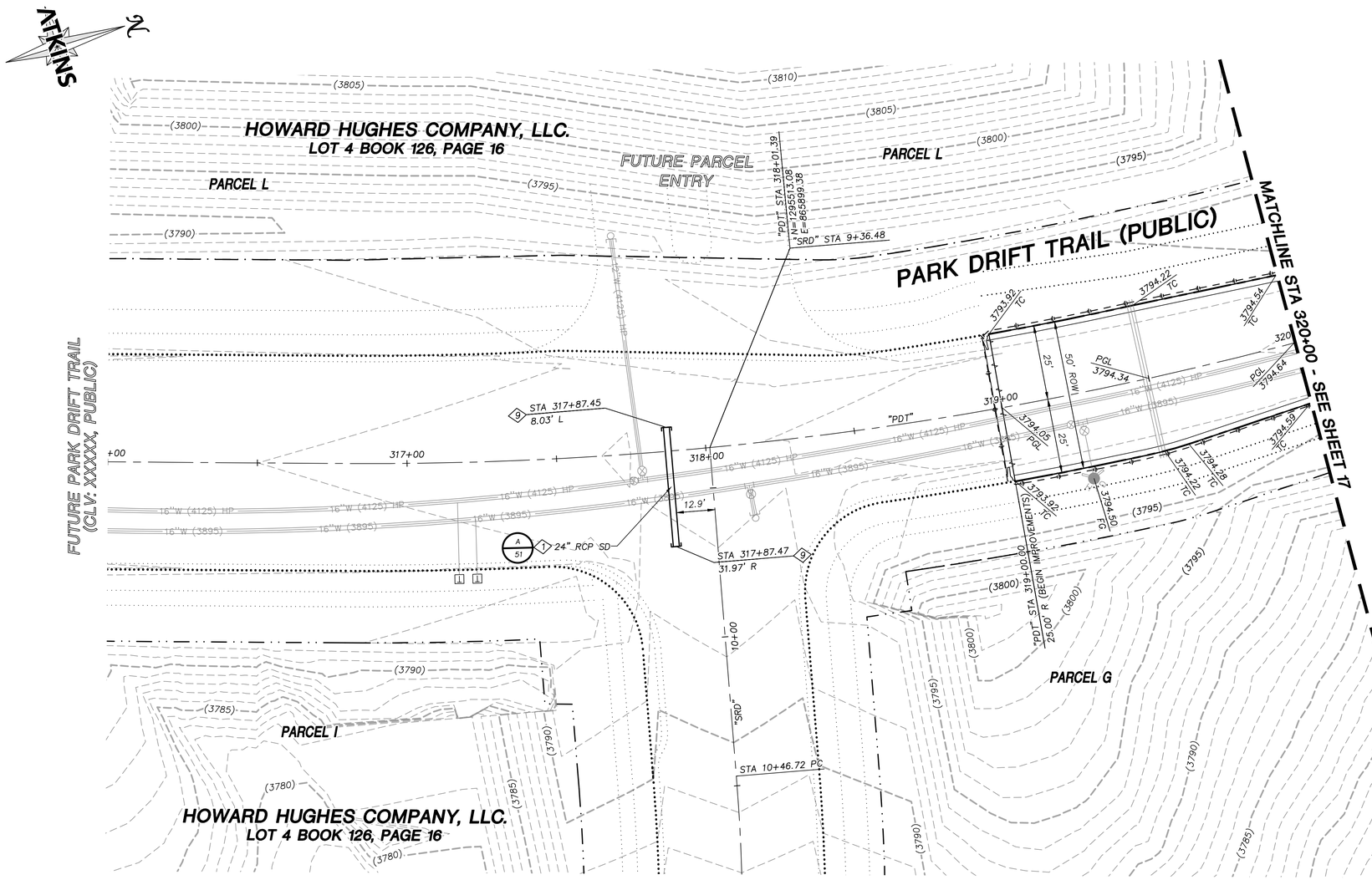
SUMMERLIN WEST VILLAGE 27
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

MASTER DRAINAGE PLAN
STA 358+00 TO END

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=60' |
| VERT.: | NONE |
| DATE: | May 2023 |
| DRAWING NO. | 7 /97 |
| JOB NO. | 100069316 |

107V9664
L22-01955

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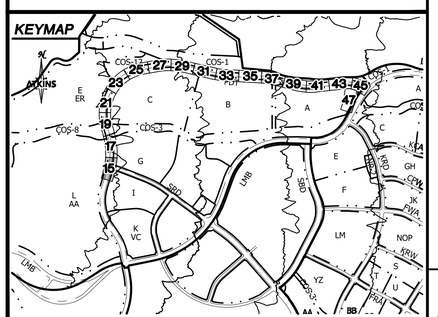



## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

KEYMAP



## WATERTIGHT STRUCTURE NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND STRUCTURE SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB WALLS, BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS. CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID BURIED UTILITIES BY CONTACTING UTILITY LINES 72 HRS. (NOT INCL. WEEKENDS)
Call 811 OR 1-800-642-2444

AVOID WITHIN OVERHEAD POWER LINES 10 FEET.
CALL BEFORE YOU DIG OVERHEAD
1-702-227-2929

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PROFESSIONAL ENGINEER, STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 12-31-23
CIVIL
No. 18849
5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

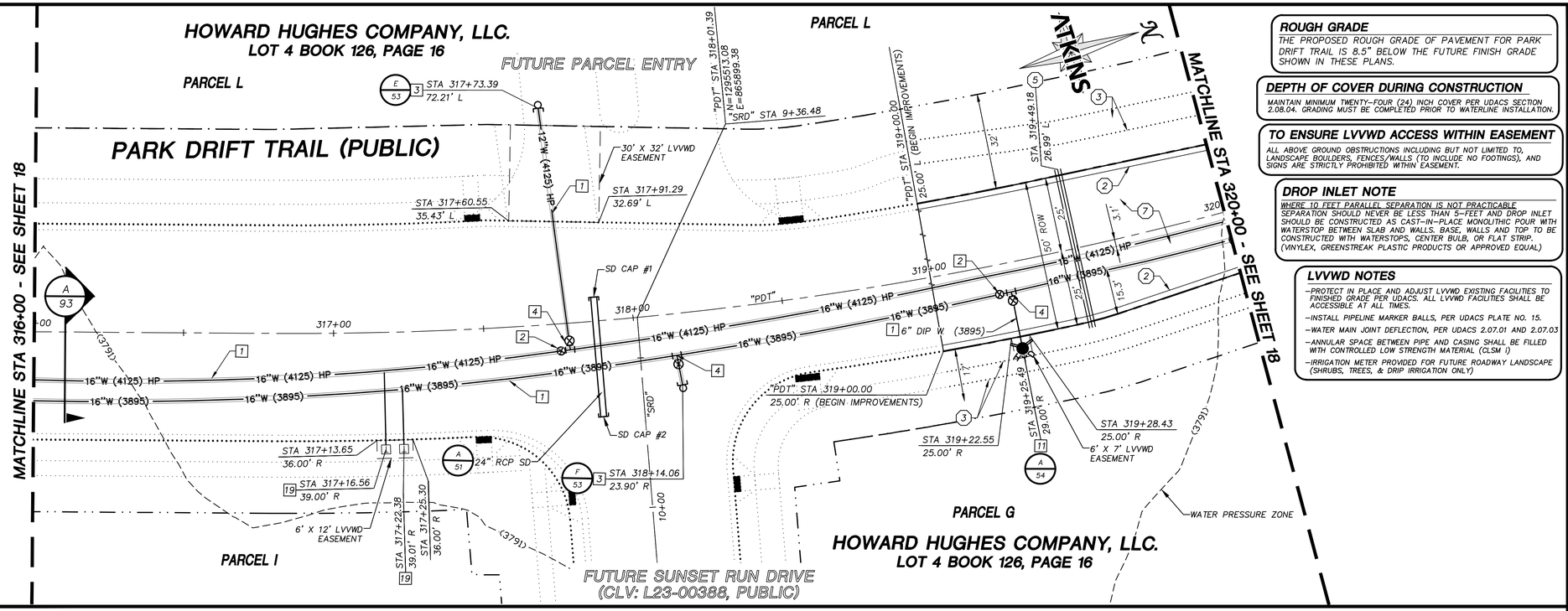
SUMMERLIN

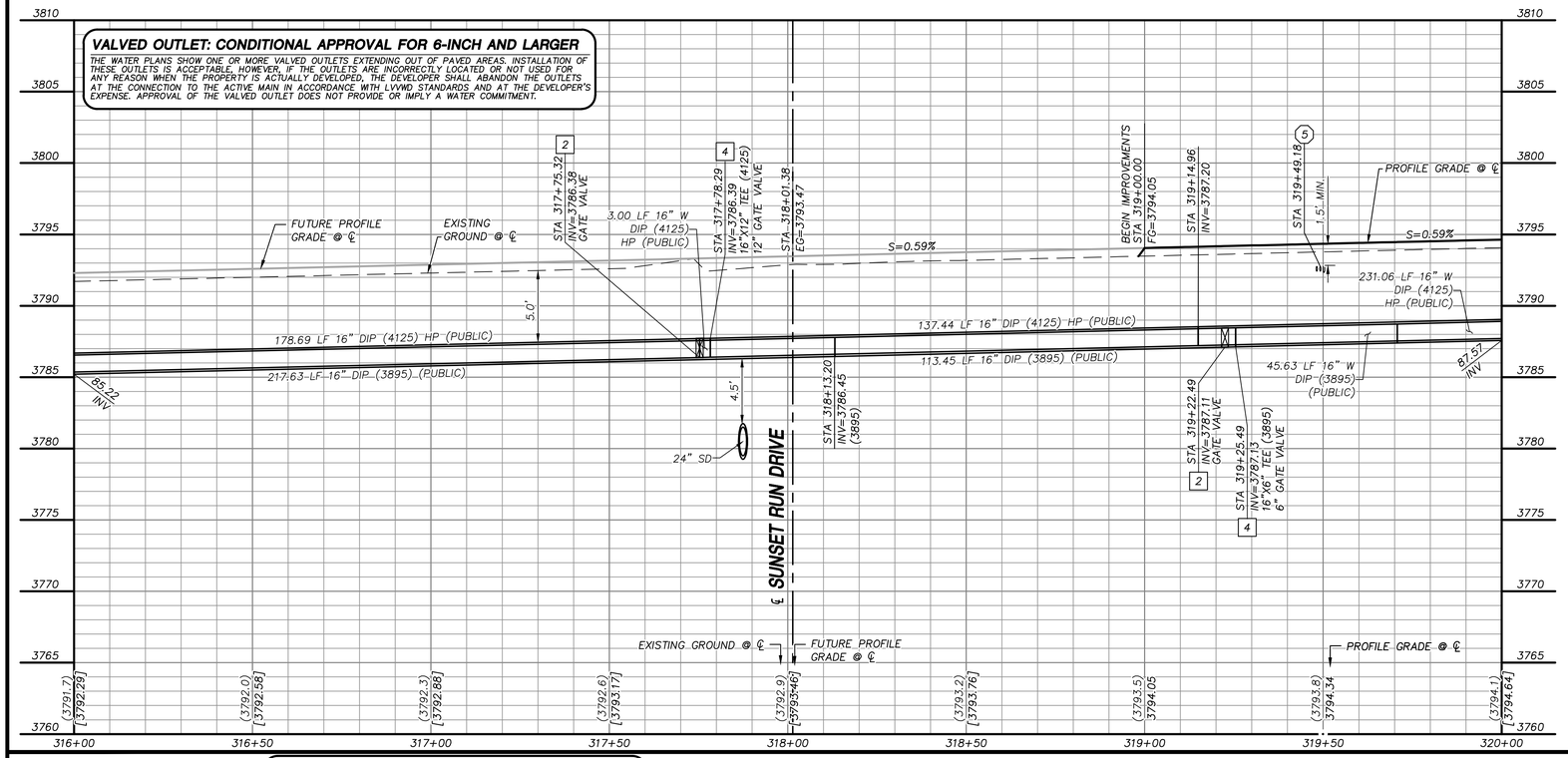
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**BEGIN TO STA 320+00**

| | |
|---|---|
| DESIGNED BY: | B. MOHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 15/97 |
| JOB NO. | 100069316 |

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GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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T21S,R59E,S03

Call before you Dig
NOTE CUTTING OR BOORING OF UTILITY LINES, VTN CONTR.
Call 811
1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, VTN CONTR.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

**ROUGH GRADE**
THE PROPOSED ROUGH GRADE OF PAVEMENT FOR PARK DRIFT TRAIL IS 8.5" BELOW THE FUTURE FINISH GRADE SHOWN IN THESE PLANS.

**DEPTH OF COVER DURING CONSTRUCTION**
MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

**TO ENSURE LVVWD ACCESS WITHIN EASEMENT**
ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

**DROP INLET NOTE**
WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND DROP INLET SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP. (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

**LVVWD NOTES**
- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM )
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)

**NOTE**
LVVWD CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED.
THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE REMAINING WATER. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.
CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.

**NOTE**
THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE), PRESSURE-REDUCING VALVES (PRV) BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY, AND WILL NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF LVVWD FACILITIES.

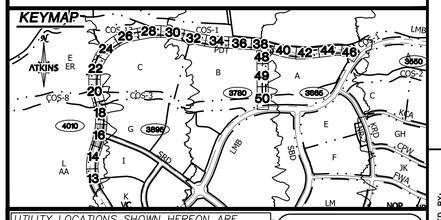
## STORM DRAIN CONSTRUCTION NOTES
1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
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6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
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8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## SEWER CONSTRUCTION NOTES
1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

## WATERLINE CONSTRUCTION NOTES
1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLT. #39, #40, AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES
1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY ORTIZ
EXP. 6-30-25
CIVIL
No. 18649
5/17/2023

| REVISIONS | | | |
|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

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Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

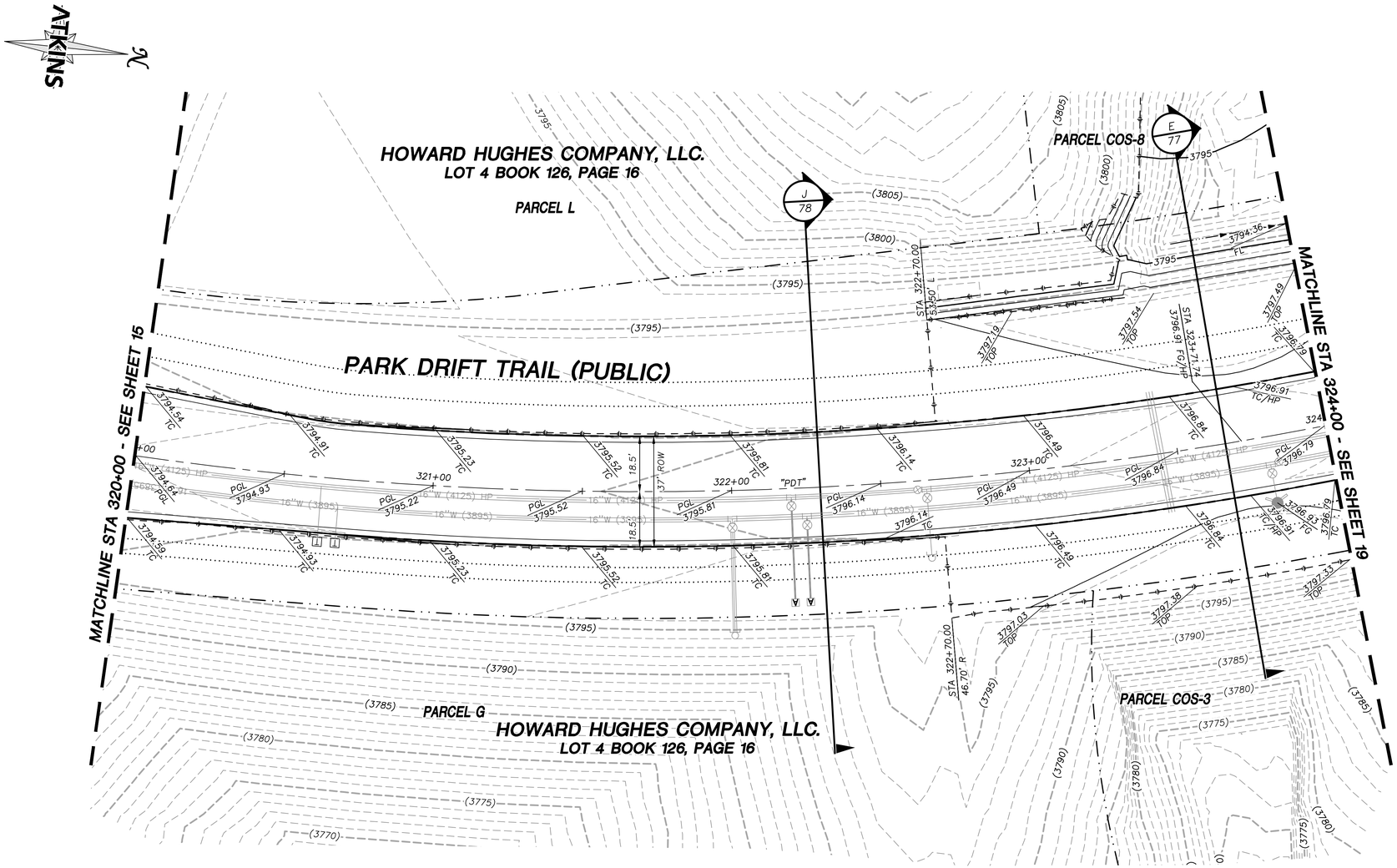
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 316+00 TO STA 320+00**

DESIGNED BY: B. MOCHITAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=4'

107/9664
L22-01955
DATE: May 2023
DRAWING NO. 16/97
JOB NO. 100069316

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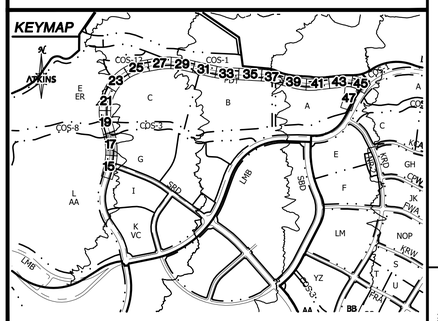



## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
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6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

| REVISIONS | | | |
|---|---|---|---|
| REV. | DESCRIPTION | DATE | APPROVAL |

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING OR DAMAGING UTILITY LINES. IT'S COSTLY.
Call 811
1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
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1-702-227-2929

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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
Exp. 6-30-25
CIVIL
No. 18849
5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

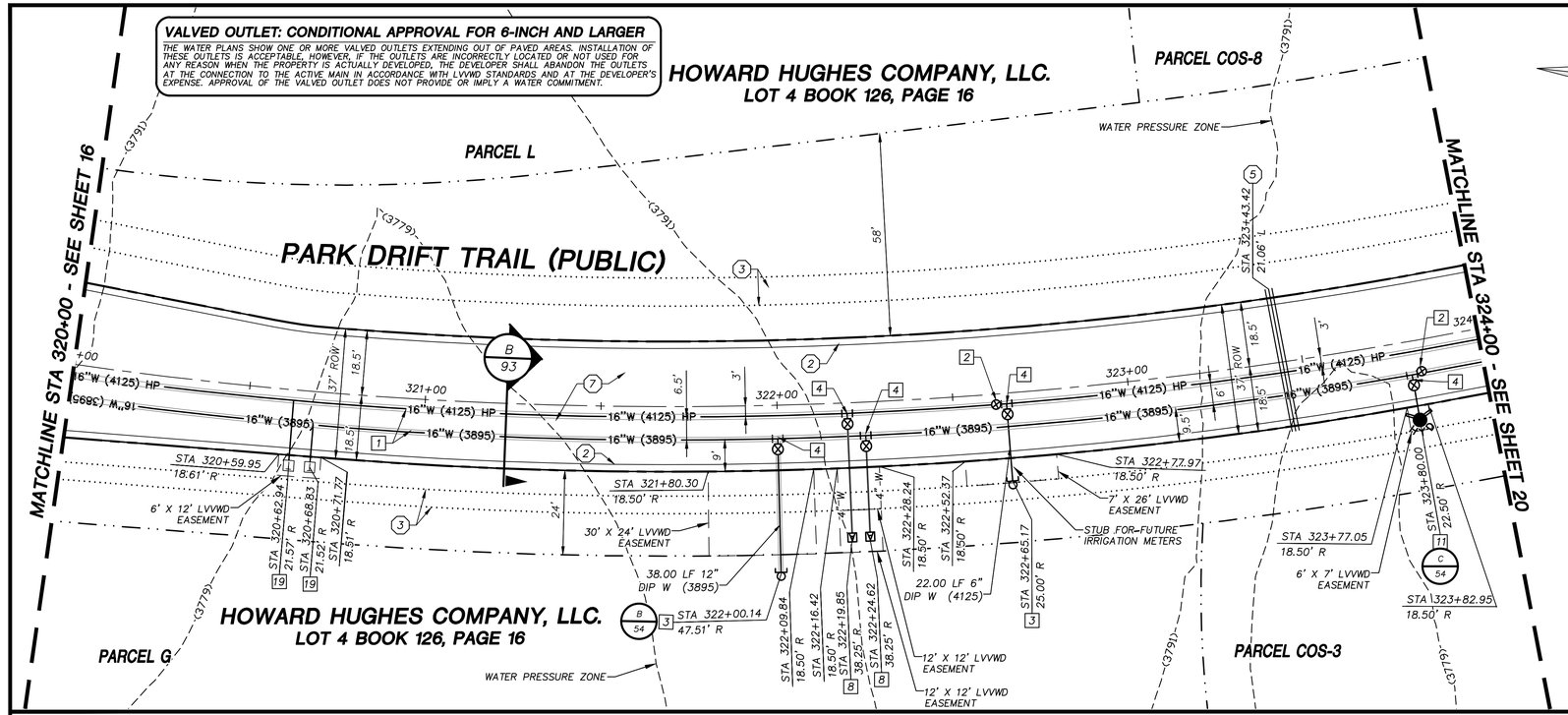
**ROADWAY GRADING PLAN**
**STA 320+00 TO STA 324+00**

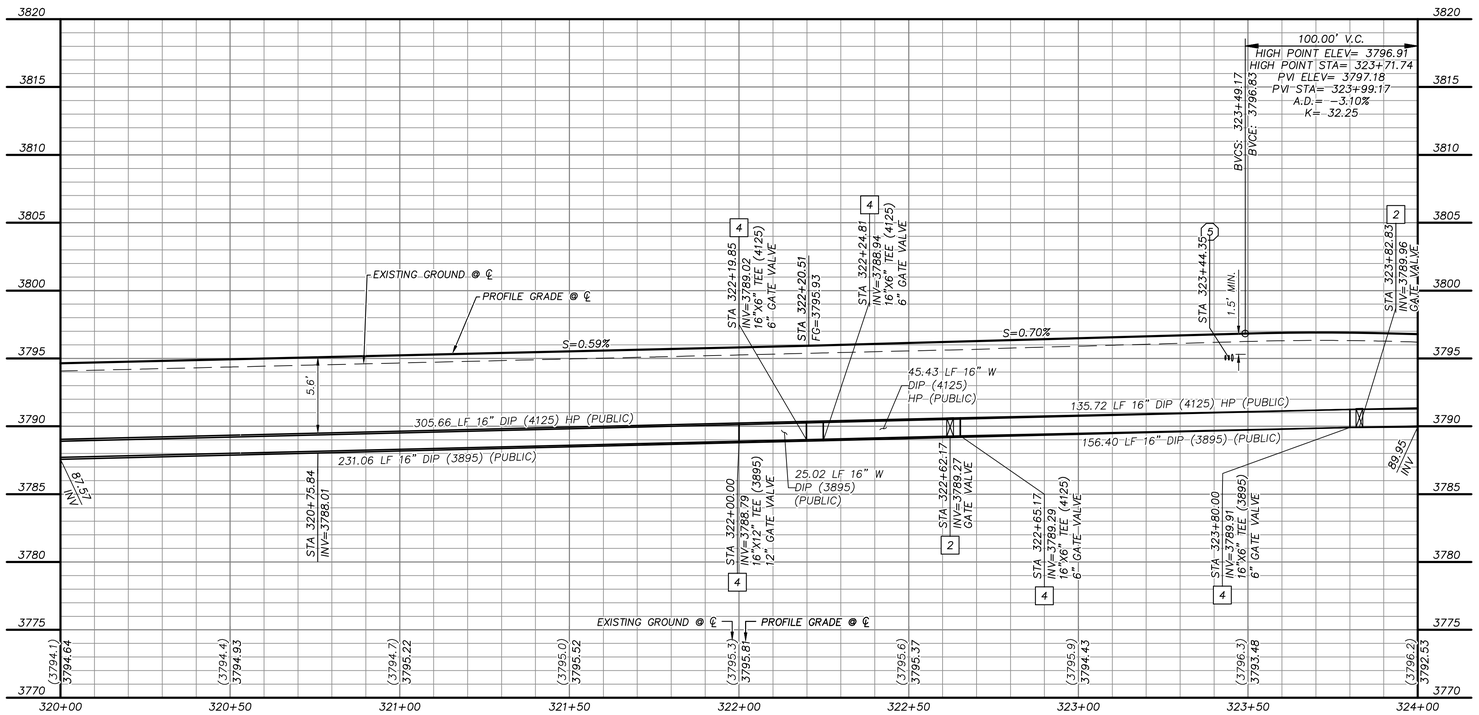
| | |
|---|---|
| DESIGNED BY: | B. MOCHITJAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| 107/9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 17/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkrnam01\dms548621\69316-32-GRAD-G1.dwg LAYOUT: 14 ROADWAY GRADING PLAN May 17, 2023 - 3:13PM

**VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER**

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.




GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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**DROP INLET NOTE**

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**LVVWD NOTES**

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM I)
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**DEPTH OF COVER DURING CONSTRUCTION**

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

**TO ENSURE LVVWD ACCESS WITHIN EASEMENT**

ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

**NOTE**

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE), PRESSURE-REDUCING VALVES (PRV) BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY, AND WILL NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF LVVWD FACILITIES.

**NOTE**

LVVWD CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED.

THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE REMAINING WATER. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.

CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.

## STORM DRAIN CONSTRUCTION NOTES

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## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

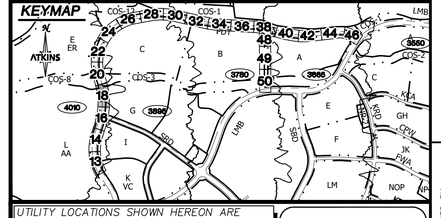
## WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL,VALVE,AND TEE) PER UDACS PLT. #39,#40,AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5" BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY A. ORTIZ
CIVIL
EXP. 6-30-25
No. 18949
5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |


ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

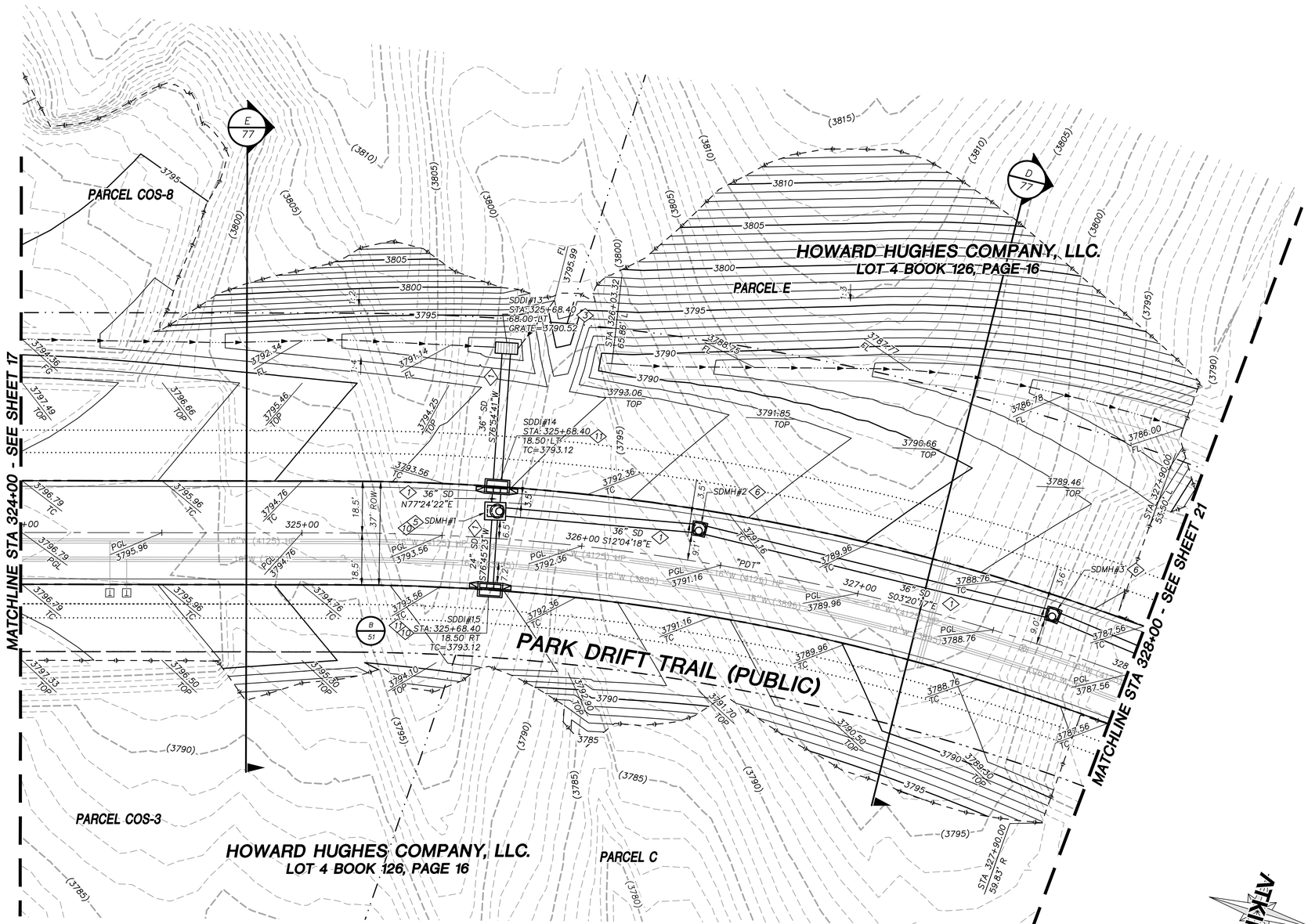

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 320+00 TO STA 324+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 18/97 |
| JOB NO. | 100069316 |

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## STORM DRAIN CONSTRUCTION NOTES

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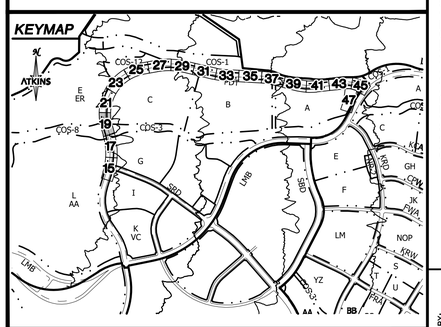
ATKINS
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Telephone: +1.702.263.7275
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SUMMERLIN

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PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA 324+00 TO STA 328+00**

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

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DS#5563

**BASIS OF BEARING**

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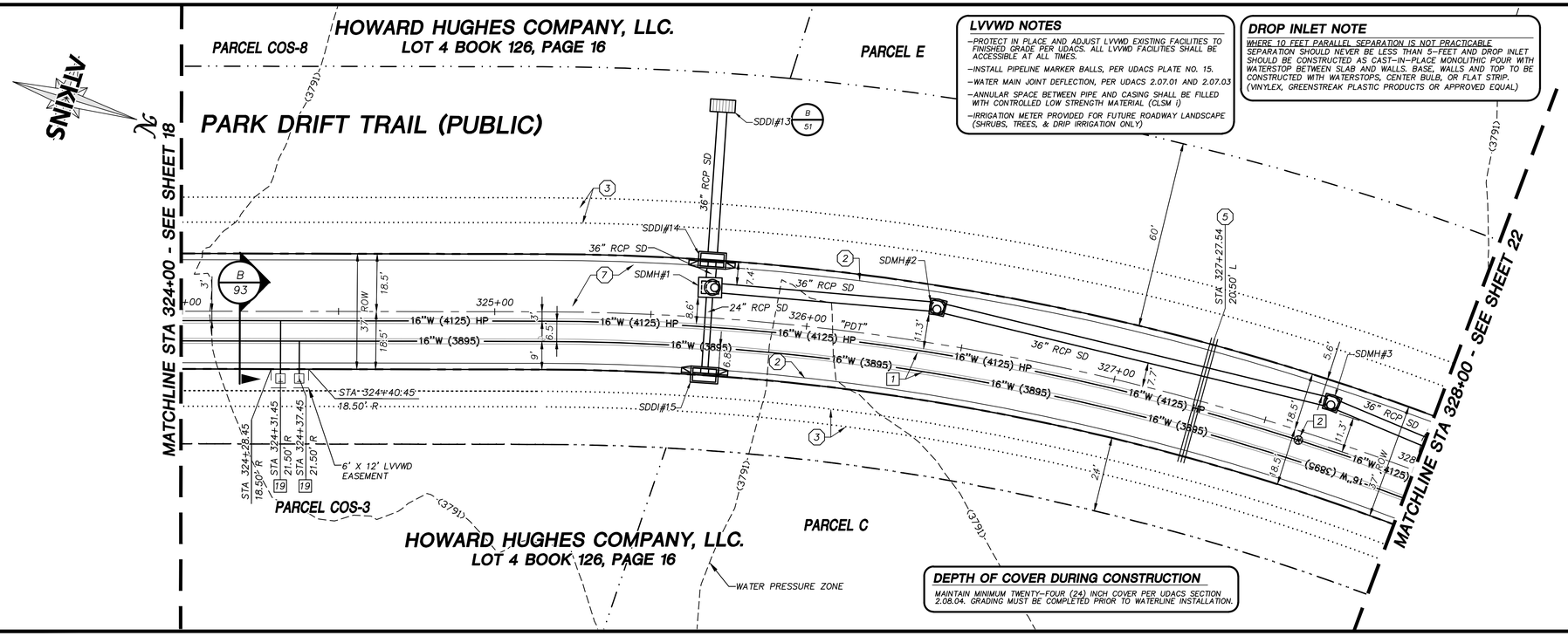
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PROFESSIONAL ENGINEER-SITE/CIVIL — ANTHONY J. ORTIZ — EXP. 12-31-23 — No. 18849 — 5/17/2023

| | |
|---|---|
| 107V9664 L22-01955 | DESIGNED BY: B. MOCHTYAK |
| DATE: May 2023 | DRAWN BY: K. HENDRY |
| DRAWING NO. 19/97 | CHECKED BY: N. BARCOS |
| | HORIZ.: 1"=20' |
| | VERT.: NONE |
| JOB NO. 100069316 | |

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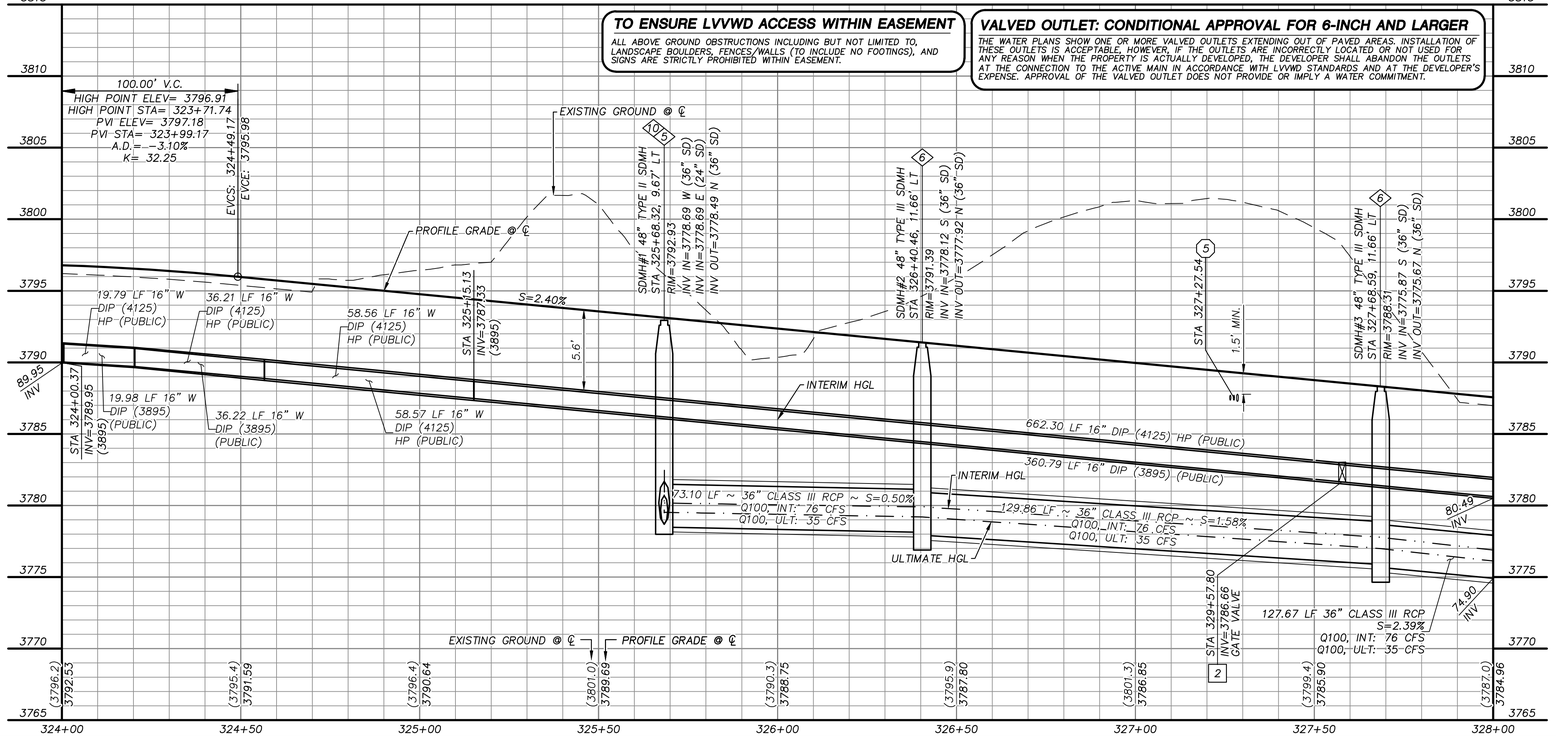
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### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### BASIS OF BEARING

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(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UTILITY CONDUCTORS
UTILITY NOTIFICATION CENTER, INC. OF NEVADA
Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

### STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

### SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
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9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

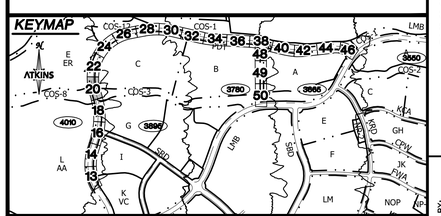
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2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
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18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
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### ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
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7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




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PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY A. ORTIZ
EXP. 6-30-25
CIVIL
No. 18649
5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

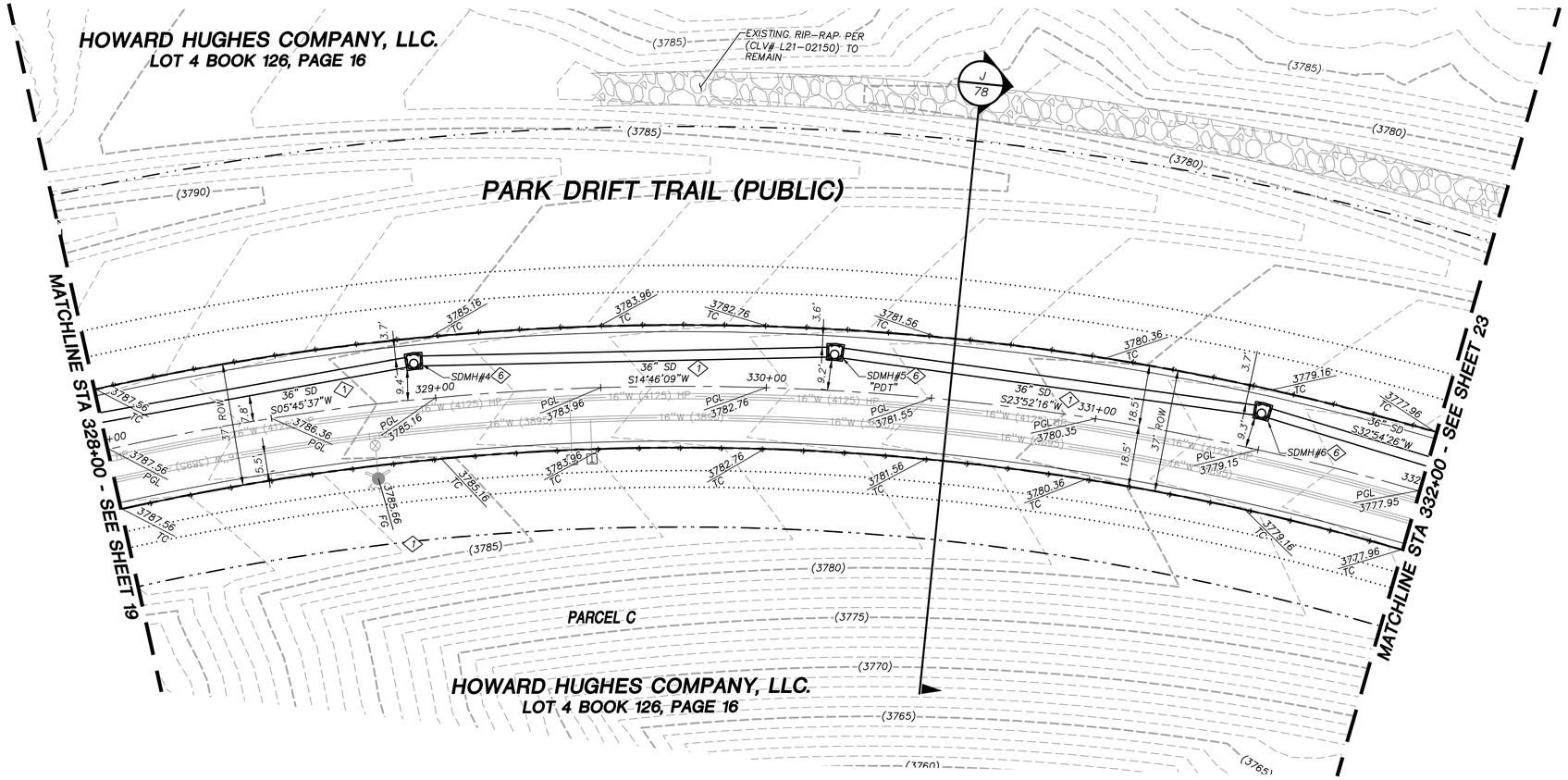
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 324+00 TO STA 328+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 20/97 |
| JOB NO. | 100069316 |

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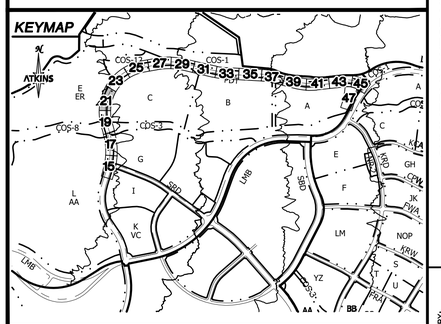

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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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(REVISED 2008)
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T21S,R59E,S03

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18849
5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

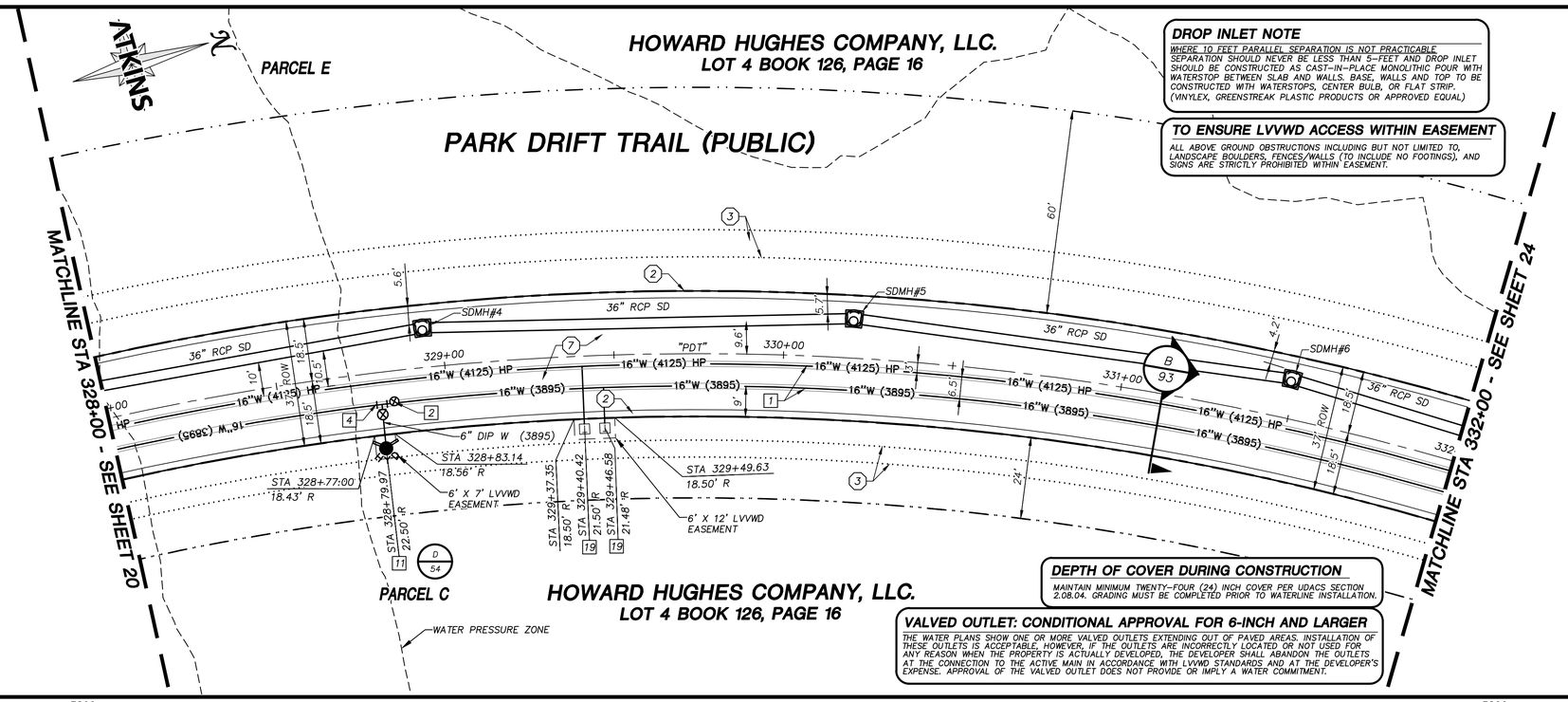
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

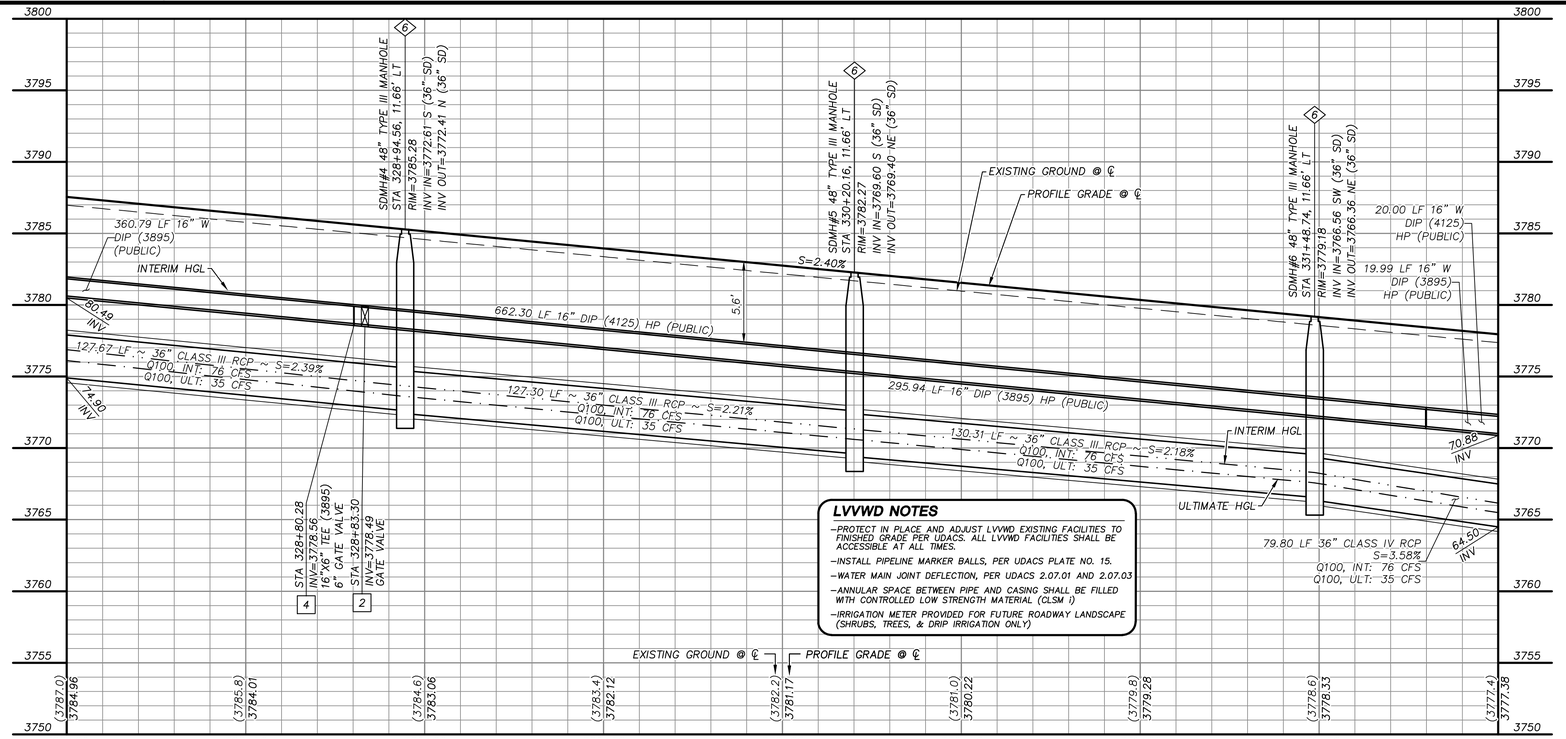
**ROADWAY GRADING PLAN**
**STA 328+00 TO STA 332+00**

DESIGNED BY: B. MOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 21/97
JOB NO. 100069316

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**LVVWD NOTES**

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM.)
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)

GRAPHIC SCALE

HORIZONTAL: 1"=20' (20 0 10 20 40)

VERTICAL: 1"=5' (5 0 2.5 5 10)

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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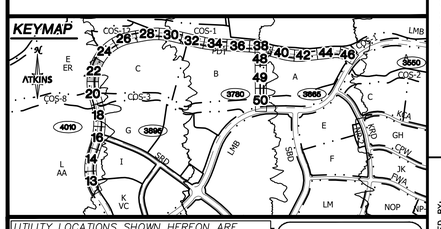
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KEYMAP




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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18649

5/18/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

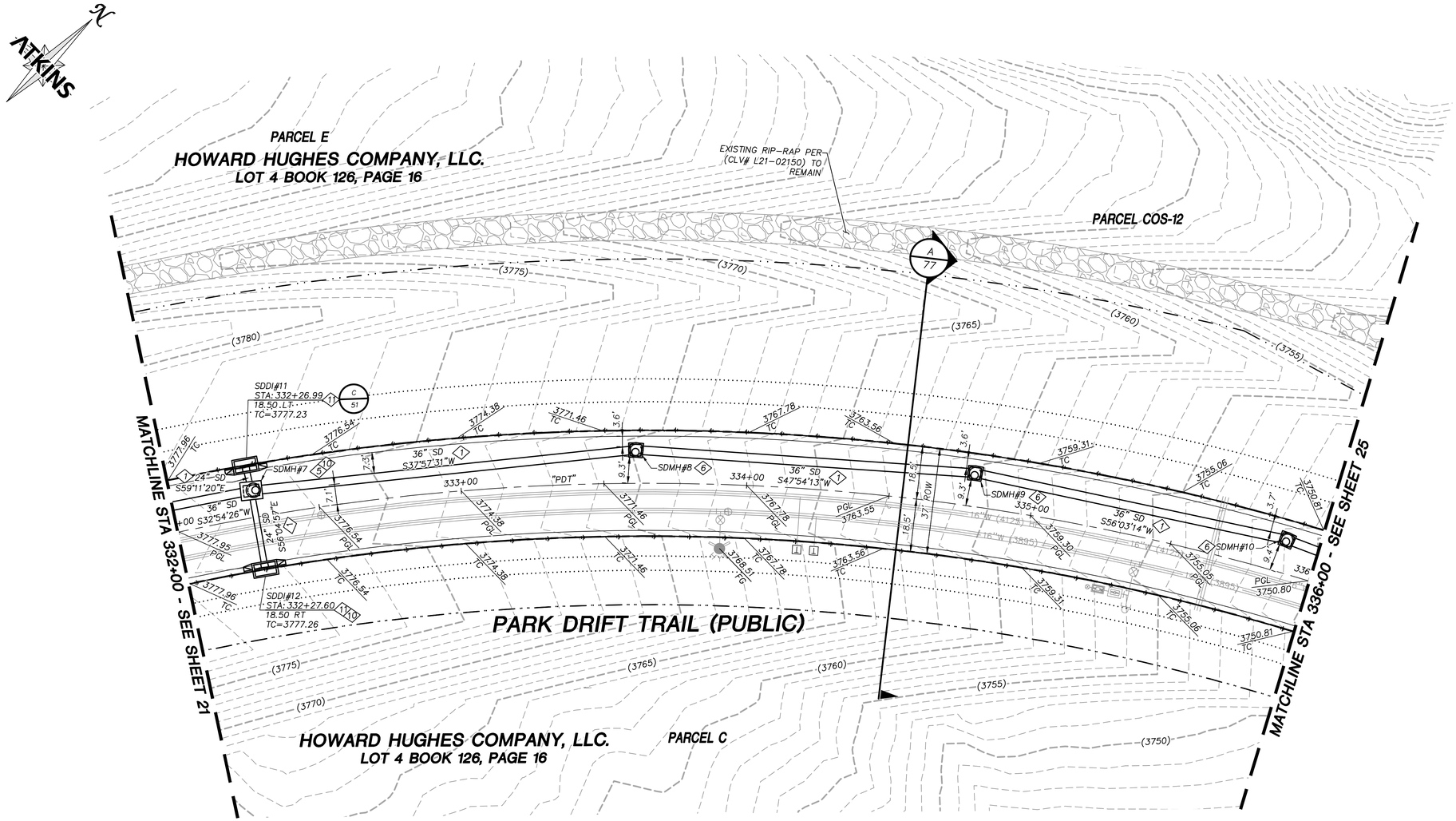
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 328+00 TO STA 332+00**

| | |
|---|---|
| DESIGNED BY: | B. WICHTHAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 22/97 |
| JOB NO. | 100069316 |

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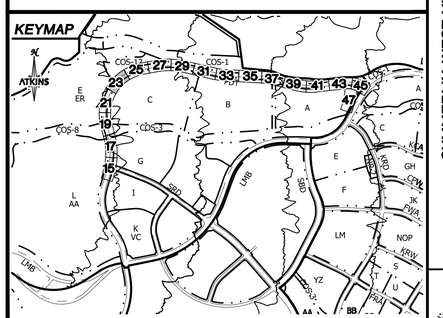
REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
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ATKINS
2270 Corporate Circle Suite 200
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Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

KEYMAP




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

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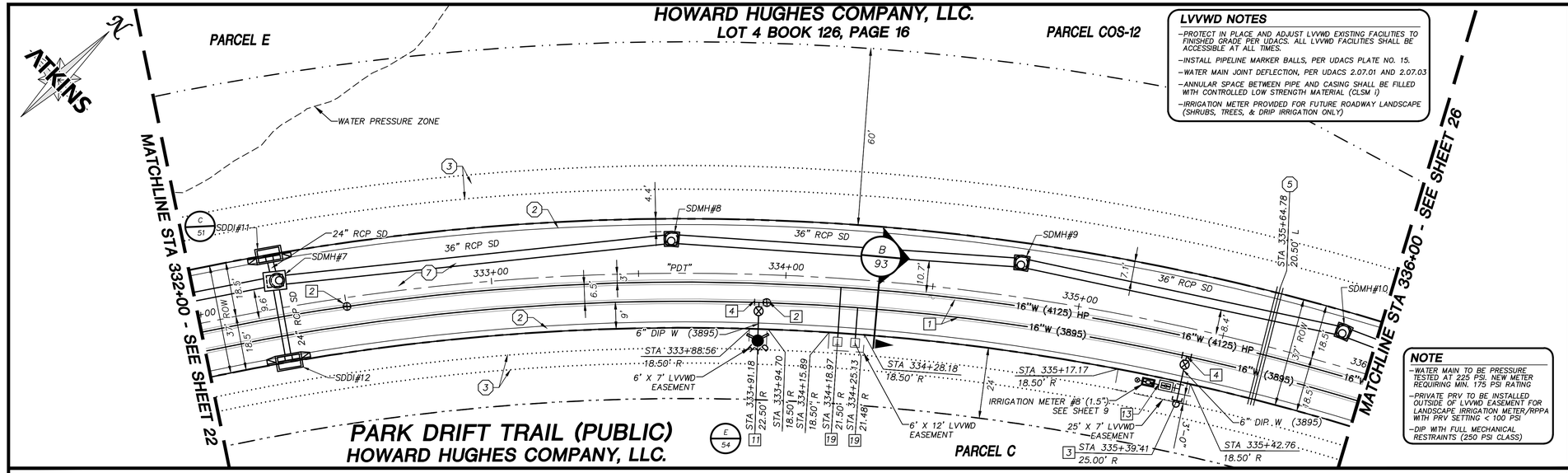
PROFESSIONAL ENGINEER, STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-25
CIVIL
No. 18849
5/17/2023

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA 332+00 TO STA 336+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| 107V9664 | |
| L22-01955 | |
| DATE: | May. 2023 |
| DRAWING NO. | 23/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkinsv01\dms54862\69316-32-GRAD-01.dwg LAYOUT: 20 ROADWAY GRADING PLAN May 17, 2023 - 3:13PM

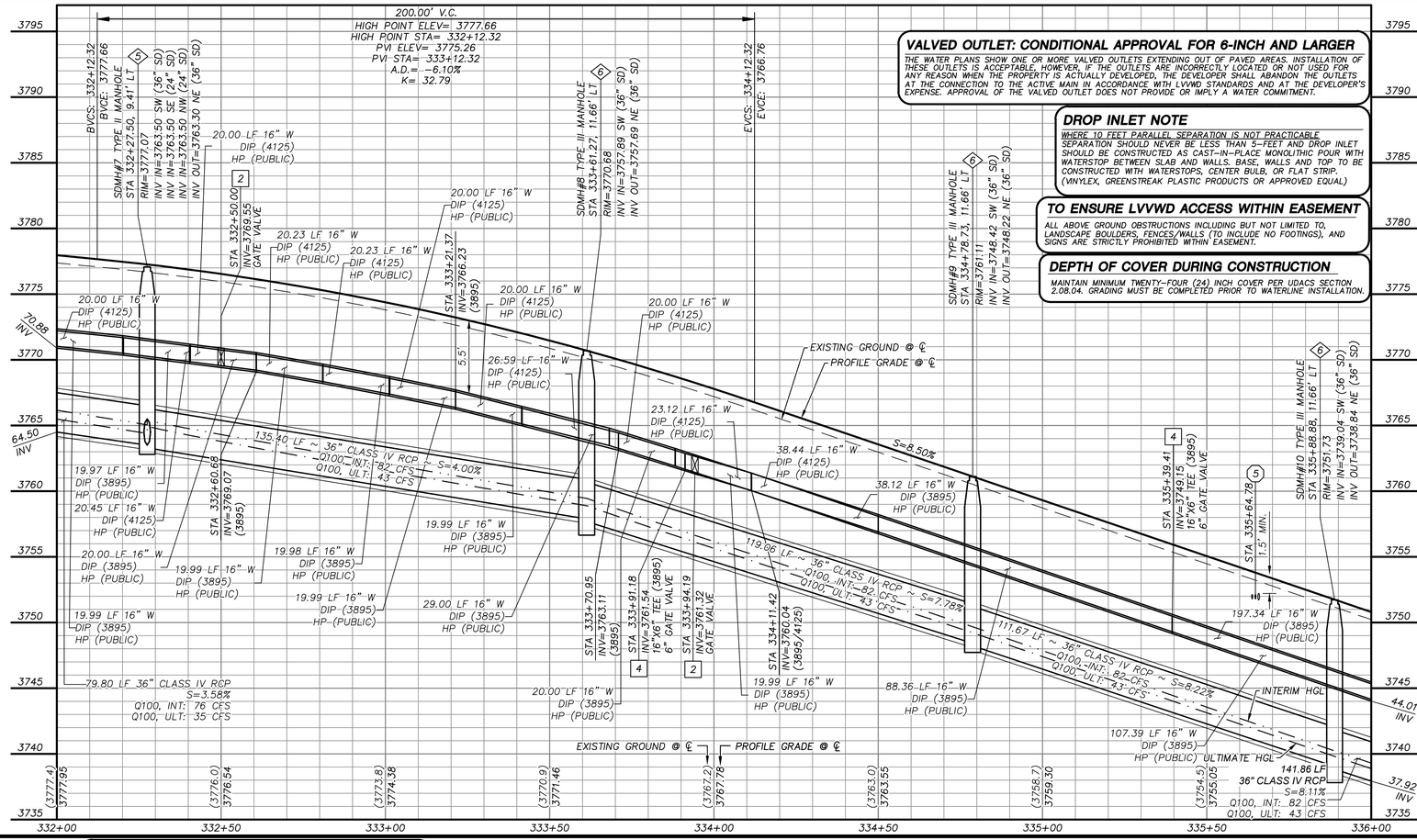



## LVVWD NOTES

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM 1)
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)

## NOTE

- WATER MAIN TO BE PRESSURE TESTED AT 225 PSI, NEW METER REQUIRING MIN. 175 PSI RATING
- PRIVATE PRV TO BE INSTALLED OUTSIDE OF LVVWD EASEMENT FOR LANDSCAPE IRRIGATION METER/RPPA WITH PRV SETTING < 100 PSI
- DIP WITH FULL MECHANICAL RESTRAINTS (250 PSI CLASS)




## VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.

## DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE
SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND DROP INLET SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP. (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

## TO ENSURE LVVWD ACCESS WITHIN EASEMENT

ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

## DEPTH OF COVER DURING CONSTRUCTION

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

## WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL, VALVE, AND TEE) PER UDACS PLT. #39, #40, AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig AVOID CUTTING, ENDANGERING UTILITY LINES, IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY. CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18948 - 5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

SUMMERLIN WEST VILLAGE 27
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

ROADWAY PLAN AND PROFILE
STA 332+00 TO STA 336+00

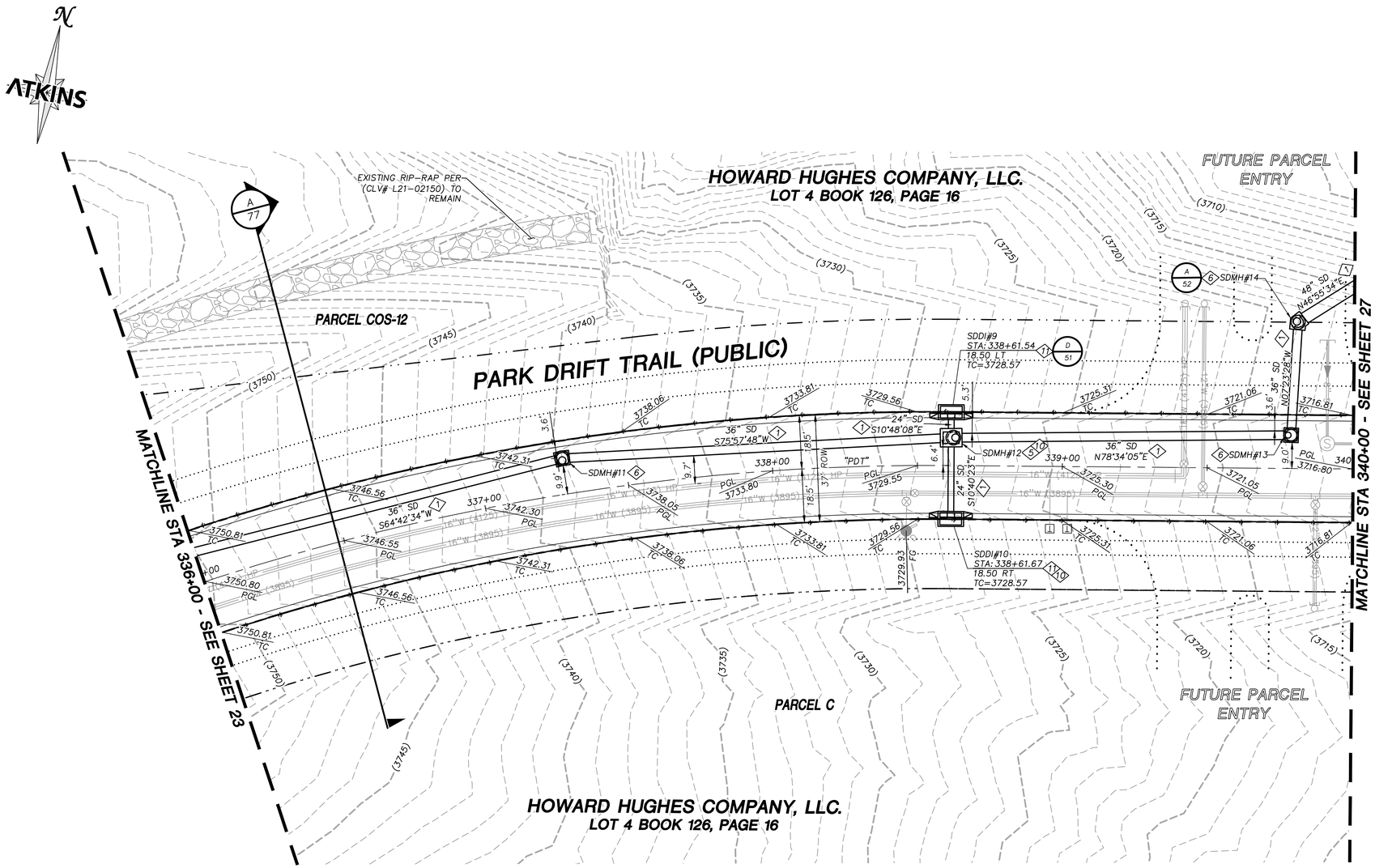
DESIGNED BY: B. MOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=4'

107V9664
L22-01955

DATE: May 2023
DRAWING NO. 24/97

JOB NO. 100069316

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GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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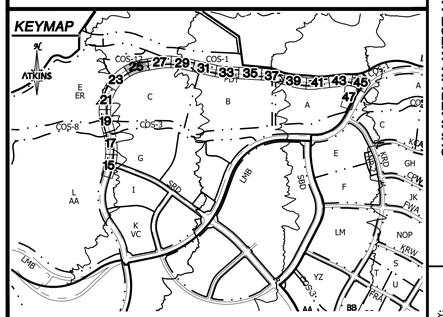
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2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

KEYMAP



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PROFESSIONAL ENGINEER, STATE OF NEVADA — ANTHONY ORTIZ — Exp. 6-30-25 — CIVIL — No. 18949 — 5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

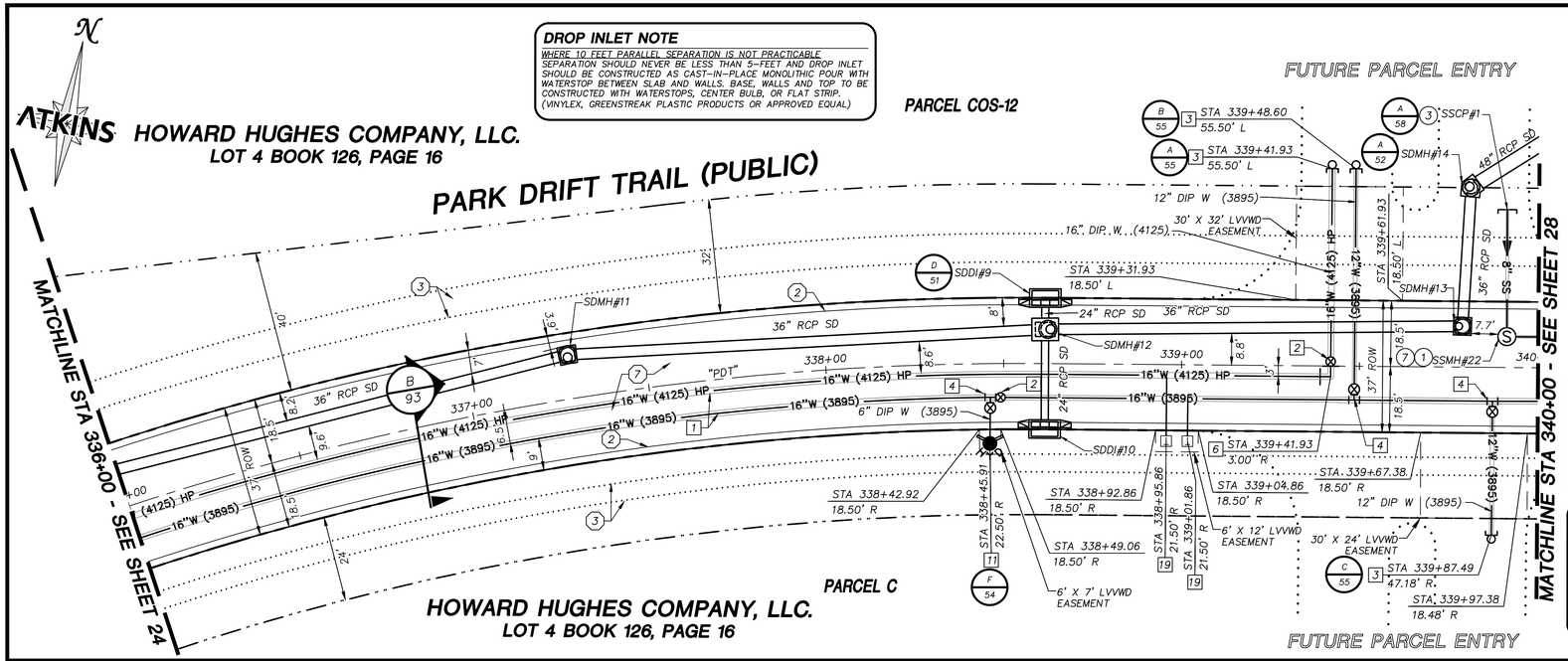
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA 336+00 TO STA 340+00**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 25/97
JOB NO. 100069316

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### DROP INLET NOTE

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### NOTE

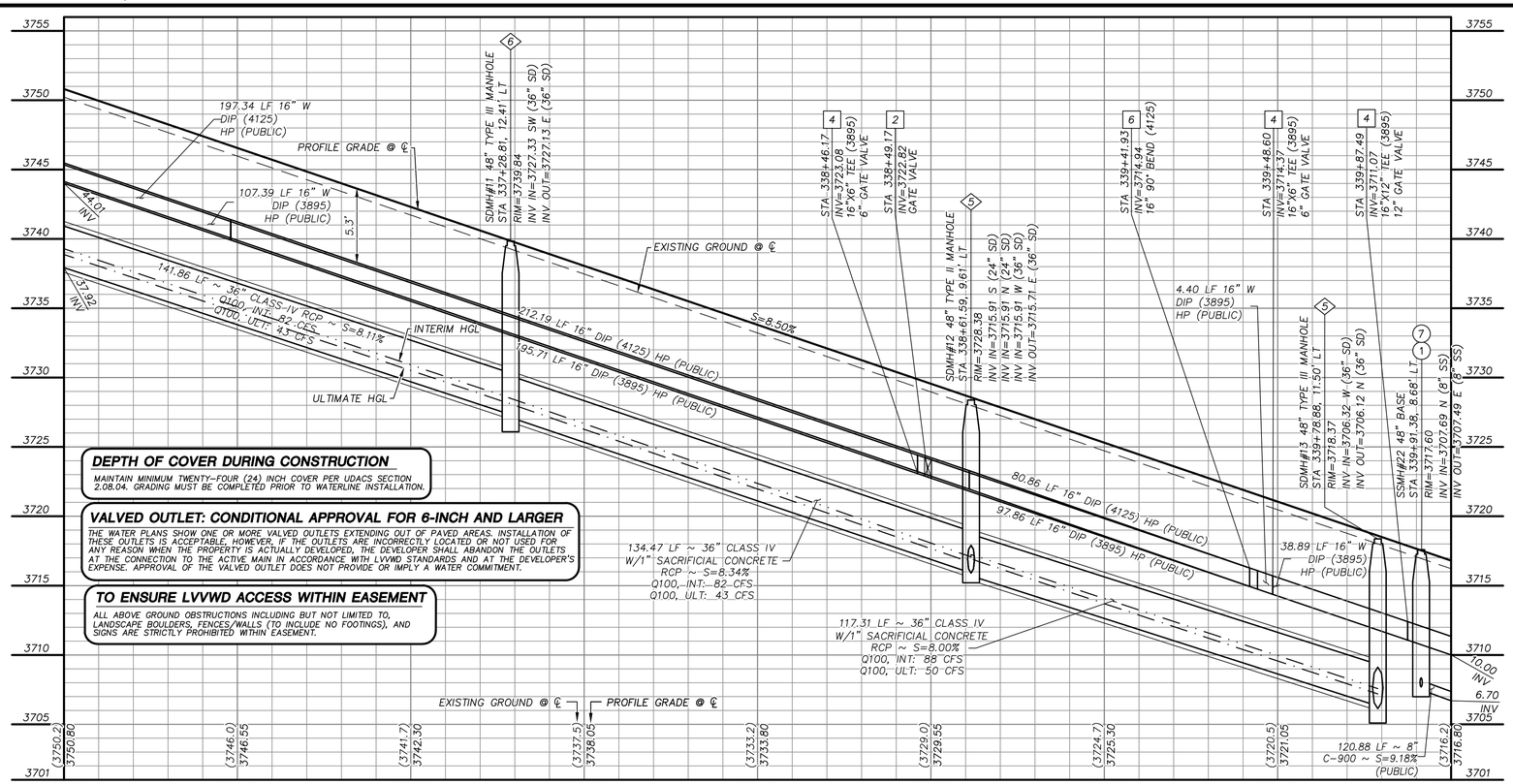
LVVWD CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED.

THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE REMAINING WATER. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.

CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.

### LVVWD NOTES

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### DEPTH OF COVER DURING CONSTRUCTION

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### NOTE

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL ON-SITE (PRIVATE) PRESSURE-REDUCING VALVES (PRV) BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY, AND WILL NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF LVVWD FACILITIES.

GRAPHIC SCALE

HORIZONTAL: 1"=20' (20 0 10 20 40)

VERTICAL: 1"=5' (5 0 2.5 5 10)

### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### BASIS OF BEARING

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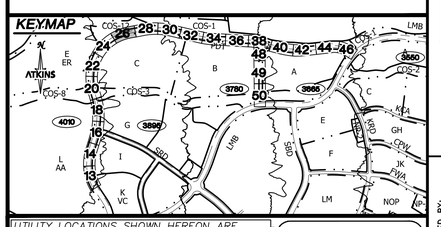
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KEYMAP




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18649 - 5/18/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

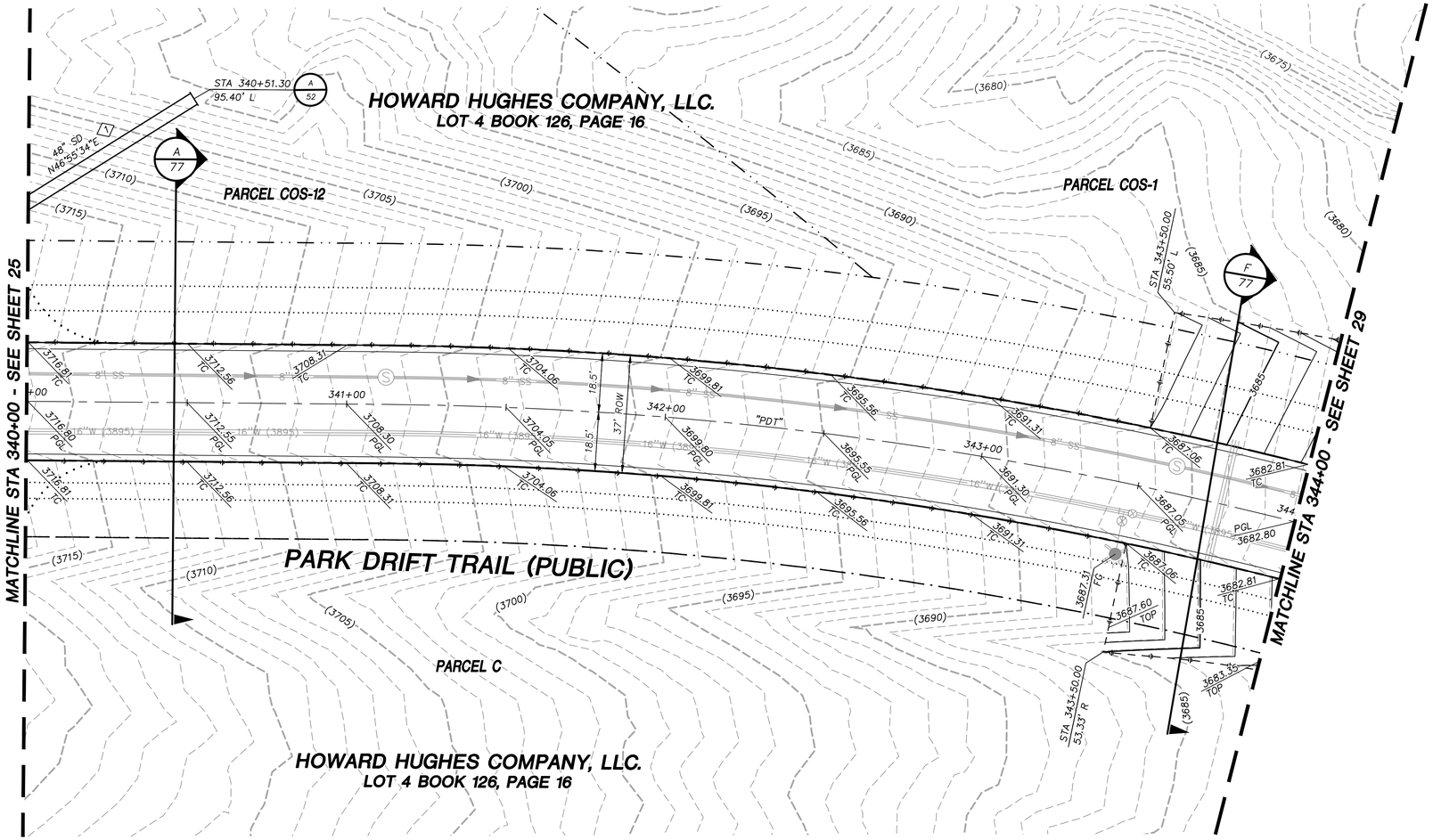
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 336+00 TO STA 340+00**

| | |
|---|---|
| DESIGNED BY: | B. WICHTHAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| DATE: | May 2023 |
| DRAWING NO. | 26/97 |
| JOB NO. | 100069316 |

107V9664
L22-01955

C:\pw_work\atkinsn01\dms54862\69316-33-PLAN-P1.dwg LAYOUT: 25 ROADWAY PLAN AND PROFILE May 18, 2023 - 8:30AM




GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ — PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. DON'T GUESS.
Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS SIMPLE.
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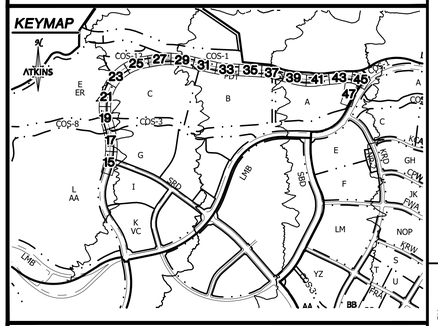
## STORM DRAIN CONSTRUCTION NOTES

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2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
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7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

KEYMAP




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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-25
CIVIL
No. 18849
5/17/2023

ATKINS
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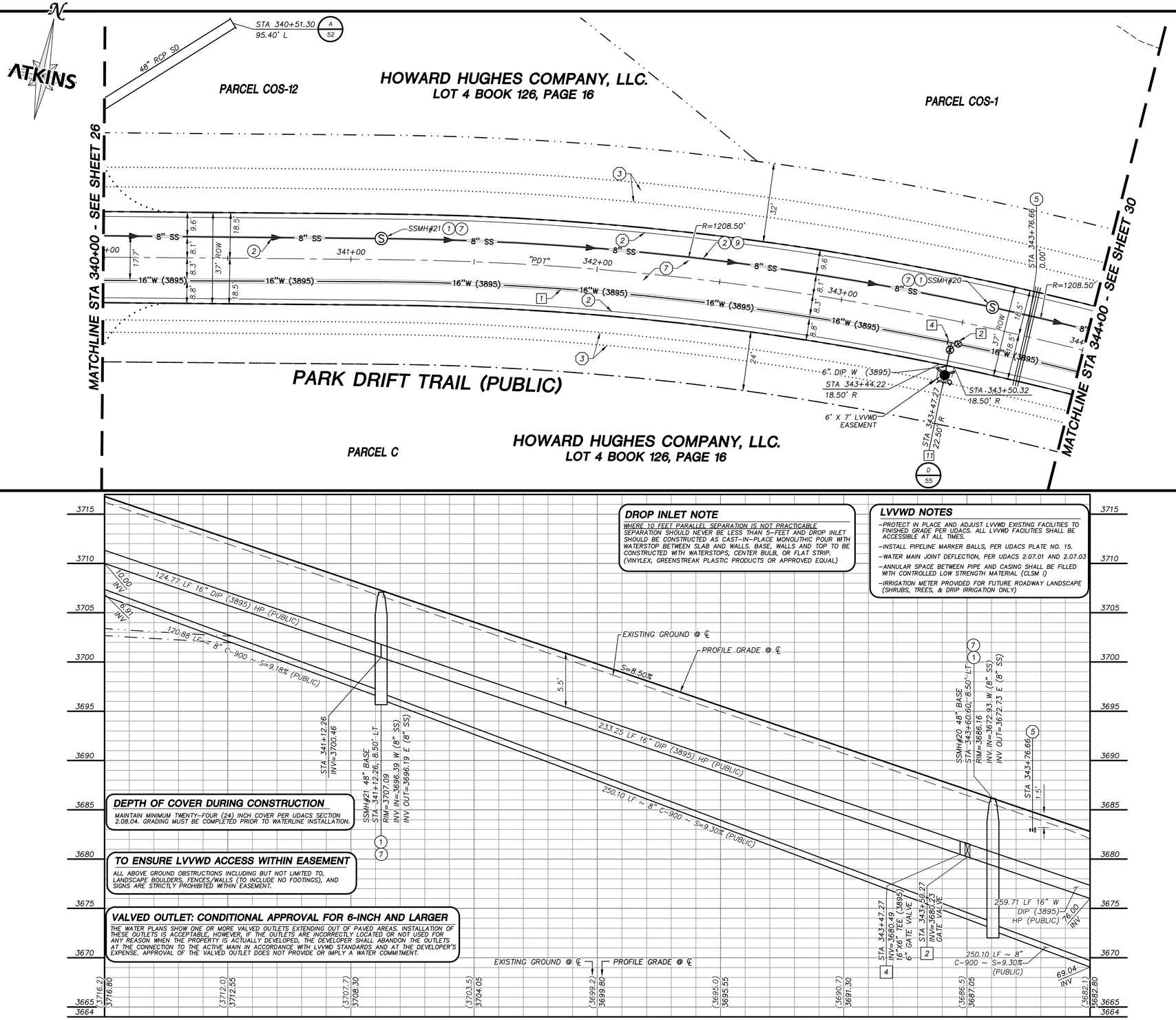
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA 340+00 TO STA 344+00**

| | |
|---|---|
| 107V9664 | DESIGNED BY: B. WOCHYAK |
| L22-01955 | DRAWN BY: K. HENDRY |
| DATE: May 2023 | CHECKED BY: N. BARCOS |
| DRAWING NO. 27/97 | HORIZ.: 1"=20' VERT.: NONE |
| JOB NO. 100069316 | |

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### DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND DROP INLET SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP. (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

### LVVWD NOTES

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM I)
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)

### DEPTH OF COVER DURING CONSTRUCTION

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

### TO ENSURE LVVWD ACCESS WITHIN EASEMENT

ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

### VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.

GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES IN CLARK COUNTY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S SIMPLE. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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### SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

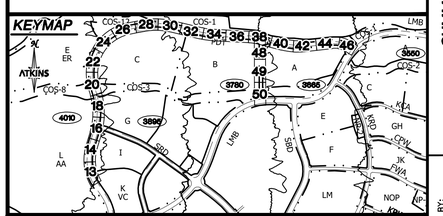
### WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL,VALVE,AND TEE) PER UDACS PLT. #39,#40,AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5" BEND PER UDACS SEC. 2.15

### ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - Exp. 6-30-23 - CIVIL - No. 18649

5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

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2270 Corporate Circle Suite 200
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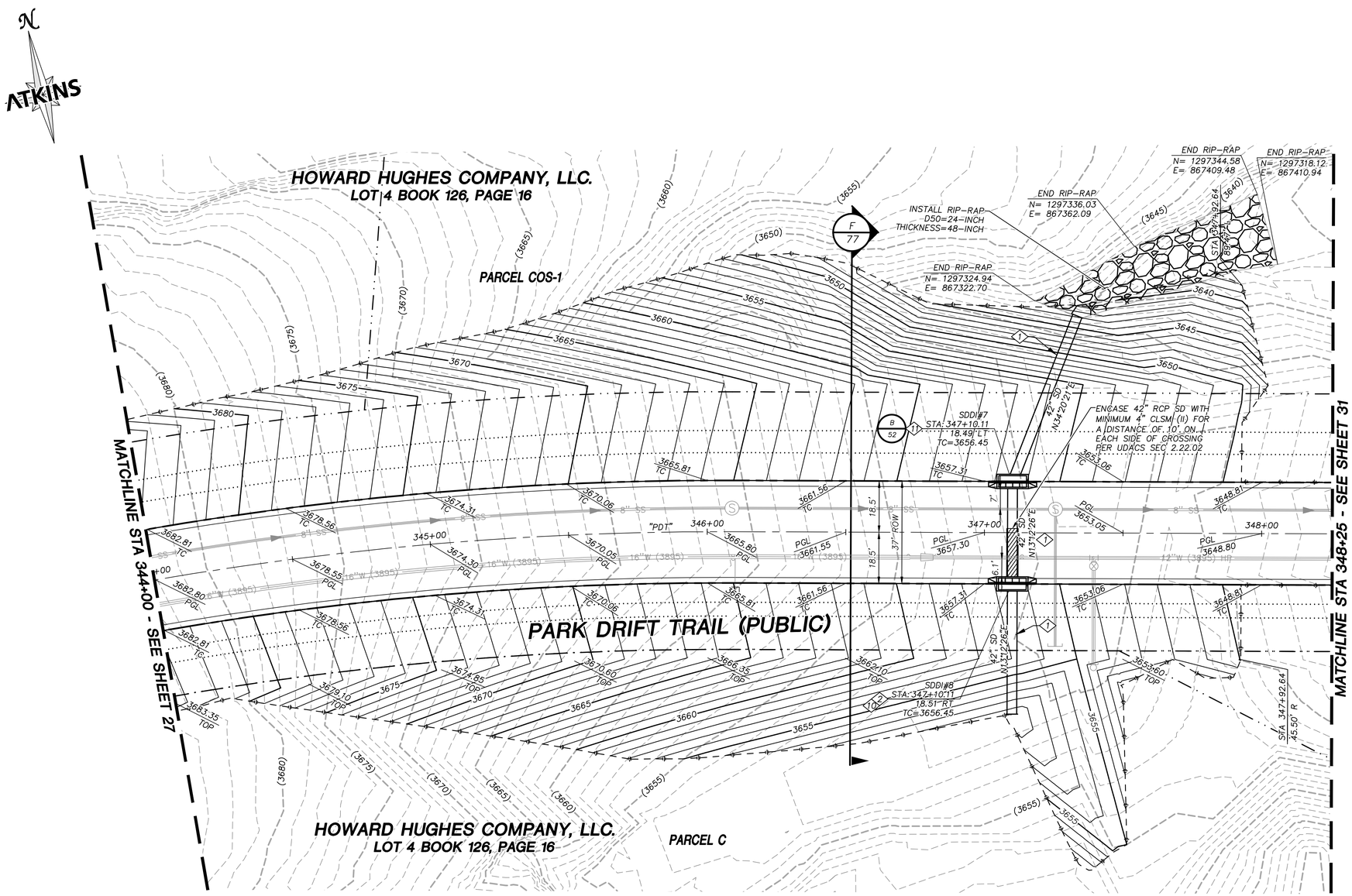
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 340+00 TO STA 344+00**

| | |
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| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
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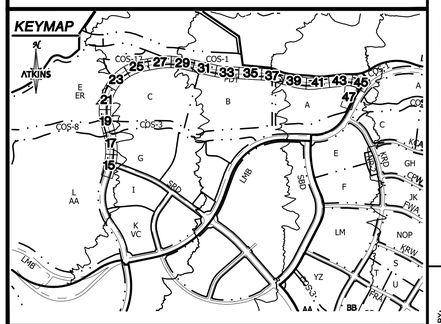

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KEYMAP



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HORIZONTAL: 1"=20'

GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

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PROFESSIONAL ENGINEER-SITE/CIVIL — ANTHONY J. ORTIZ — EXP. 6-30-25 — CIVIL — No. 18849 — 5/17/2023

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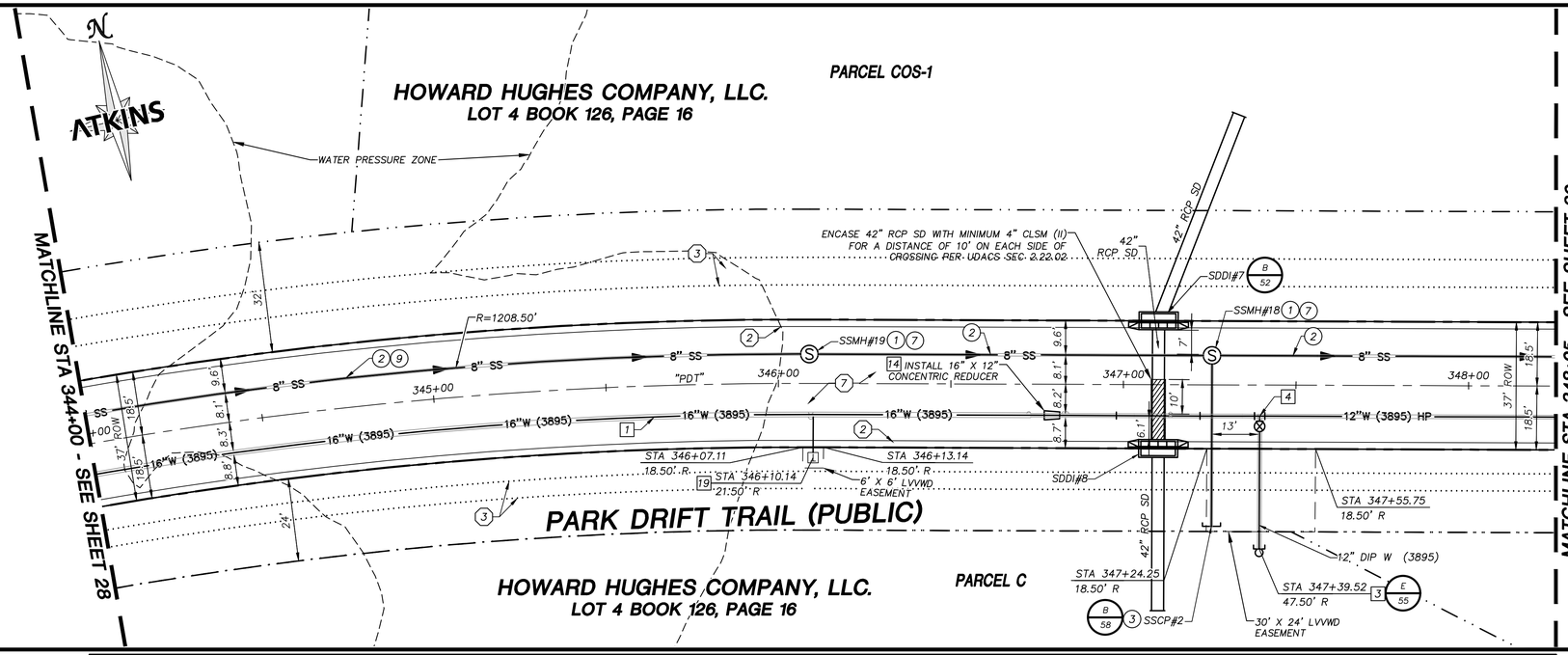
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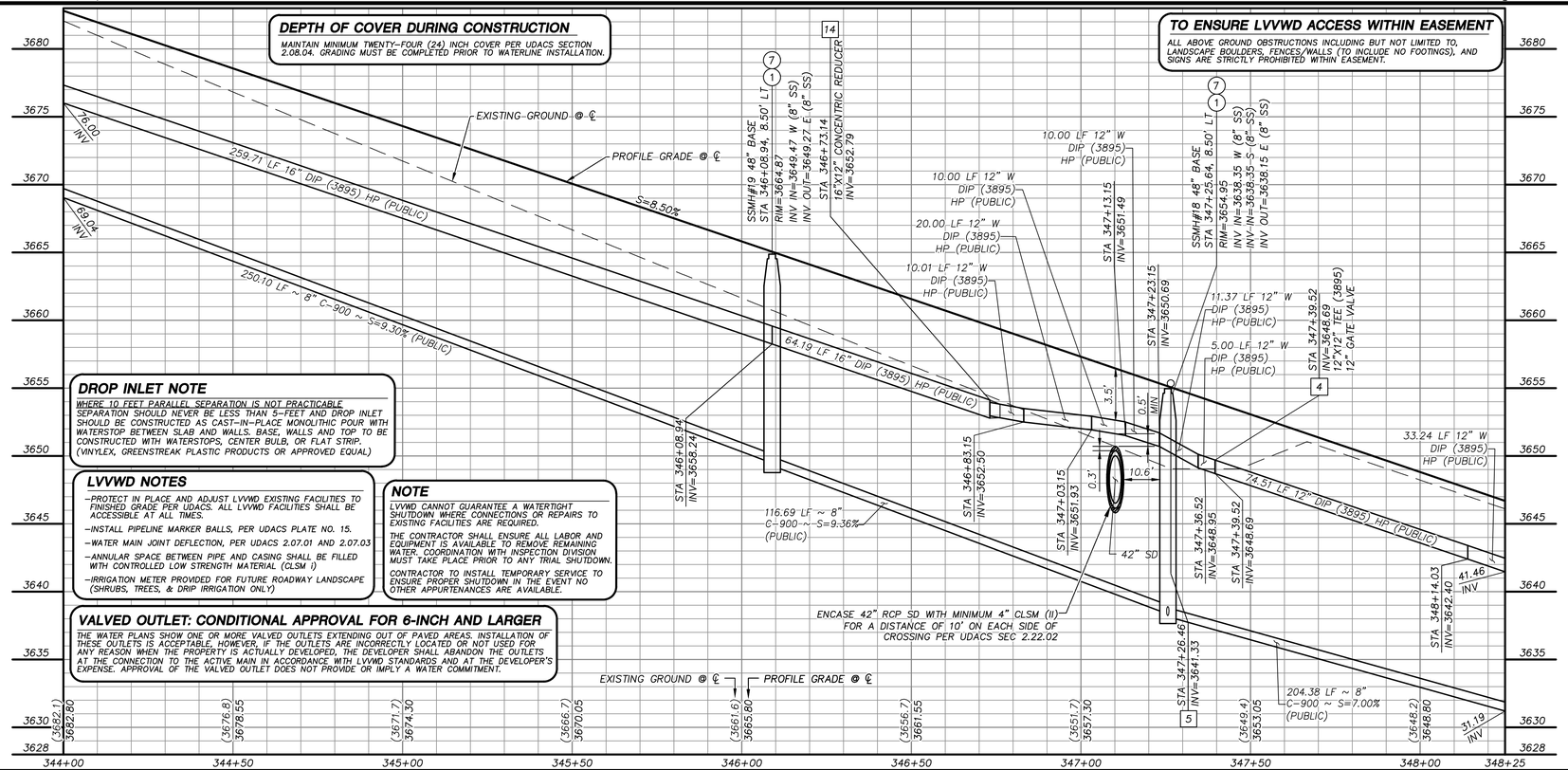
**ROADWAY GRADING PLAN**
**STA 344+00 TO STA 348+25**

| | |
|---|---|
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| DRAWN BY: | K. HENORY |
| CHECKED BY: | N. BARCOS |
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| VERT.: | NONE |

107W664
L22-01955
DATE: May 2023
DRAWING NO. 29/97
JOB NO. 100069316

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GRAPHIC SCALE

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HORIZONTAL: 1"=20'

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VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

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5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
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7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

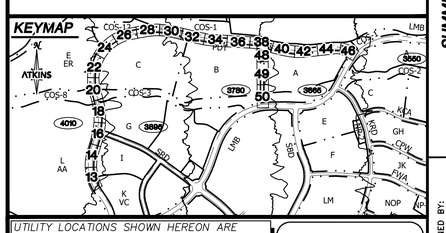
## WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL,VALVE,AND TEE) PER UDACS PLT. #39,#40,AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-23 - CIVIL - No. 18949

5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

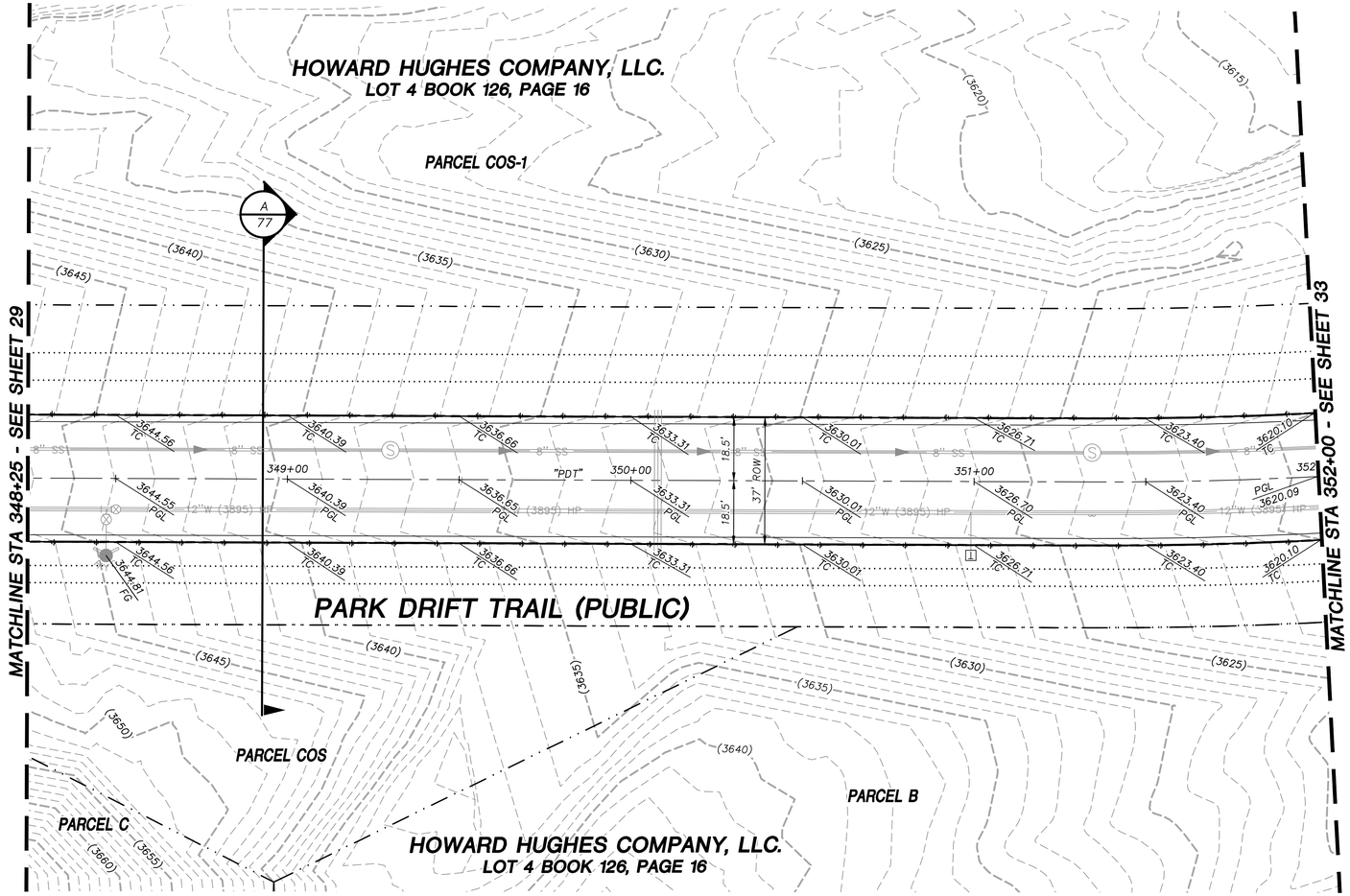
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 344+00 TO STA 348+25**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BAROOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| JOB NO. | 100069316 |
| DRAWING NO. | 30/97 |
| DATE: | May 2023 |

107V9664
L22-01955

C:\pw_work\atkinsnv01\dms54862\69316-33-PLAN-P1.dwg LAYOUT: 27 ROADWAY PLAN AND PROFILE May 17, 2023 - 3:09PM




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig — AVOID CUTTING UNDERGROUND UTILITY CABLES, PIPE OR CONDUIT — Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, PIPE OR CONDUIT — CALL BEFORE YOU DIG OVERHEAD — 1-702-227-2929

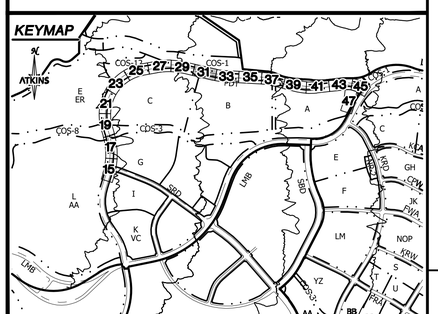
## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

KEYMAP




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER, STATE OF NEVADA — ANTHONY ORTIZ — EXP. 6-30-25 — CIVIL — No. 18849 — 5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

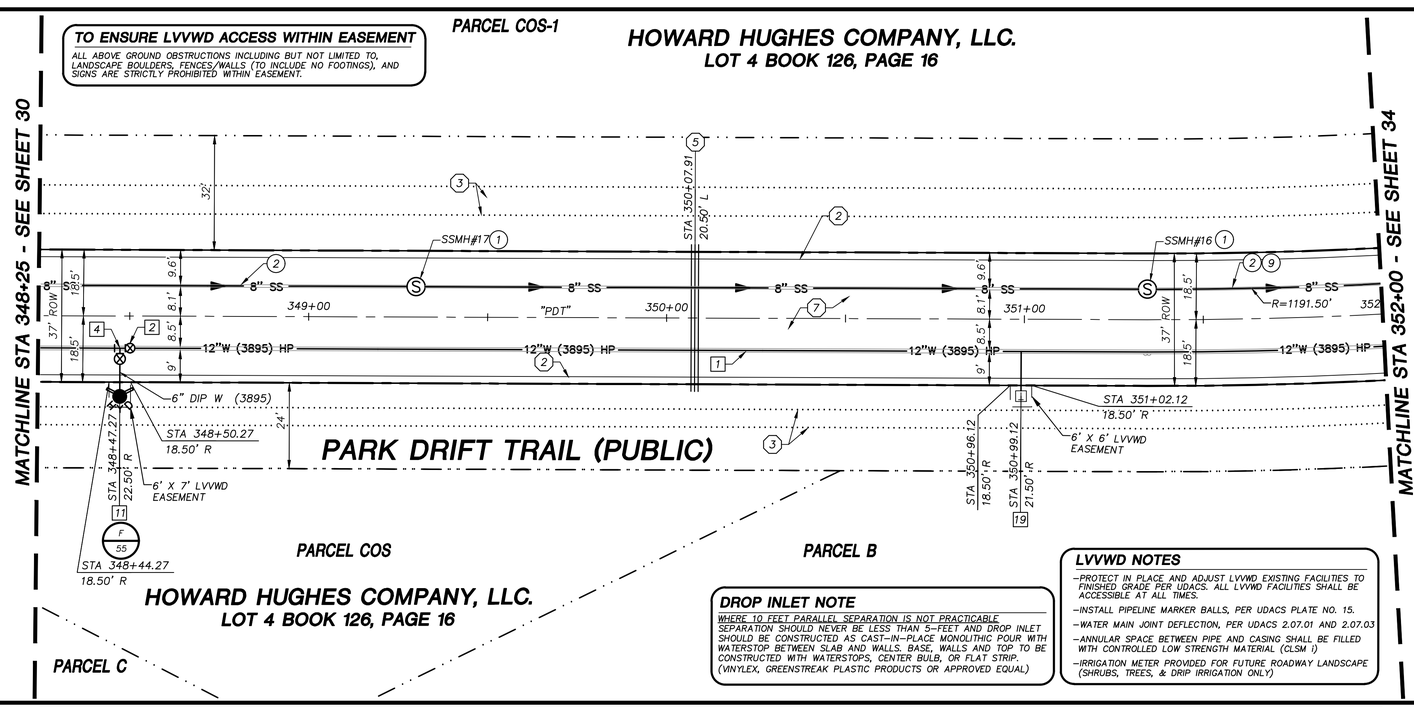
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

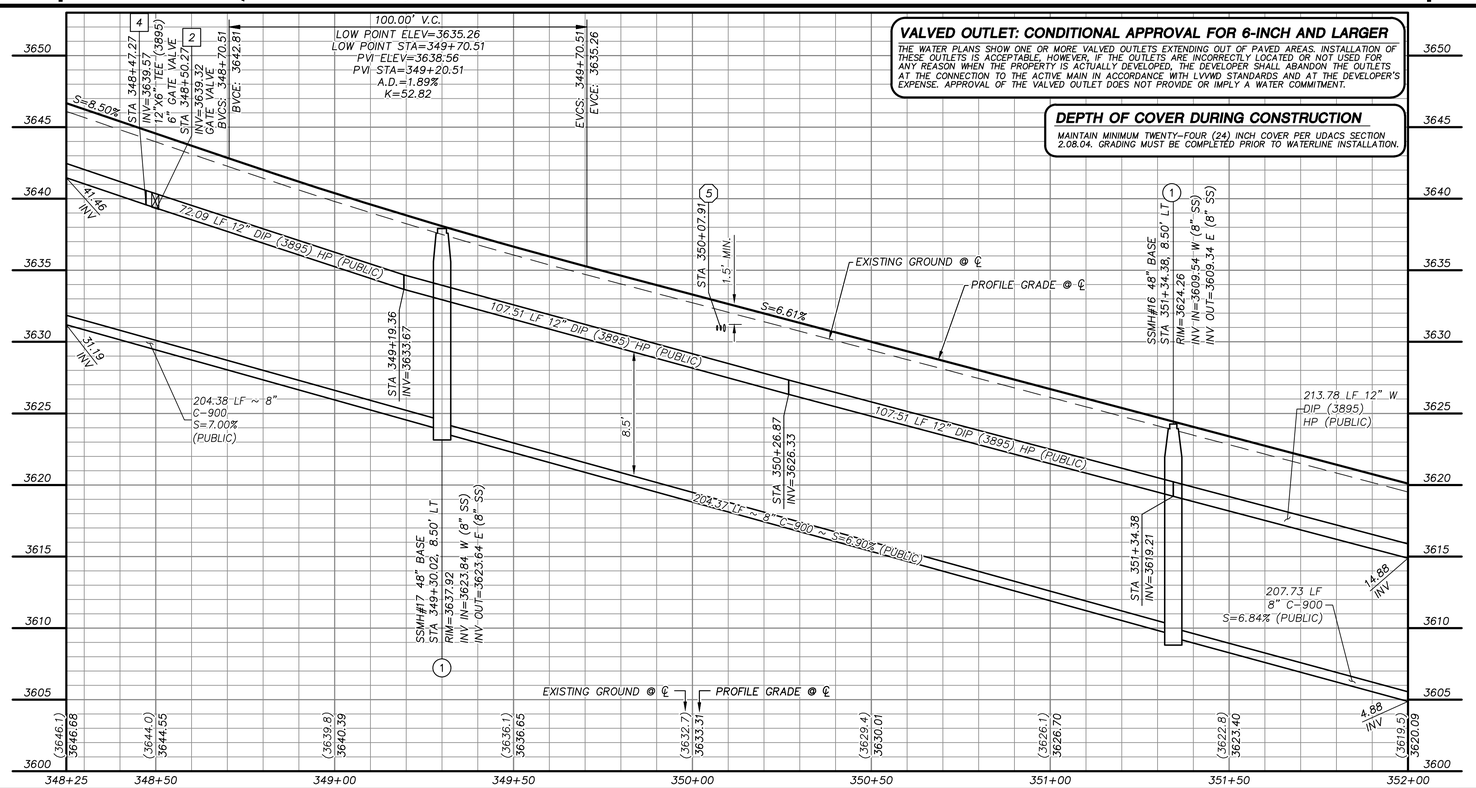
**ROADWAY GRADING PLAN**
**STA 348+25 TO STA 352+00**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| DATE: | May 2023 |
| DRAWING NO. | 31/97 |
| JOB NO. | 100069316 |

107V9664
L22-01955

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**VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER**

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.

**DEPTH OF COVER DURING CONSTRUCTION**

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES ITS QUICK! Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS QUICK! CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929

## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
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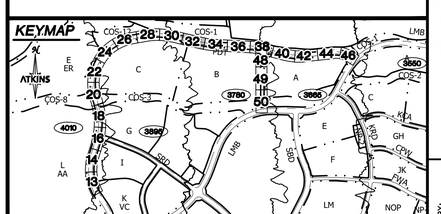
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20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
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KEYMAP




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PROFESSIONAL ENGINEER-STATE OF NEVADA ANTHONY ORTIZ EXP. 6-30-23 CIVIL No. 18649 5/17/2023

| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

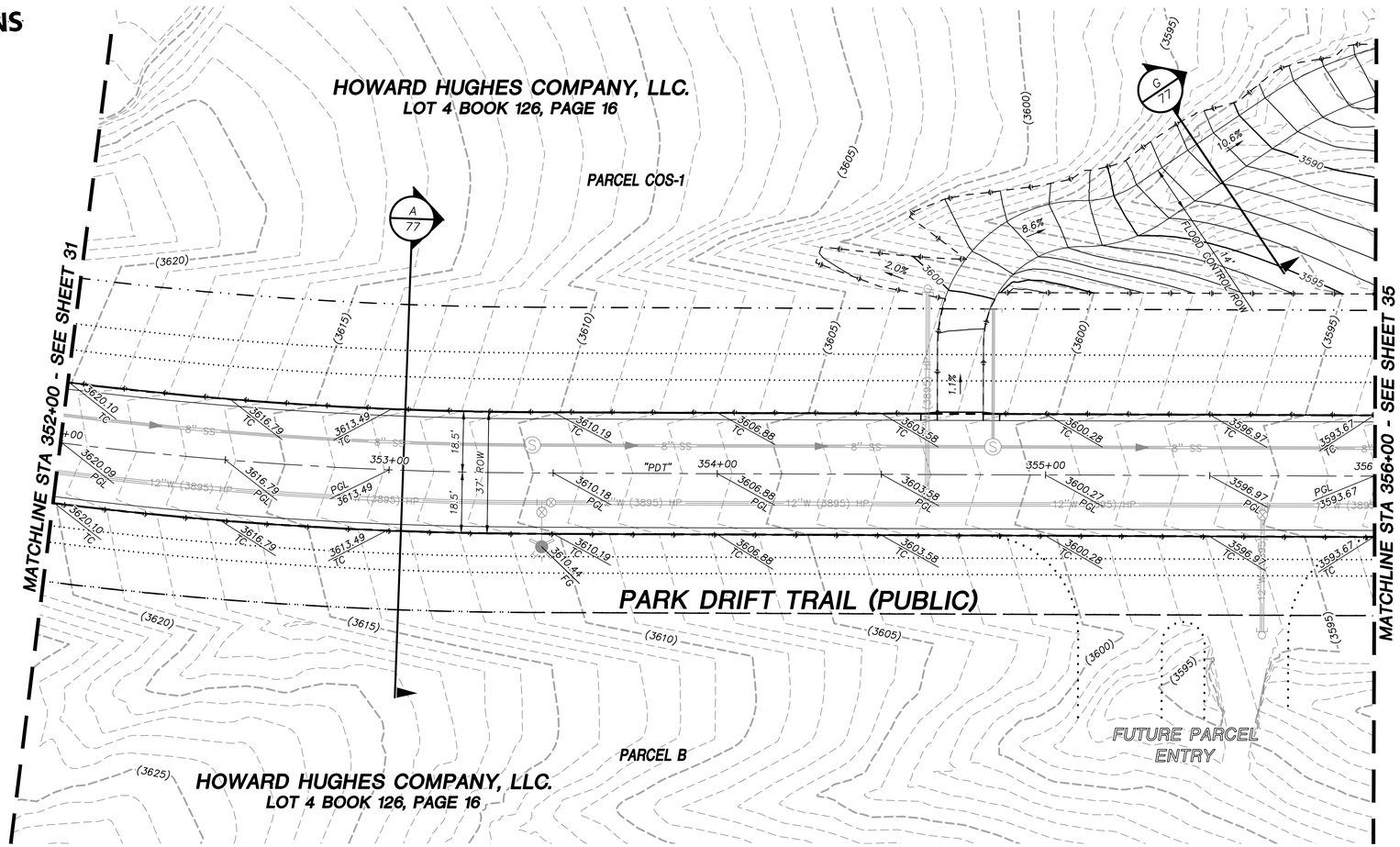
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 348+25 TO STA 352+00**

DESIGNED BY: B. MOCHITAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=4'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 32/97
JOB NO. 100069316

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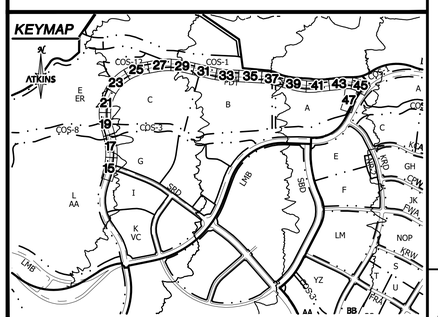



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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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(REVISED 2008)
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COURTLY.
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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
CIVIL
EXP. 06-30-25
No. 18849
5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
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SUMMERLIN

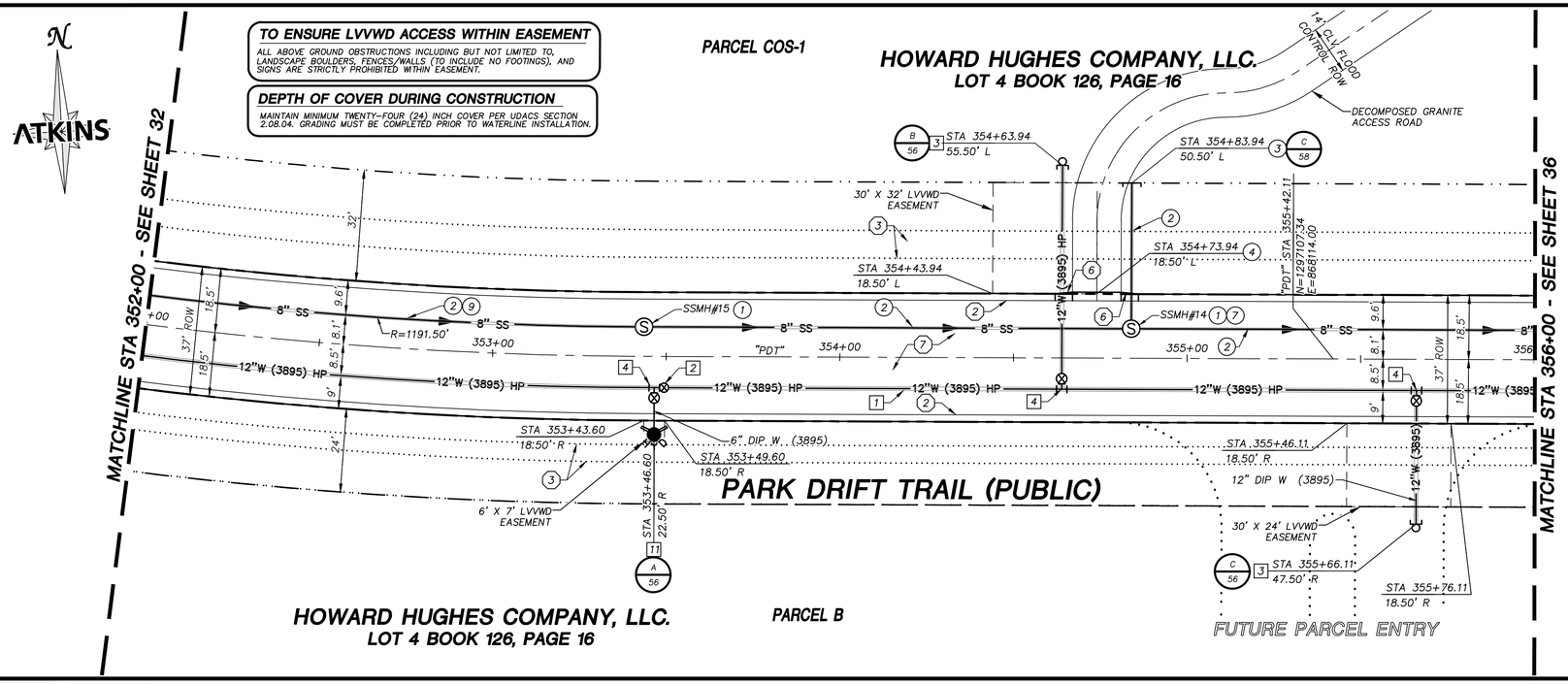
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
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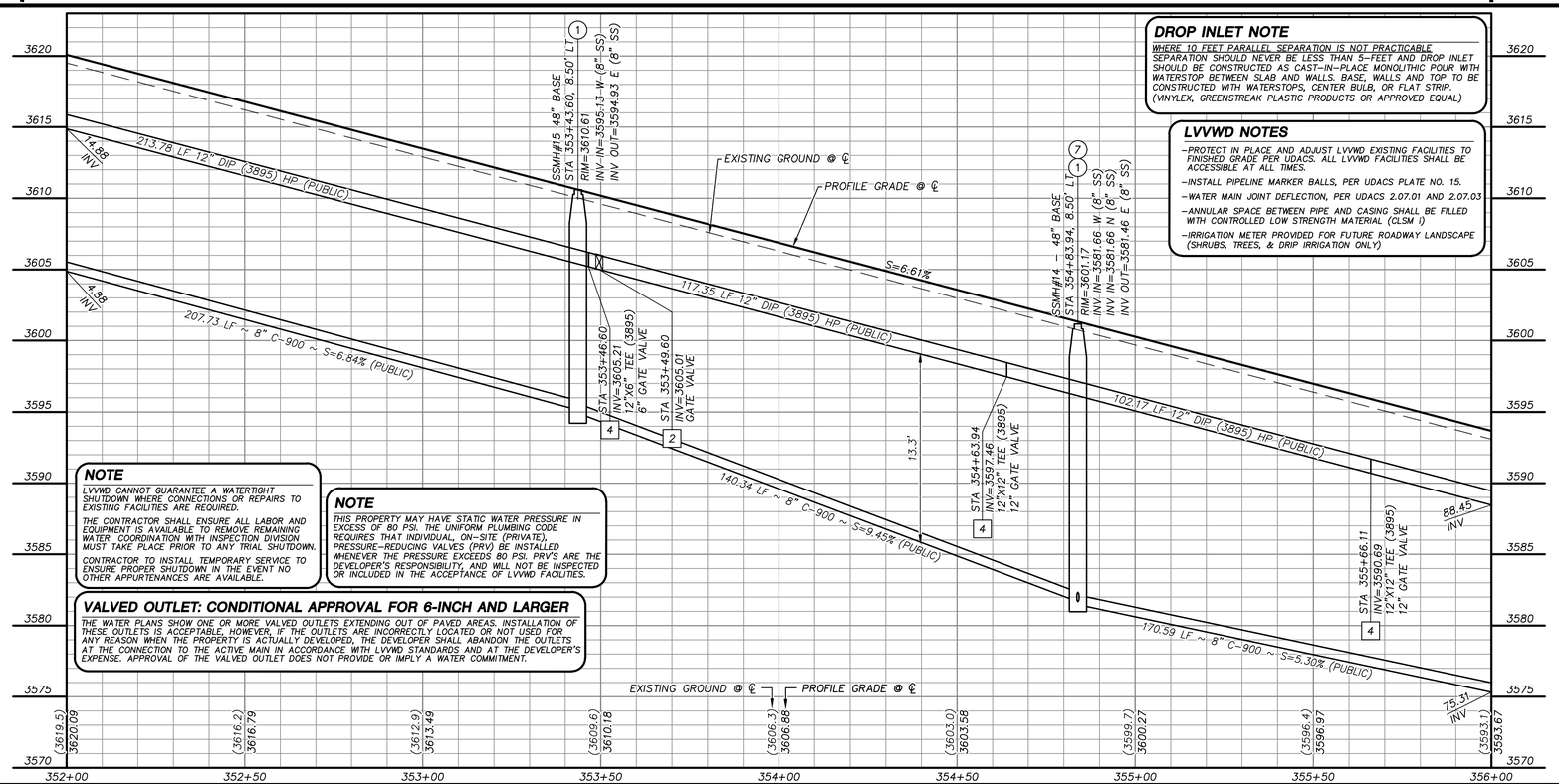
**ROADWAY GRADING PLAN**
**STA 352+00 TO STA 356+00**

DESIGNED BY: B. WOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 33/97
JOB NO. 100069316

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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**NOTE**

LVVWD CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED.

THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE REMAINING WATER. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.

CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.

**NOTE**

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE), PRESSURE-REDUCING VALVES (PRV) BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY, AND WILL NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF LVVWD FACILITIES.

**VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER**

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.

**DROP INLET NOTE**

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND DROP INLET SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP. (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

**LVVWD NOTES**

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM I)
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
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7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

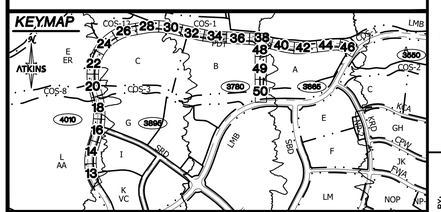
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1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
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8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
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12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18849 - 5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

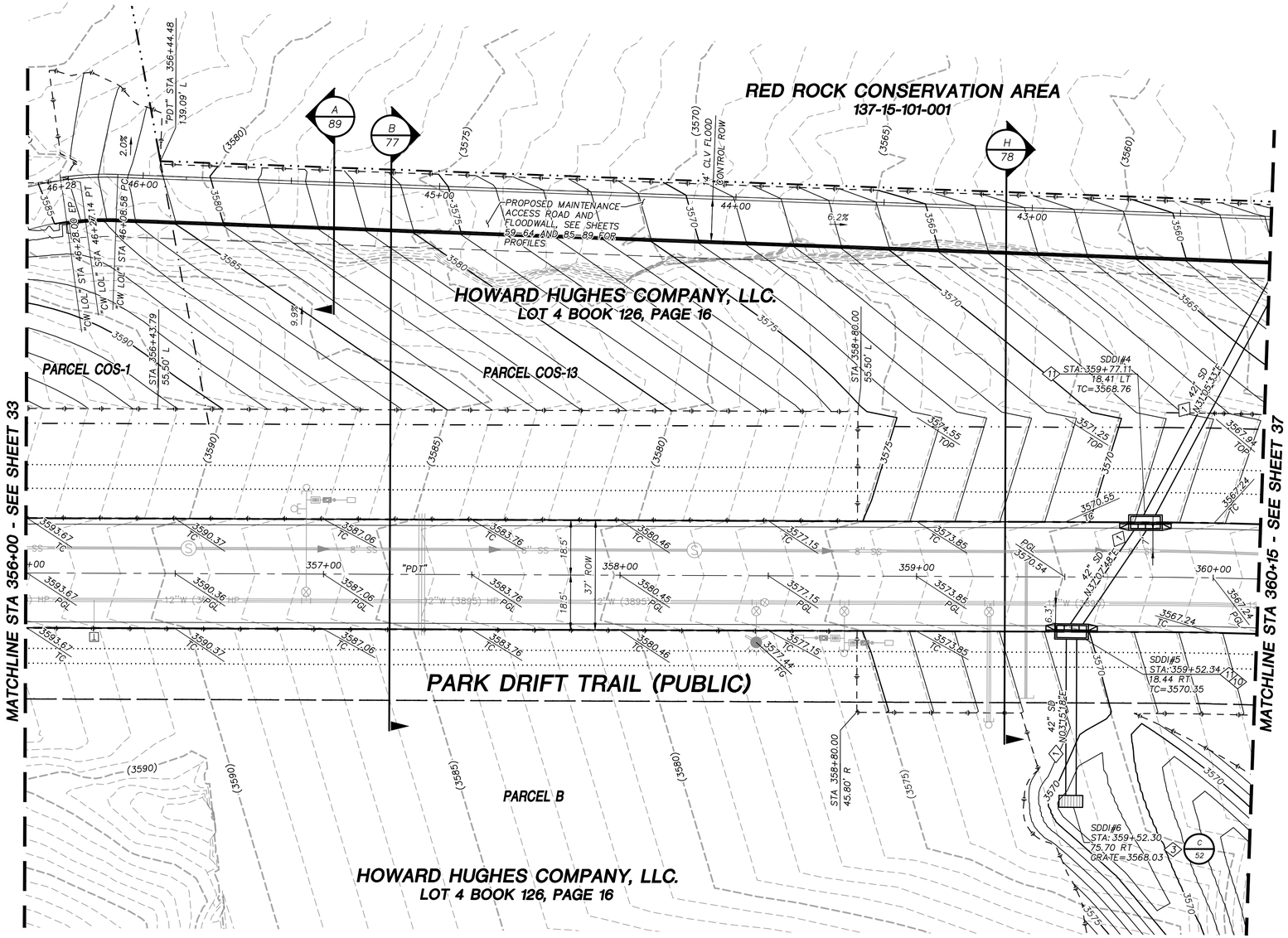
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 352+00 TO STA 356+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BAROOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| DATE: | May 2023 |
| DRAWING NO. | 34/97 |
| JOB NO. | 100069316 |

107V9664
L22-01955

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## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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## WATERTIGHT STRUCTURE NOTE

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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
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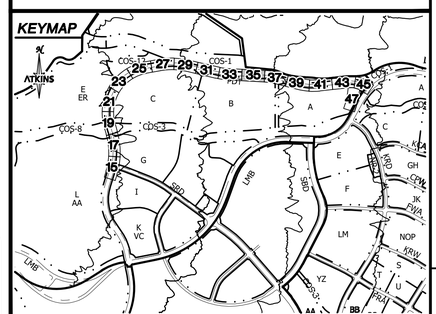
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PROFESSIONAL ENGINEER, STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 12-31-23
CIVIL
No. 18849
5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

KEYMAP




ATKINS
2270 Corporate Circle Suite 200
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Fax: +1.702.263.7200

SUMMERLIN

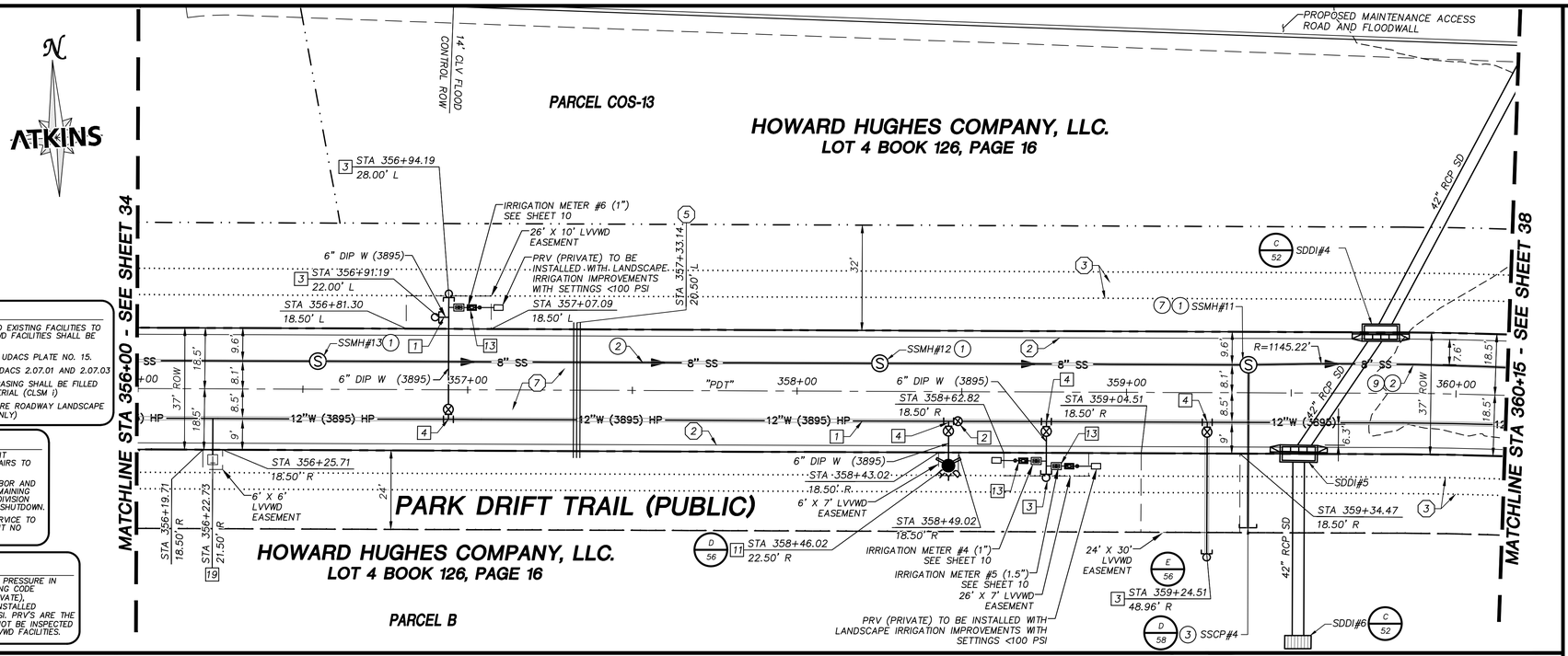
SUMMERLIN WEST VILLAGE 27
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

ROADWAY GRADING PLAN
STA 356+00 TO STA 360+15

DESIGNED BY: B. MOGHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 35/97
JOB NO. 100069316

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## NOTE

- WATER MAIN TO BE PRESSURE TESTED AT 225 PSI. NEW METER REQUIRING MIN. 175 PSI RATING
- PRIVATE PRV TO BE INSTALLED OUTSIDE OF LVVWD EASEMENT FOR LANDSCAPE IRRIGATION METER/RPPA WITH PRV SETTING < 100 PSI
- DIP WITH FULL MECHANICAL RESTRAINTS (250 PSI CLASS)

## LVVWD NOTES

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
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## NOTE

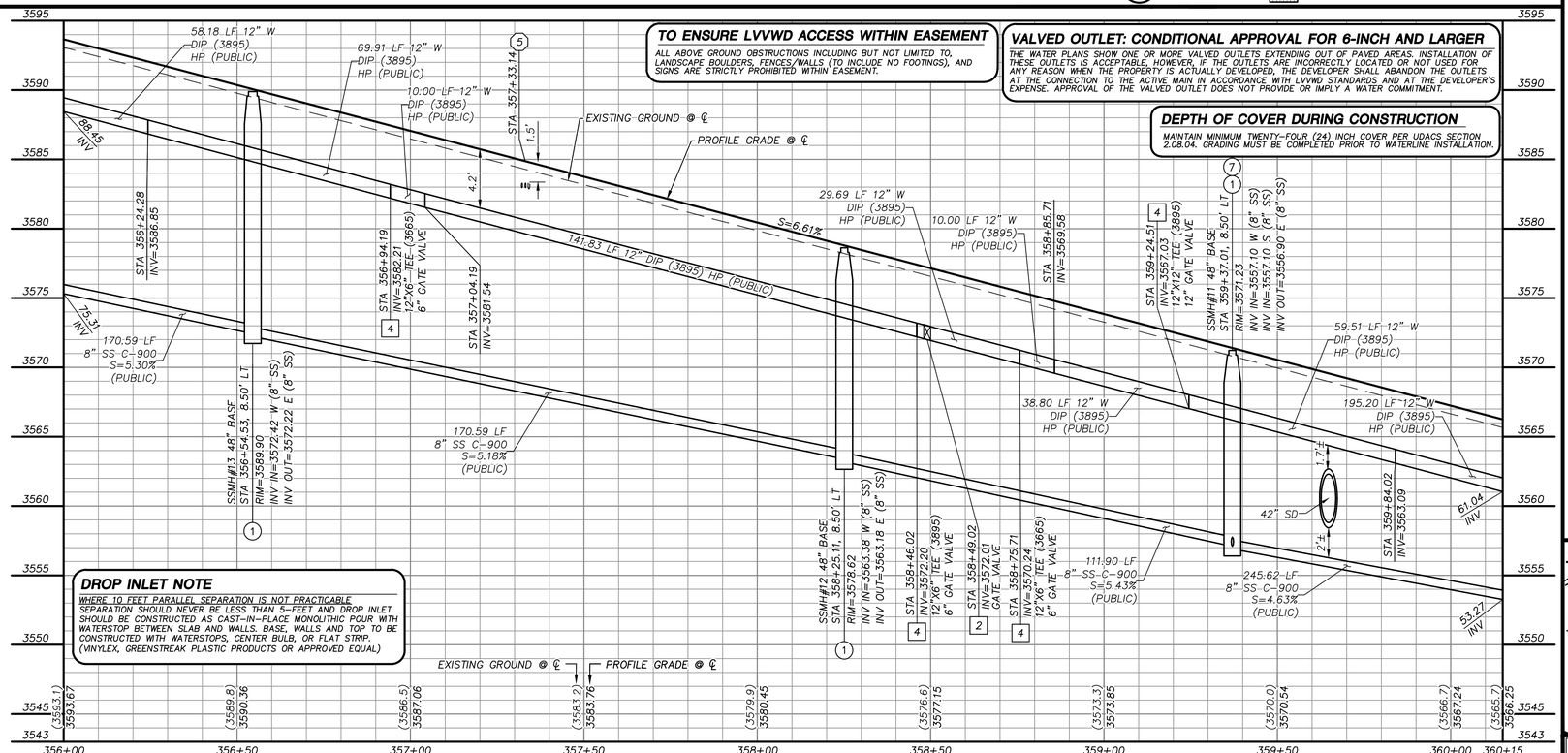
LVVWD CANNOT GUARANTEE A WATERTIGHT SHUTDOWN WHERE CONNECTIONS OR REPAIRS TO EXISTING FACILITIES ARE REQUIRED.

THE CONTRACTOR SHALL ENSURE ALL LABOR AND EQUIPMENT IS AVAILABLE TO REMOVE REMAINING WATER. COORDINATION WITH INSPECTION DIVISION MUST TAKE PLACE PRIOR TO ANY TRIAL SHUTDOWN.

CONTRACTOR TO INSTALL TEMPORARY SERVICE TO ENSURE PROPER SHUTDOWN IN THE EVENT NO OTHER APPURTENANCES ARE AVAILABLE.

## NOTE

THIS PROPERTY MAY HAVE STATIC WATER PRESSURE IN EXCESS OF 80 PSI. THE UNIFORM PLUMBING CODE REQUIRES THAT INDIVIDUAL, ON-SITE (PRIVATE), PRESSURE-REDUCING VALVES (PRV) BE INSTALLED WHENEVER THE PRESSURE EXCEEDS 80 PSI. PRV'S ARE THE DEVELOPER'S RESPONSIBILITY, AND WILL NOT BE INSPECTED OR INCLUDED IN THE ACCEPTANCE OF LVVWD FACILITIES.




## TO ENSURE LVVWD ACCESS WITHIN EASEMENT

ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

## VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER

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## DEPTH OF COVER DURING CONSTRUCTION

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

## DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE
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GRAPHIC SCALE

20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

## BASIS OF BEARING

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PROFESSIONAL ENGINEER STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-25
CIVIL
No. 18949
5/17/2023

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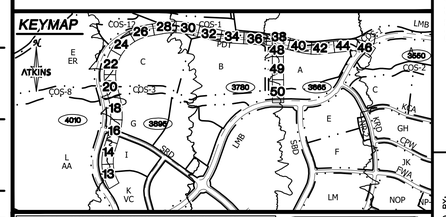
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REVISIONS

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

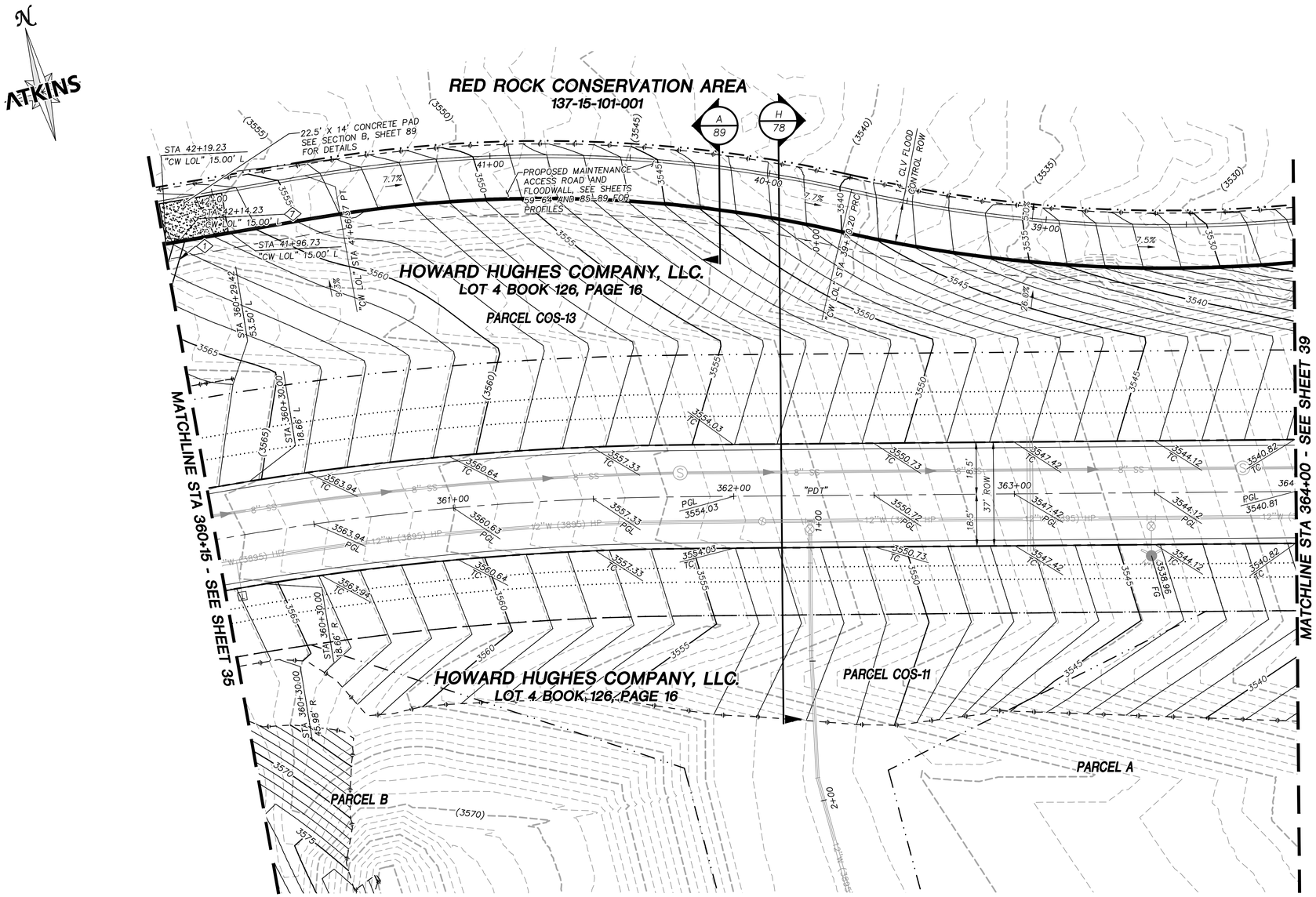
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 356+00 TO STA 360+15**

| | |
|---|---|
| DESIGNED BY: | B. WOHTIAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| JOB NO. | 100069316 |
| DRAWING NO. | 36/97 |
| DATE: | May. 2023 |

107V9664
L22-01955

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GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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AVOID CUTTING, ALTERING OR DAMAGING UTILITY LINES, PITS OR APPURT'S.
Call 811
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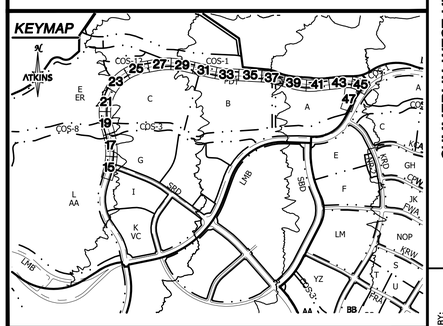
AVOID HITTING OVERHEAD POWER LINES, PITS OR APPURT'S.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
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| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

KEYMAP




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PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-25
CIVIL
No. 18849
5/17/2023

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2270 Corporate Circle Suite 200
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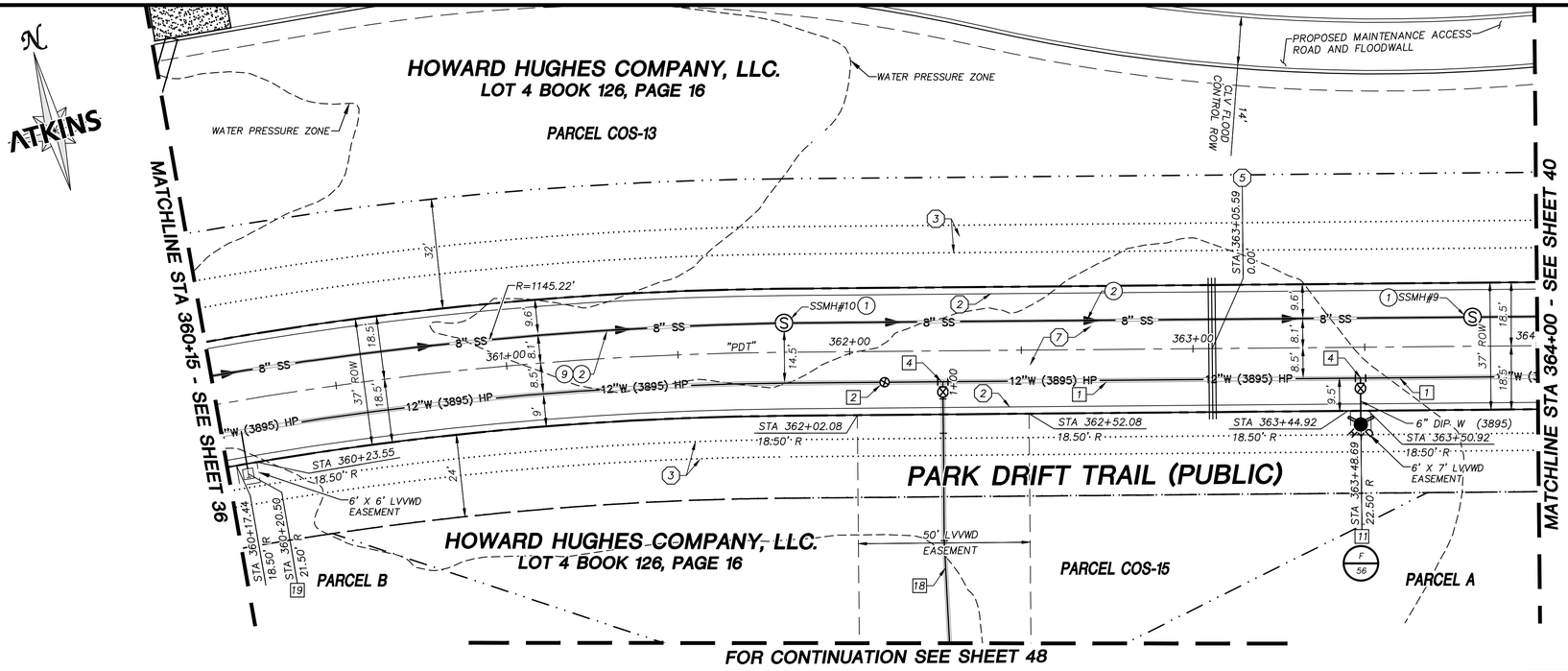
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA 360+15 TO STA 364+00**

| | |
|---|---|
| DESIGNED BY: | B. MOGHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
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| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 37/97 |
| JOB NO. | 100069316 |

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## LVVWD NOTES

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- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
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- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM I)
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## DROP INLET NOTE

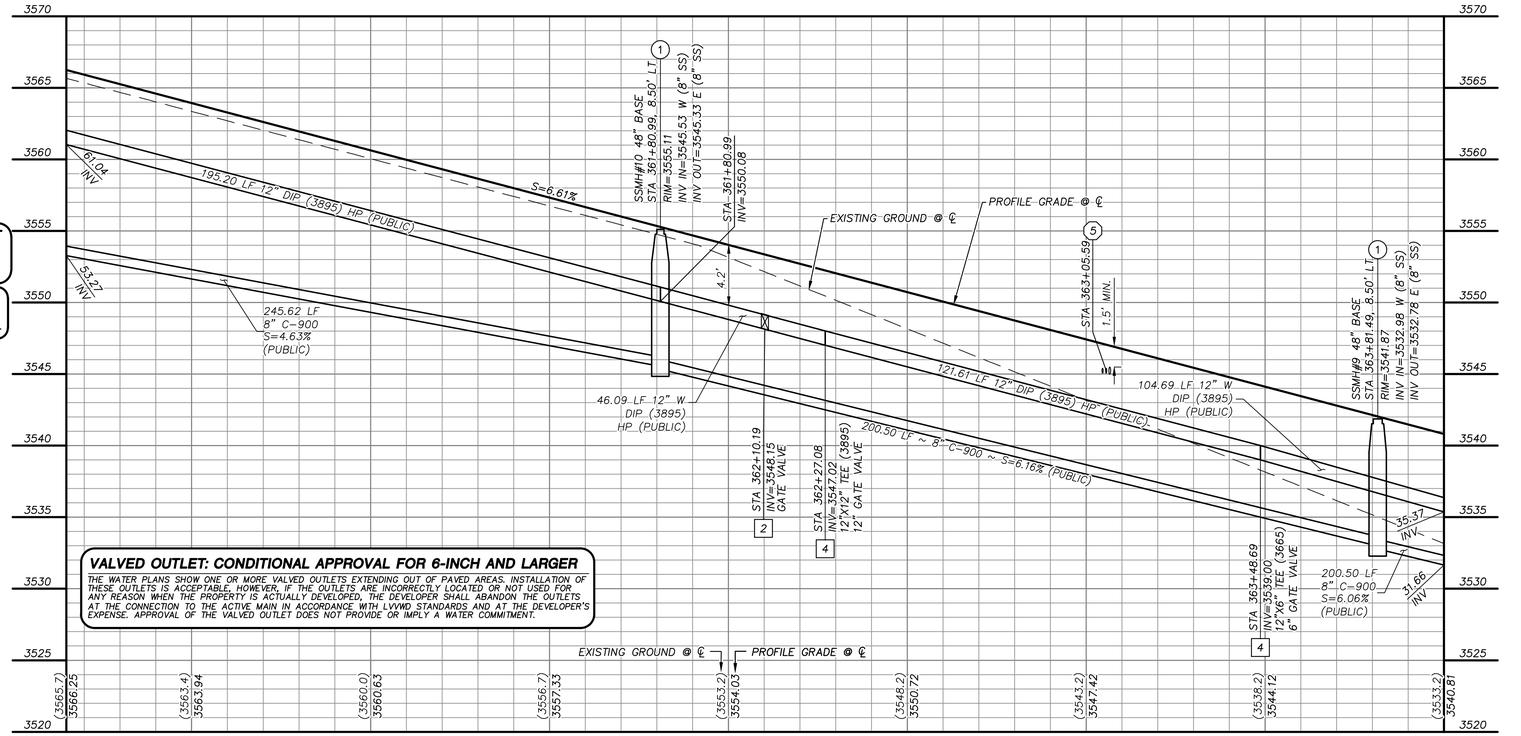
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ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

## DEPTH OF COVER DURING CONSTRUCTION

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GRAPHIC SCALE
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HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

## BASIS OF BEARING

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11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

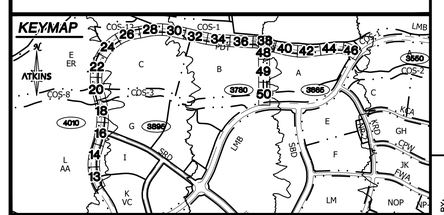
## WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL,VALVE,AND TEE) PER UDACS PLT. #39,#40,AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




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PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY ORTIZ
EXP. 6-30-25
CIVIL
No. 18649
5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
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SUMMERLIN

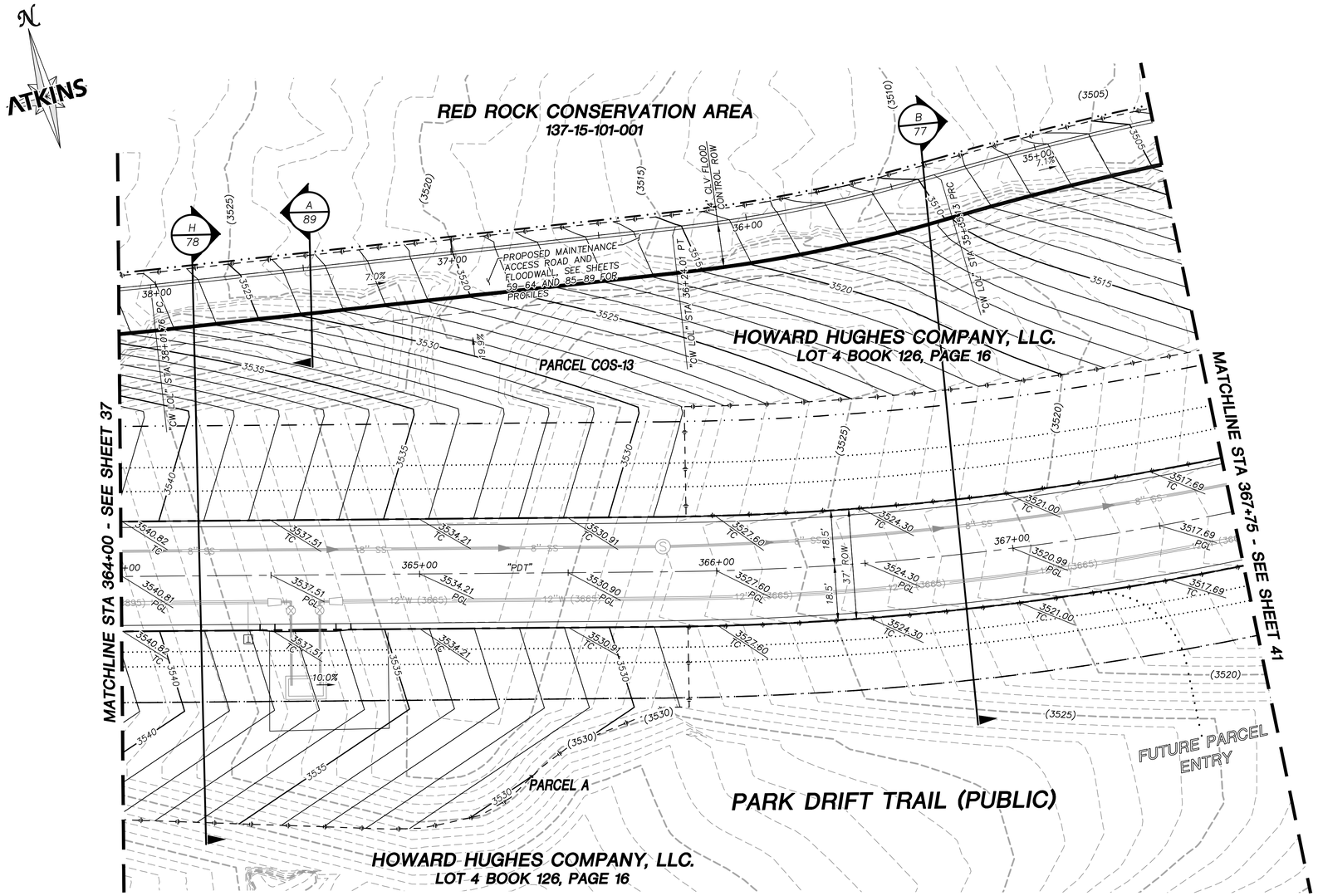
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 360+15 TO STA 364+00**

| | |
|---|---|
| DESIGNED BY: | B. MOCHITAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
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| JOB NO. | 100069316 |
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107V9664
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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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T21S,R59E,S03

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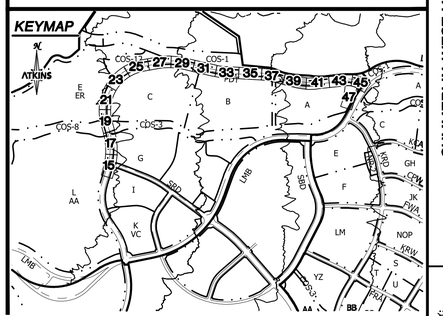
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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

KEYMAP



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2270 Corporate Circle Suite 200
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Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

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PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

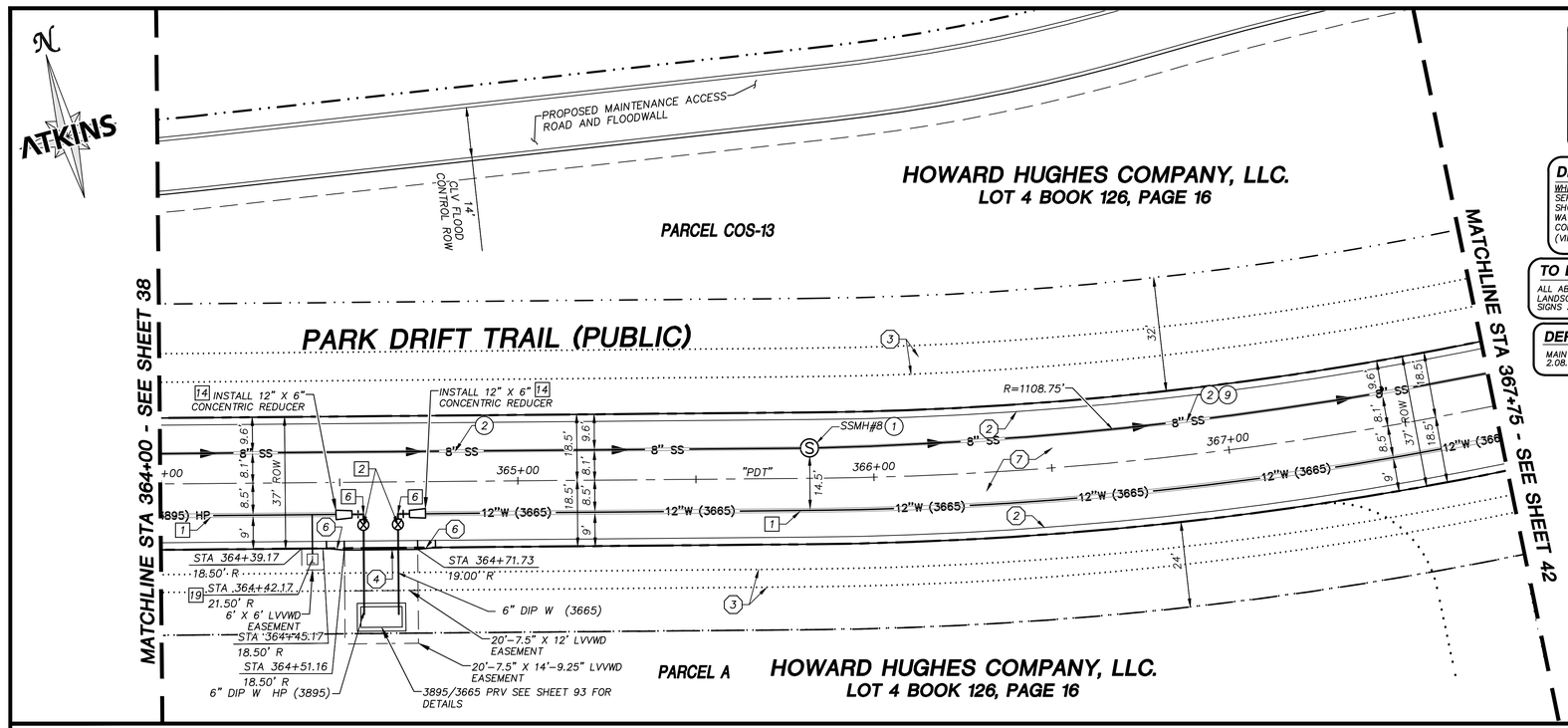
**ROADWAY GRADING PLAN**
**STA 364+00 TO STA 368+00**

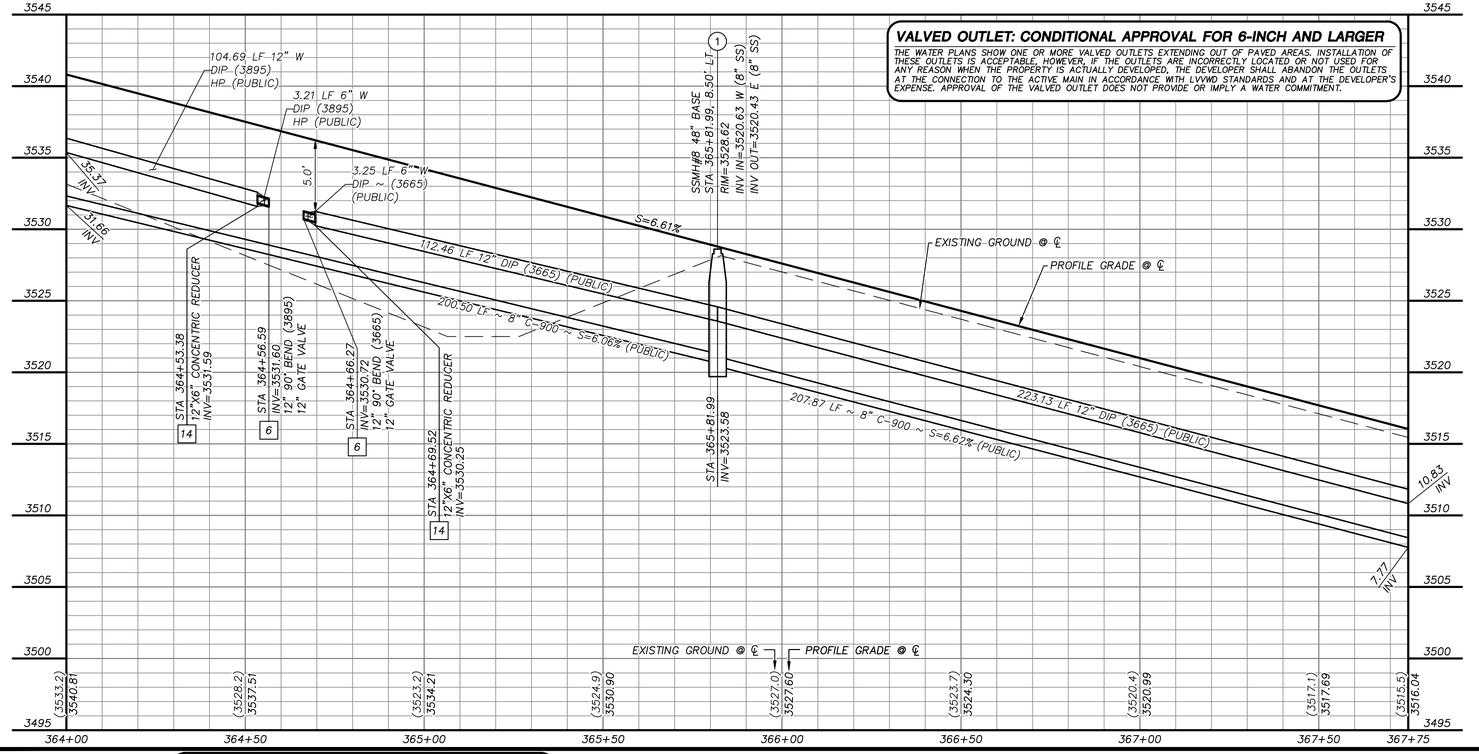
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C:\pw_work\atkinsnv01\dms54862\69316-32-GRAD-01.dwg LAYOUT: 36 ROADWAY GRADING PLAN May 17, 2023 - 3:14PM




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GRAPHIC SCALE

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VERTICAL: 1"=5'

## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

## BASIS OF BEARING

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5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
6. PROTECT SEWER AT UTILITY CROSSING PER DCSWCS SD-19
7. INSTALL CORROSION PROTECTION PER 3.16.8
8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

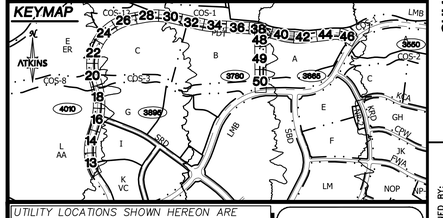
## WATERLINE CONSTRUCTION NOTES

1. INSTALL WATER MAIN PER UDACS PLATES #17, #19, AND SEC. 2.15
2. INSTALL GATE VALVE PER UDACS PLATES #39 AND SEC. 2.15
3. INSTALL CAP AND 2" MANUAL BLOWOFF ASSEMBLY PER UDACS PLATE #36
4. INSTALL TEE W/ VALVE AND LATERAL PER UDACS PLATES #17, #19, #39, AND SEC. 2.15
5. INSTALL 6" BLOW-OFF VALVE PER UDACS PLATE #37
6. INSTALL 90° BEND PER UDACS SEC. 2.15
7. INSTALL 11.25° BEND PER UDACS SEC. 2.15
8. INSTALL 4" COMBINATION AIR VALVE ASSEMBLY WITH ALL APPURTENANCES PER UDACS PLATE #38
9. INSTALL 45° BEND PER UDACS SEC. 2.15
10. REMOVE CAP AND 2" BLOWOFF AND CONNECT TO EXISTING WATERLINE STUB
11. INSTALL FIRE HYDRANT WITH APPURTENANCES (CONCRETE PAD, LATERAL,VALVE,AND TEE) PER UDACS PLT. #39,#40,AND SEC. 2.15
12. INSTALL 1.5" SERVICE SADDLE PER UDASC PLATE #4
13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - CIVIL - EXP. 6-30-23 - No. 18649

5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

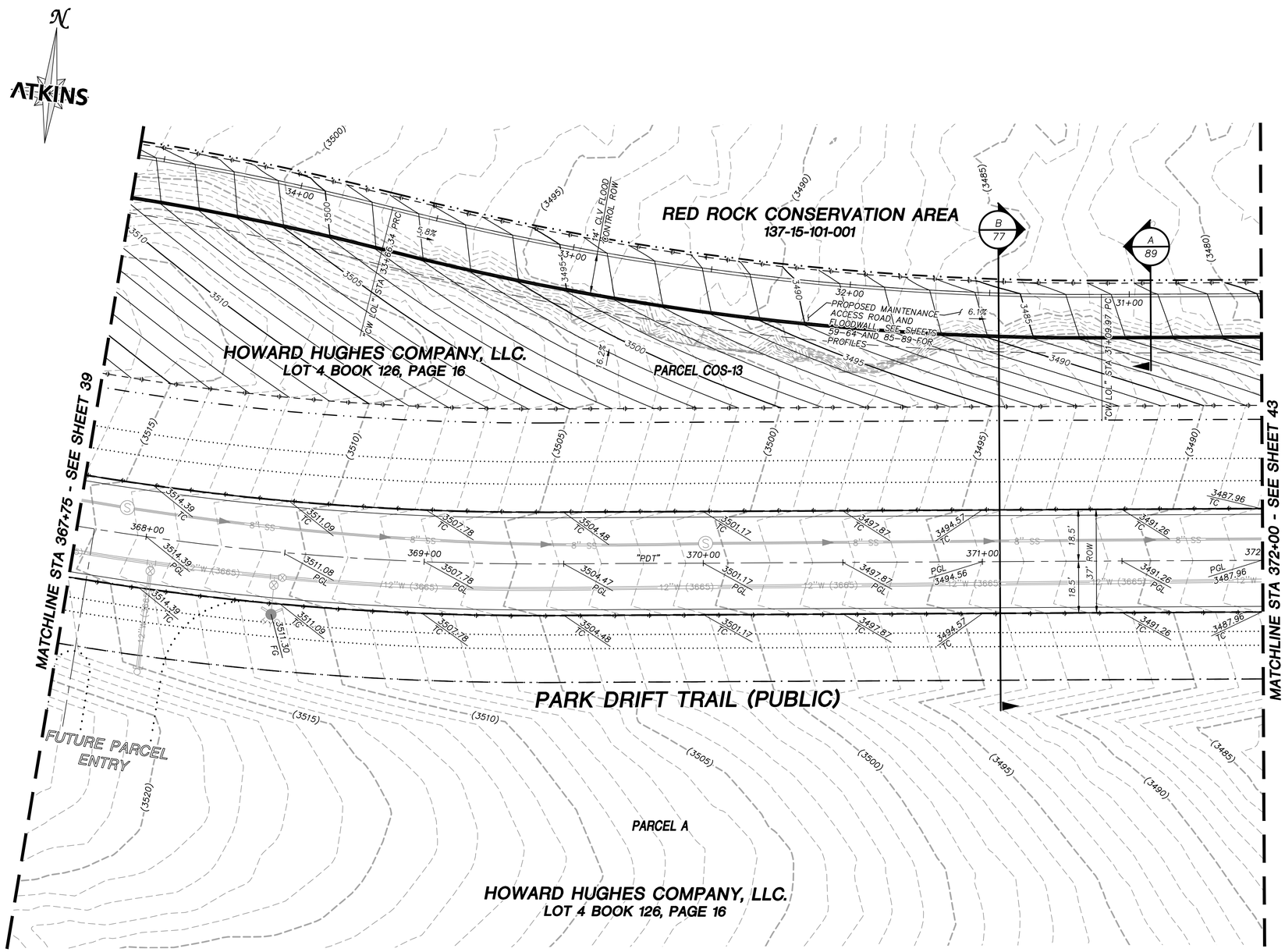
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 364+00 TO STA 368+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTJAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 40/97 |
| JOB NO. | 100069316 |

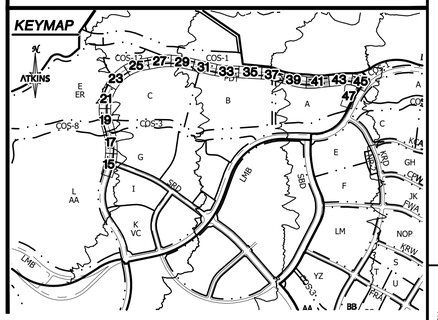
C:\pw_work\atkmain01\dms54862\69316-33-PLAN-P1.dwg LAYOUT: 37 ROADWAY PLAN AND PROFILE May 17, 2023 - 3:10PM




## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
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11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

| REVISIONS | | | |
|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |
| | | | | |




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DIG OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18849
5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

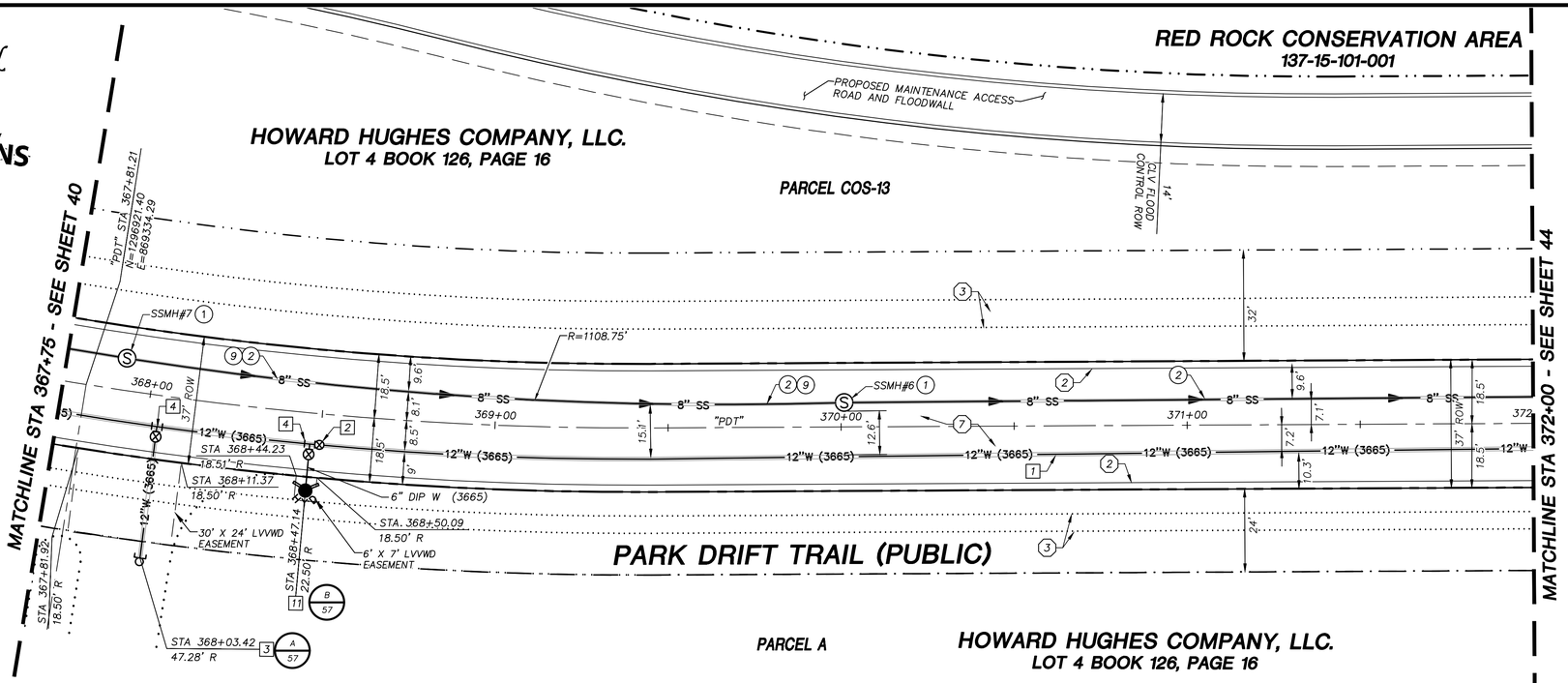
SUMMERLIN

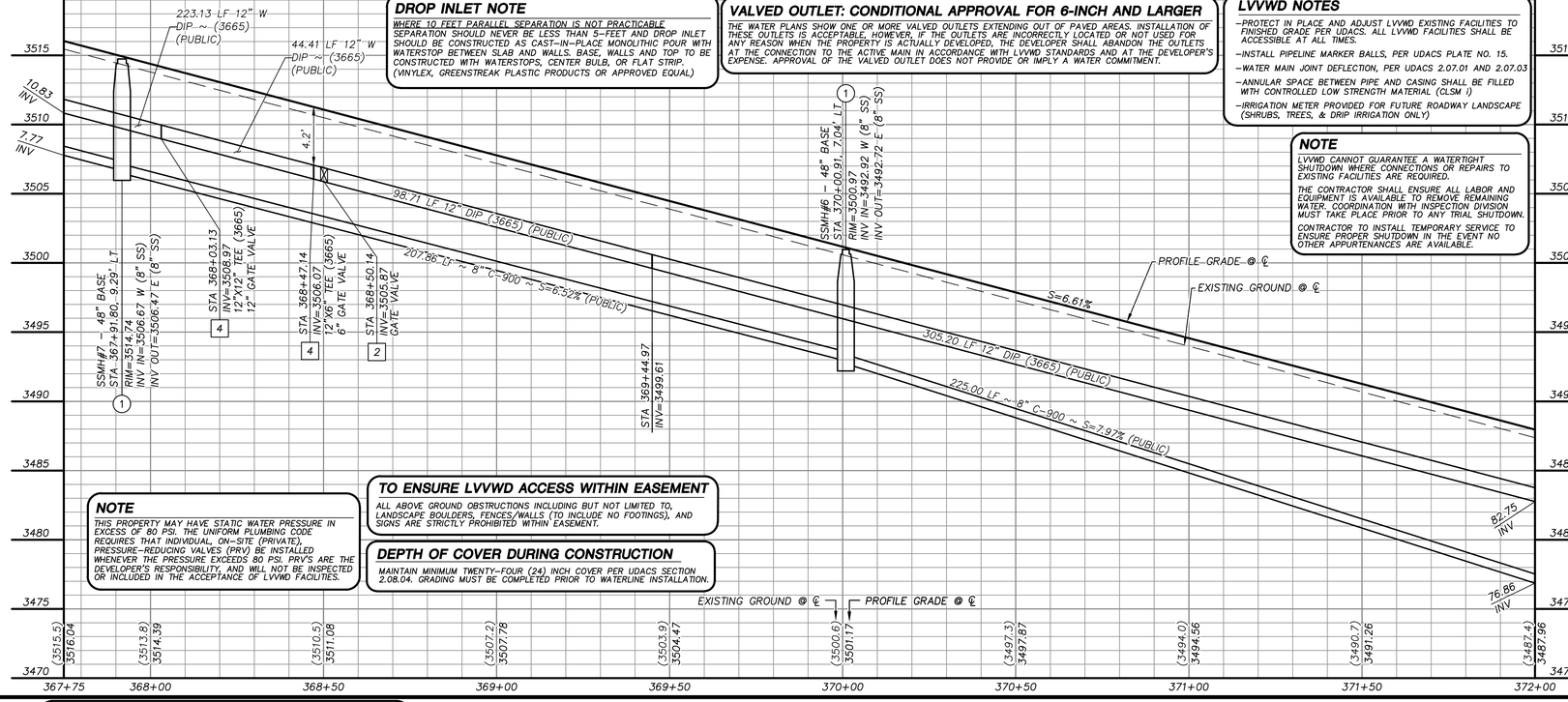
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

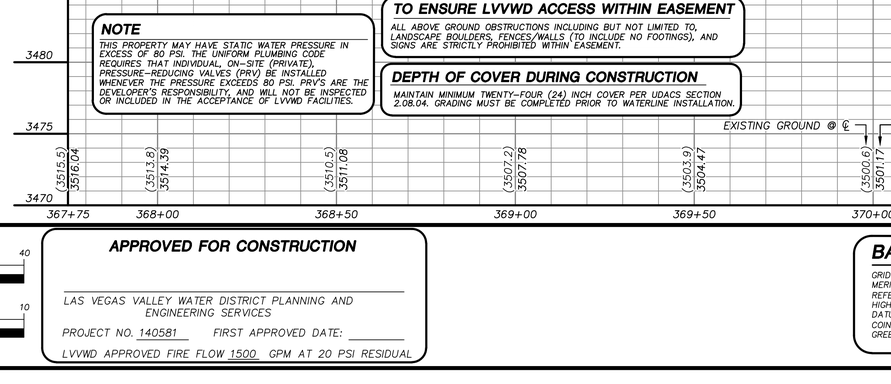
**ROADWAY GRADING PLAN**
**STA 368+00 TO STA 372+00**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 41/97 |
| JOB NO. | 100069316 |

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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
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## SEWER CONSTRUCTION NOTES

1. INSTALL STANDARD MANHOLE WITH WATERTIGHT JOINTS PER DCSWCS SD-1, SD-3, SD-4, AND SD-5 WITH SINGLE 24" LID
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5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
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8. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B
9. MINIMUM RADIUS IS 575 FEET AND A LAY LENGTH OF 10 FEET WHEN CURVED RADIUS SMALLER THAN 1,150 FEET

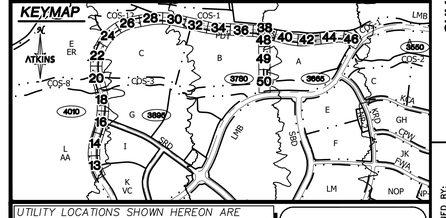
## WATERLINE CONSTRUCTION NOTES

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16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
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18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
20. INSTALL 2.5° BEND PER UDACS SEC. 2.15

## ROADWAY CONSTRUCTION NOTES

1. SAWCUT AND MATCH EXISTING
2. CONSTRUCT "L" TYPE CURB AND GUTTER PER CCAUSD #216
3. FUTURE SIDEWALK BY OTHERS
4. CONSTRUCT 30" MODIFIED ROLL CURB AND GUTTER RESIDENTIAL AREA PER CCAUSD #217.1
5. INSTALL SCHEDULE 40 PVC IRRIGATION SLEEVES (2-4", 1-6") PER DETAIL ON SHEET 81
6. CONSTRUCT 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION PER DETAIL B ON SHEET 80
7. CONSTRUCT PLANTMIX BITUMINOUS SURFACE OVER TYPE II AGGREGATE BASE PER TYPICAL SECTIONS ON SHEET 77

KEYMAP



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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18949

5/17/2023

| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

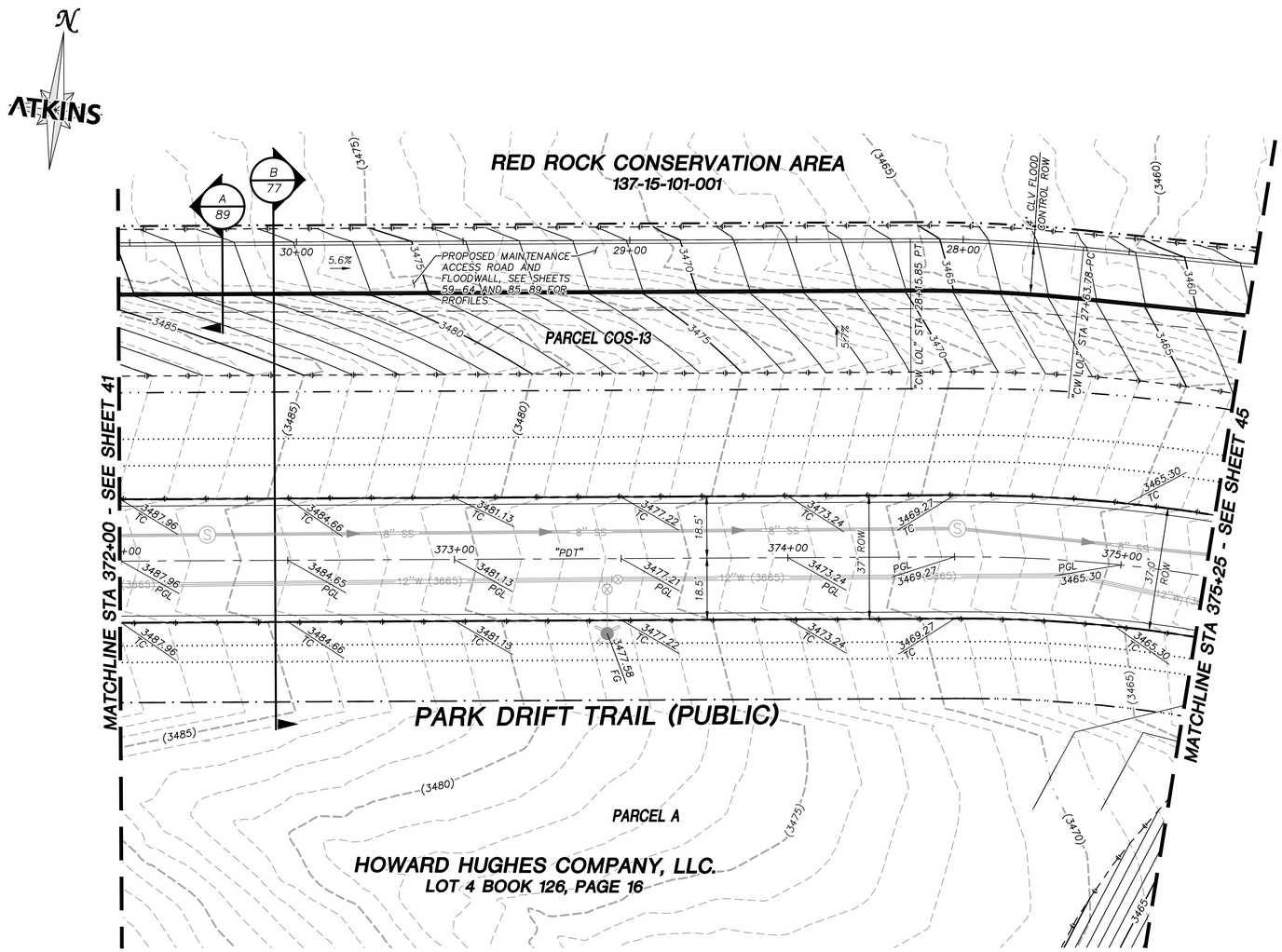
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA 368+00 TO STA 372+00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BAROOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| DRAWING NO. | 42/97 |
| JOB NO. | 100069316 |
| DATE: | May 2023 |

107V9664
L22-01955

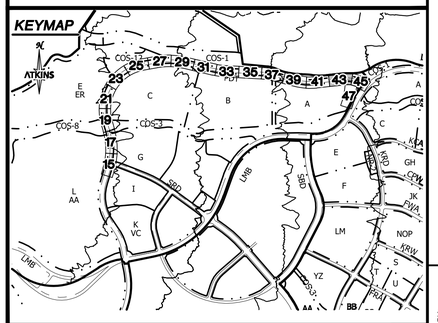
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## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig — AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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PROFESSIONAL ENGINEER-STATE OF NEVADA — ANTHONY J. ORTIZ — EXP. 6-30-25 — CIVIL — No. 18849 — 5/17/2023

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN**
**STA TO 372+00 TO STA 376+0**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 43/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkronO1\dms54862\69316-32-GRAD-G1.dwg LAYOUT: 40 ROADWAY GRADING PLAN May 17, 2023 - 3:14PM



### TO ENSURE LVVWD ACCESS WITHIN EASEMENT

ALL ABOVE GROUND OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO, LANDSCAPE BOULDERS, FENCES/WALLS (TO INCLUDE NO FOOTINGS), AND SIGNS ARE STRICTLY PROHIBITED WITHIN EASEMENT.

### DEPTH OF COVER DURING CONSTRUCTION

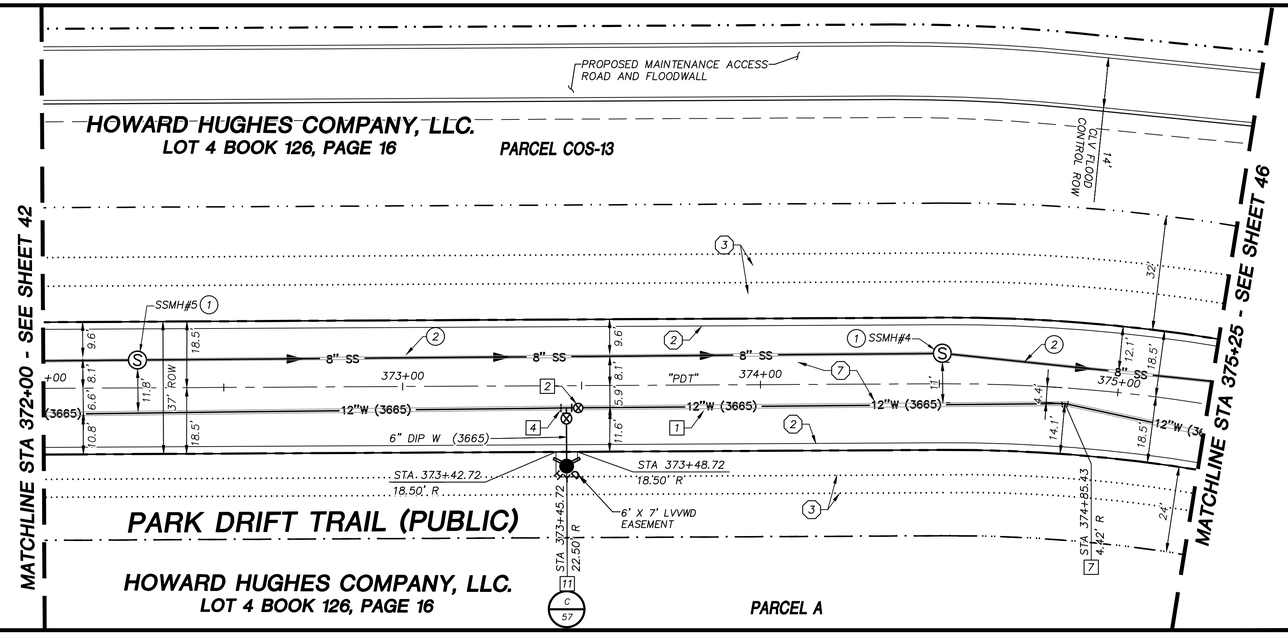
MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

### DROP INLET NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5-FEET AND DROP INLET SHOULD BE CONSTRUCTED AS CAST-IN-PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB AND WALLS. BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS, CENTER BULB, OR FLAT STRIP. (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL)

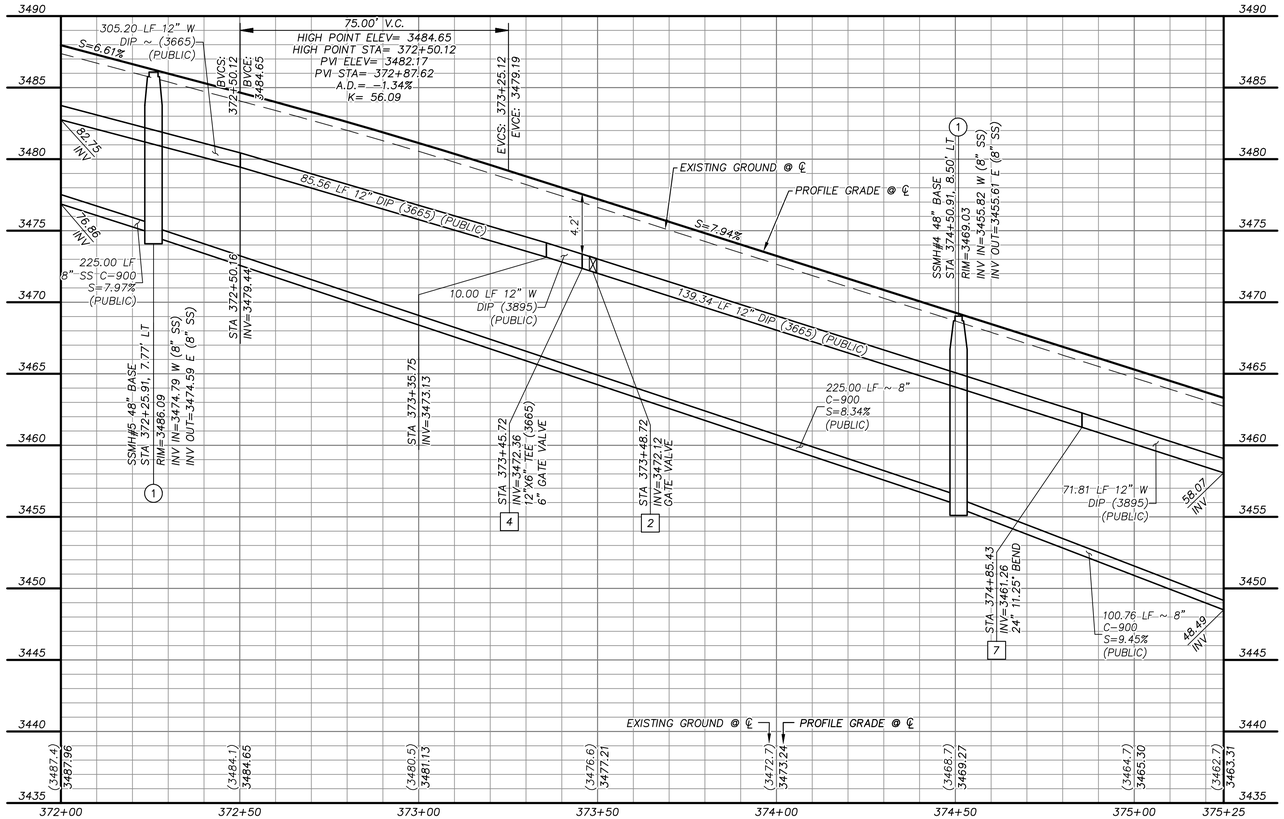
### VALVED OUTLET: CONDITIONAL APPROVAL FOR 6-INCH AND LARGER

THE WATER PLANS SHOW ONE OR MORE VALVED OUTLETS EXTENDING OUT OF PAVED AREAS. INSTALLATION OF THESE OUTLETS IS ACCEPTABLE, HOWEVER, IF THE OUTLETS ARE INCORRECTLY LOCATED OR NOT USED FOR ANY REASON WHEN THE PROPERTY IS ACTUALLY DEVELOPED, THE DEVELOPER SHALL ABANDON THE OUTLETS AT THE CONNECTION TO THE ACTIVE MAIN IN ACCORDANCE WITH LVVWD STANDARDS AND AT THE DEVELOPER'S EXPENSE. APPROVAL OF THE VALVED OUTLET DOES NOT PROVIDE OR IMPLY A WATER COMMITMENT.




### LVVWD NOTES

- PROTECT IN PLACE AND ADJUST LVVWD EXISTING FACILITIES TO FINISHED GRADE PER UDACS. ALL LVVWD FACILITIES SHALL BE ACCESSIBLE AT ALL TIMES.
- INSTALL PIPELINE MARKER BALLS, PER UDACS PLATE NO. 15.
- WATER MAIN JOINT DEFLECTION, PER UDACS 2.07.01 AND 2.07.03
- ANNULAR SPACE BETWEEN PIPE AND CASING SHALL BE FILLED WITH CONTROLLED LOW STRENGTH MATERIAL (CLSM I)
- IRRIGATION METER PROVIDED FOR FUTURE ROADWAY LANDSCAPE (SHRUBS, TREES, & DRIP IRRIGATION ONLY)




GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

### BENCHMARK

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Call before you Dig AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS-32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
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6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
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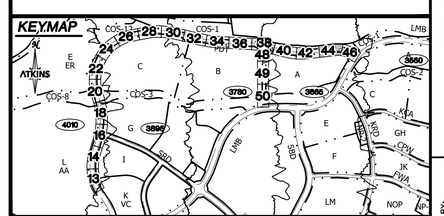
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2. INSTALL SEWER MAIN PER DCSWCS SD-17
3. STUB AND CAP SEWER PIPE. PLACE MARKER BALL AND 4"X4" POST, DOUGLAS FIR, OVER END OF PIPE AND INSTALL THRUST BLOCK (1 CUBIC FT. MINIMUM).
4. REMOVE CAP AND CONNECT TO EXISTING SEWER STUB
5. ADJUST EXISTING MANHOLE TO GRADE PER DCSWCS SD-5.
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13. INSTALL IRRIGATION METER WITH RPPA PER UDASC PLATES #4 AND #8 AND DETAIL E ON SHEET 81 WITH CURB STOP
14. INSTALL REDUCER PER UDACS SEC. 2.15
15. INSTALL STEEL SLEEVE PER UDACS PLATES #22 AND #23
16. INSTALL 22.5° BEND PER UDACS SEC. 2.15
17. INSTALL PIPE ACCESS AND REHABILITATION VAULT PER DETAILS ON SHEETS 96 AND 97
18. INSTALL WATER MAIN PER UDACS PLATES #16 AND #19 WITH 48" MAXIMUM TRENCH WIDTH
19. INSTALL CATHODIC TEST STATION PER F, G, H, I AND K ON SHEET 82
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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY A. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18649

5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|


ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200


SUMMERLIN

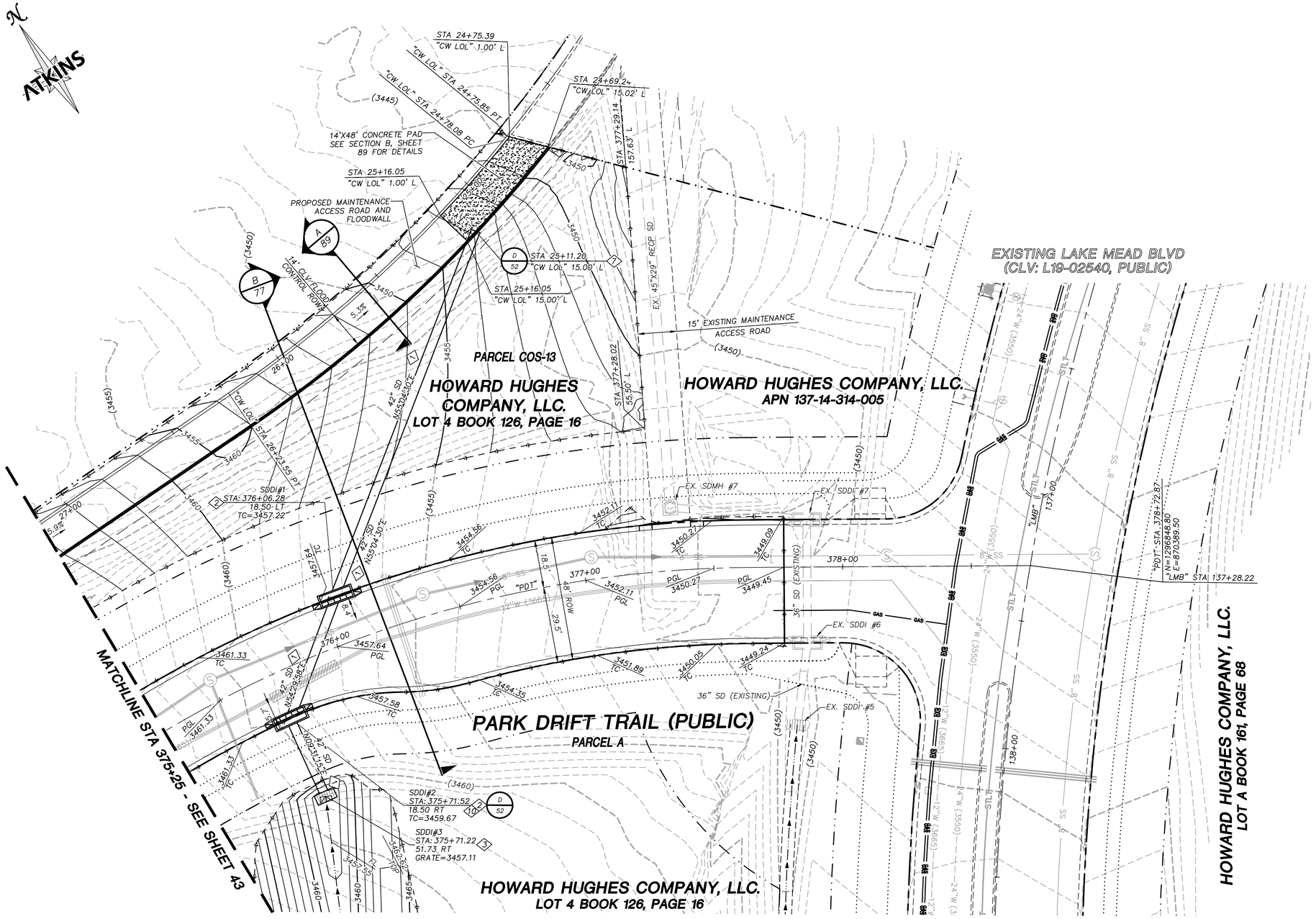
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY PLAN AND PROFILE**
**STA TO 372+00 TO STA 376+00**

DESIGNED BY: B. WOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=4'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 44/97
JOB NO. 100069316

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## STORM DRAIN CONSTRUCTION NOTES

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GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
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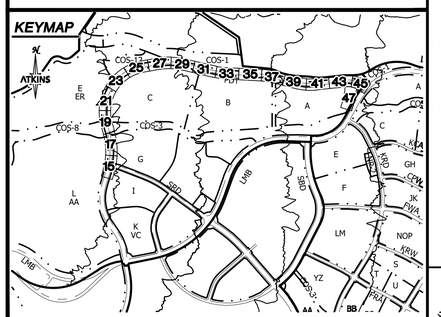
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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

KEYMAP




ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

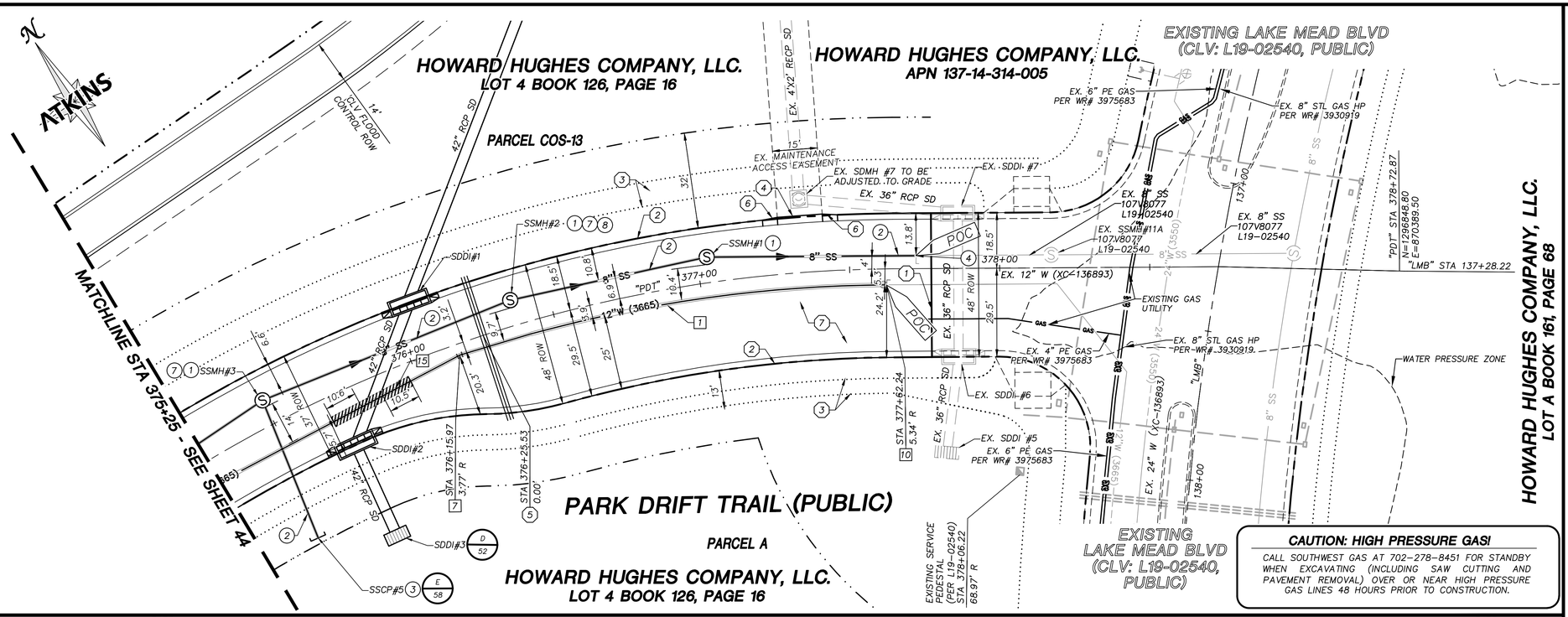
**ROADWAY GRADING PLAN**
**STA 376+00 TO END**

DESIGNED BY: B. MOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: NONE

PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
Exp. 6-30-25
CIVIL
No. 18849
5/17/2023

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 45/97
JOB NO. 100069316

C:\pw_work\ctkhorn01\dms548621\69316-32-GRAD-G1.dwg LAYOUT: 42 ROADWAY GRADING PLAN May 17, 2023 - 4:19PM




## CAUTION: HIGH PRESSURE GAS!

CALL SOUTHWEST GAS AT 702-278-8451 FOR STANDBY WHEN EXCAVATING (INCLUDING SAW CUTTING AND PAVEMENT REMOVAL) OVER OR NEAR HIGH PRESSURE GAS LINES 48 HOURS PRIOR TO CONSTRUCTION.

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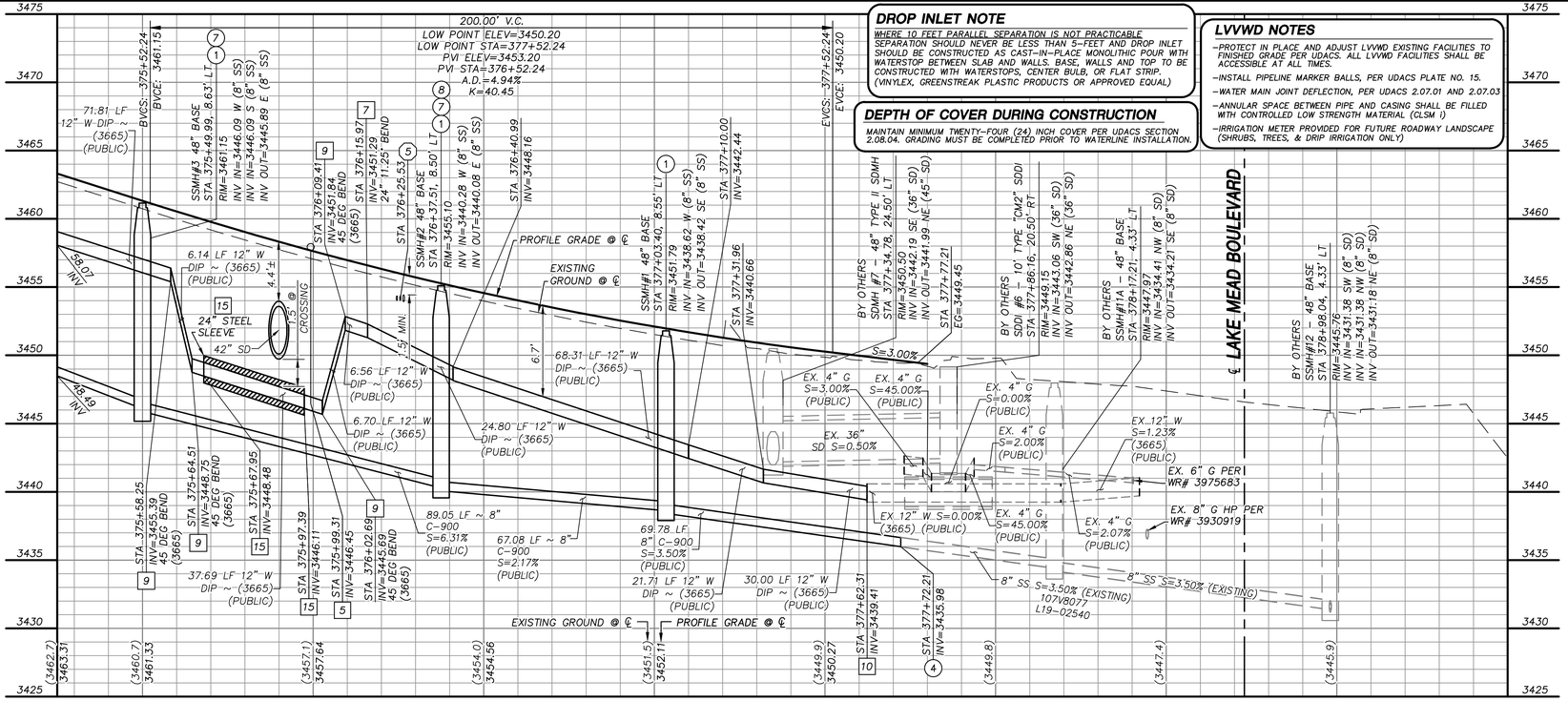
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5 0 2.5 5 10
VERTICAL: 1"=5'

## APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

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PROFESSIONAL ENGINEER - STATE OF NEVADA - ANTHONY J. ORTIZ - EXP. 6-30-25 - CIVIL - No. 18949

5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
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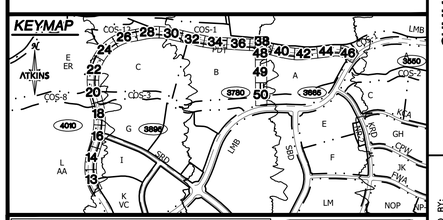
ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

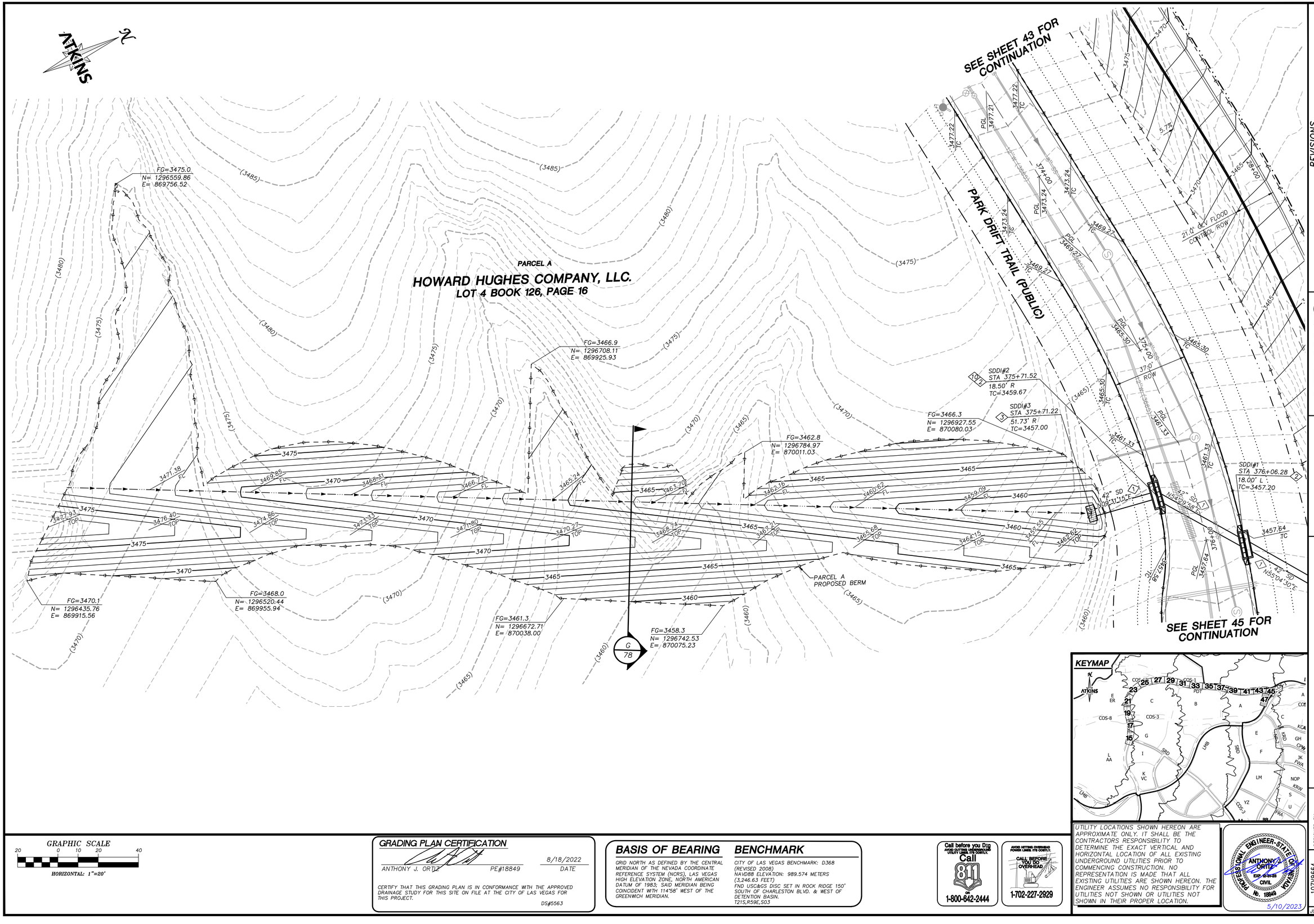
**ROADWAY PLAN AND PROFILE**
**STA 376+00 TO END**

KEYMAP




| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BAROOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=4' |
| JOB NO. | 100069316 |
| DRAWING NO. | 46/97 |
| DATE: | May 2023 |
| | 107V9664 |
| | L22-01955 |

C:\pw_work\atkinsnv01\dms54862\69316-33-PLAN-P1.dwg LAYOUT: 43 ROADWAY PLAN AND PROFILE May 17, 2023 - 3:12PM




KEYMAP

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'

## GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ — PE#18849 — 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig — AVOID CUTTING, BLASTING OR UTILITY DAMAGE, IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA — ANTHONY J. ORTIZ — EXP. 6-30-25 — CIVIL — No. 18849 — 5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

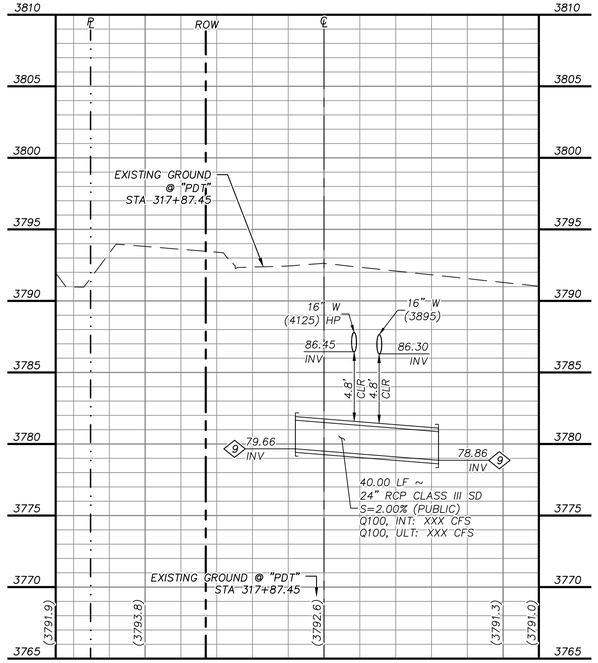
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**ROADWAY GRADING PLAN - PARCEL A BERM**

| | |
|---|---|
| DESIGNED BY: | B. MOGHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | NONE |
| DATE: | May 2023 |
| DRAWING NO. | 47/97 |

107V9664
L22-01955
JOB NO. 100069316

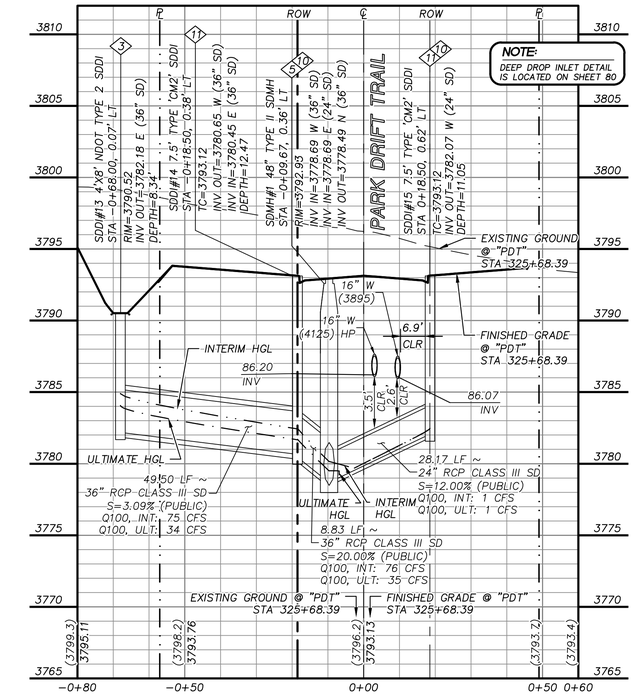
C:\pw_work\atkinsnv01\dms54862\69316-32-GRAD-G1.dwg LAYOUT: 44 ROADWAY GRADING PLAN May 10, 2023 - 2:42PM




## STORM DRAIN LATERAL 1

"PDT" STA. 317+87.45 SEE SHEET 16

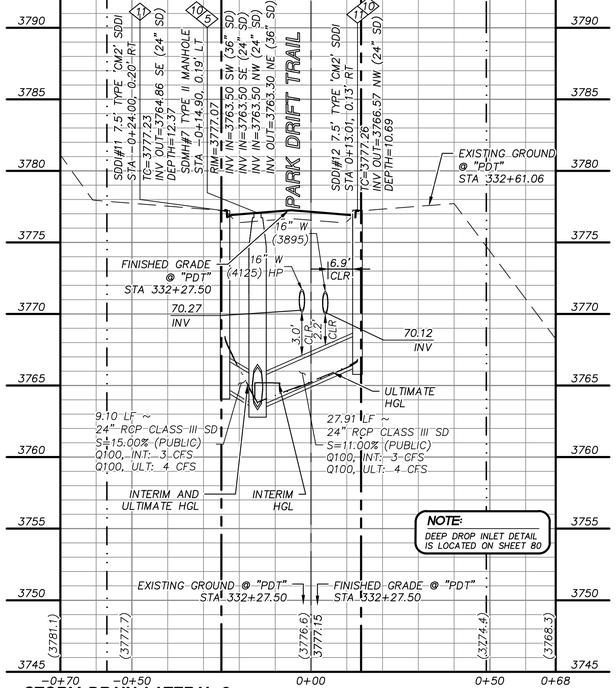
A 51




## STORM DRAIN LATERAL 2

"PDT" STA. 325+68.39 SEE SHEET 20

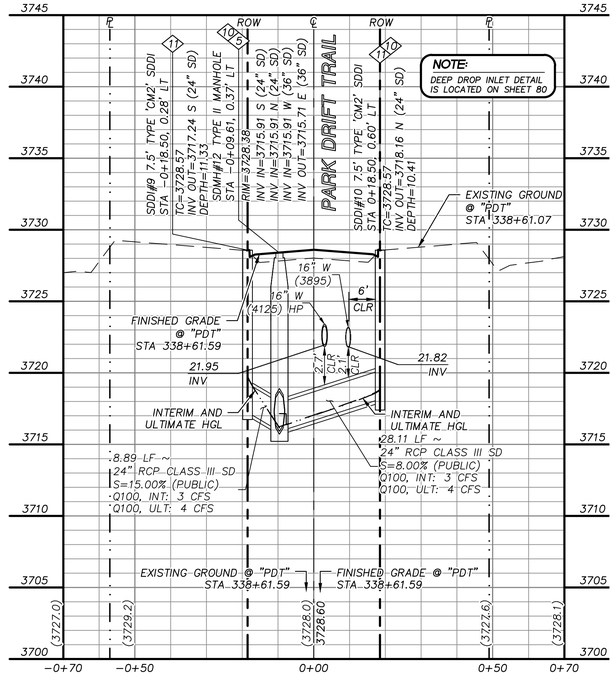
B 51




## STORM DRAIN LATERAL 3

"PDT" STA. 332+27.50 SEE SHEET 24

C 51




## STORM DRAIN LATERAL 4

"PDT" STA. 338+61.59 SEE SHEET 26

D 51

## STORM DRAIN CONSTRUCTION NOTES

1. INSTALL STORM DRAIN. SEE ROADWAY PLAN AND PROFILE SHEETS FOR ADDITIONAL STORM DRAIN NOTES AND INFORMATION.
2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
3. INSTALL NDOT TYPE 2 DROP INLET PER NDOT DS−32 AND SHEET 80 (TO BE PRIVATELY MAINTAINED)
4. INSTALL TYPE I SD MANHOLE PER CCAUSD #403.1
5. INSTALL TYPE II SD MANHOLE PER CCAUSD #405.1
6. INSTALL TYPE III SD MANHOLE PER CCAUSD #406.1
7. OUTLET STORM DRAIN PIPE AT WALL FACE. SEE DETAILS A AND B ON SHEET 91
8. REMOVE CAP AND CONNECT TO EXISTING STORM DRAIN STUB
9. STUB & PLUG STORM DRAIN FOR FUTURE CONNECTION PER MANUFACTURER'S PLUG, OR APPROVED EQUAL
10. WATERTIGHT STRUCTURE SHALL BE TREATED WITH WATERTIGHT/EPOXY PER UDACS 02.22.01B.
11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

## WATERTIGHT STRUCTURE NOTE

WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5−FEET AND STRUCTURE SHOULD BE CONSTRUCTED AS CAST−IN−PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB WALLS, BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS. CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|


ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200


SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**STORM DRAIN LATERALS**

DESIGNED BY: B. MOCHITAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=5'

JOB NO. 100069316
DRAWING NO. 51/97
DATE: May 2023

107V9664
L22−01955

GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

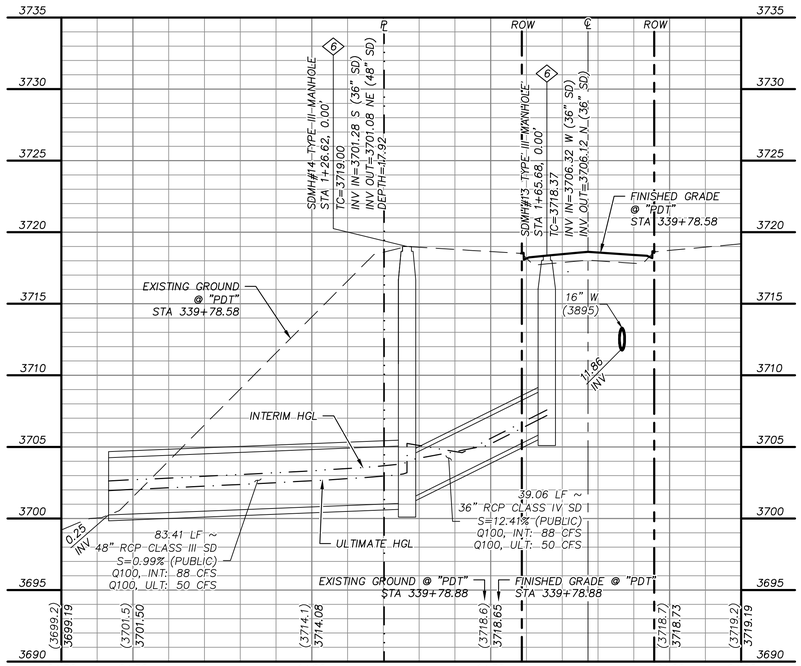
Call before you Dig
AVOID CUTTING & BACKHOEING UTILITY LINES. IT'S COSTLY.
Call 811
1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
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1-702-227-2929

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PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY J. ORTIZ
Exp. 6-30-25
CIVIL
No. 18849
5/17/2023

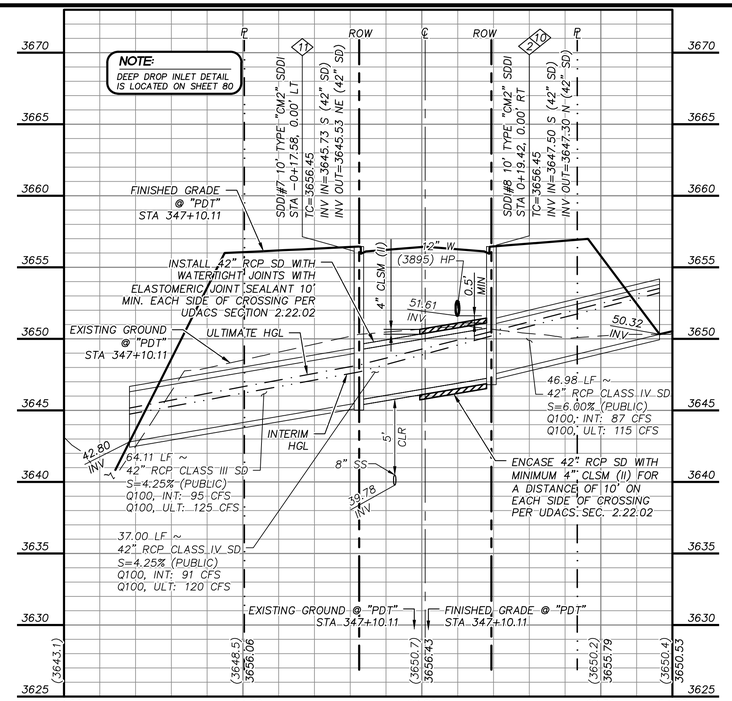
C:\pw_work\ctkronm01\dms54862\69316-XX-LATL-SD1.dwg LAYOUT: 44 STORM DRAIN LATERALS May 17, 2023 - 4:19PM




## STORM DRAIN LATERAL 6

"PDT" STA. 339+78.88 SEE SHEET 26

A 52




## STORM DRAIN LATERAL 7

"PDT" STA. 347+10.11 SEE SHEET 30

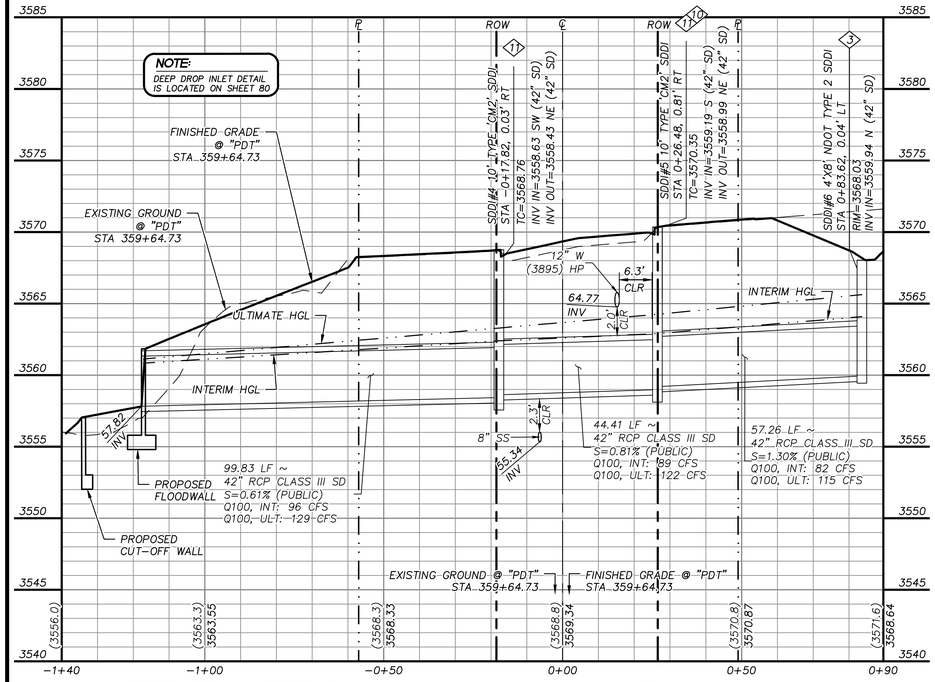
B 52

### STORM DRAIN CONSTRUCTION NOTES

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2. INSTALL TYPE "CM2" DROP INLET PER CCAUSD #412.1 & #421
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11. INSTALL MODIFIED TYPE "CM2" DROP INLET PER CCAUSD #412.1, #421, AND DEEP DROP INLET DETAIL SHEET 80

### WATERTIGHT STRUCTURE NOTE

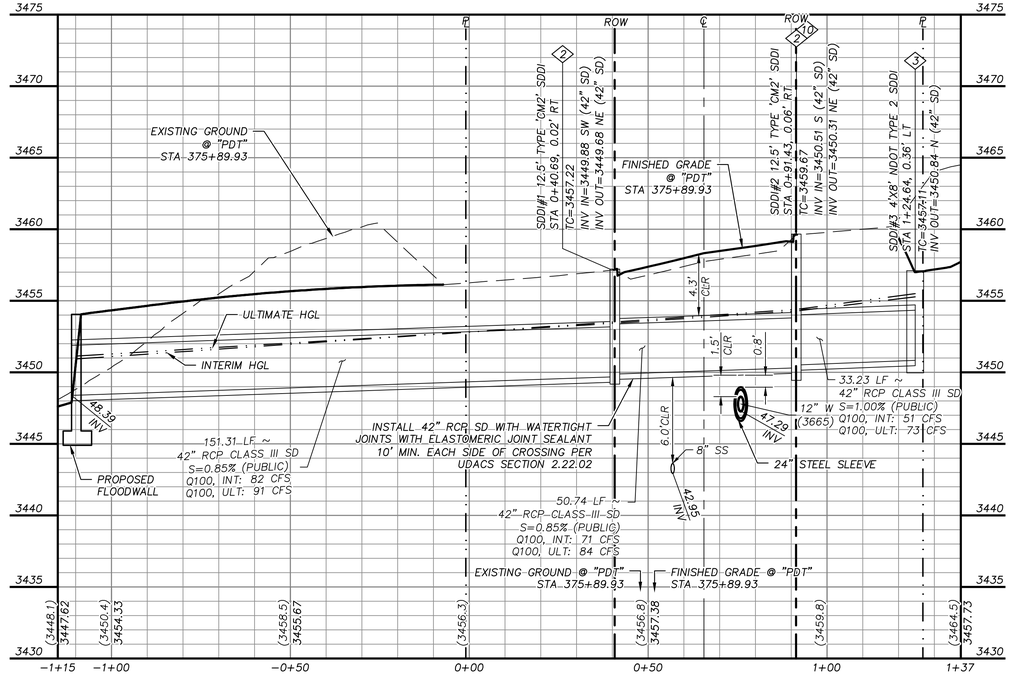
WHERE 10 FEET PARALLEL SEPARATION IS NOT PRACTICABLE SEPARATION SHOULD NEVER BE LESS THAN 5−FEET AND STRUCTURE SHOULD BE CONSTRUCTED AS CAST−IN−PLACE MONOLITHIC POUR WITH WATERSTOP BETWEEN SLAB WALLS, BASE, WALLS AND TOP TO BE CONSTRUCTED WITH WATERSTOPS. CENTER BULB, OR FLAT STRIP (VINYLEX, GREENSTREAK PLASTIC PRODUCTS OR APPROVED EQUAL).




## STORM DRAIN LATERAL 8

"PDT" STA. 359+64.73 SEE SHEET 36

C 52




## STORM DRAIN LATERAL 9

"PDT" STA. 375+89.93 SEE SHEET 46

D 52

GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

### APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

### GRADING PLAN CERTIFICATION

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

### BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

### BENCHMARK

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NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811 OR 1-800-642-2444

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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 06-30-25
CIVIL
No. 18849
5/18/2023

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | REVISIONS | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

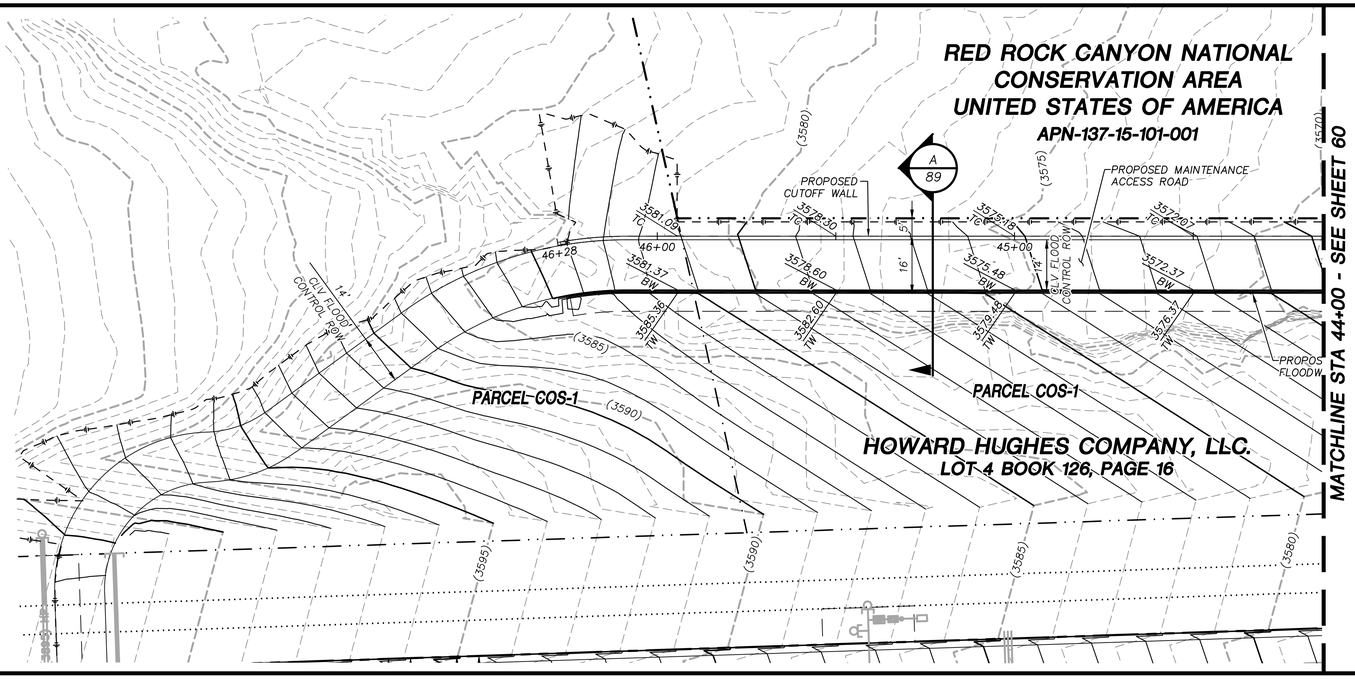
SUMMERLIN

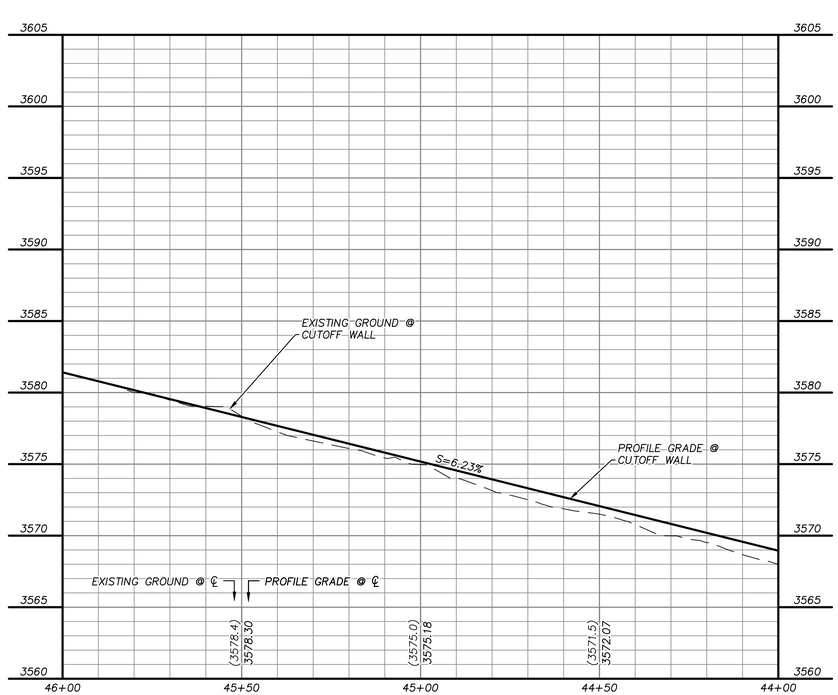
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**STORM DRAIN LATERALS**

| | |
|---|---|
| DESIGNED BY: | B. WOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=5' |
| 107V9664 | |
| L22−01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 52/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkinon01\dms548621\69316−XX−LATL−SD1.dwg LAYOUT: 45 STORM DRAIN LATERALS May 18, 2023 − 8:00AM

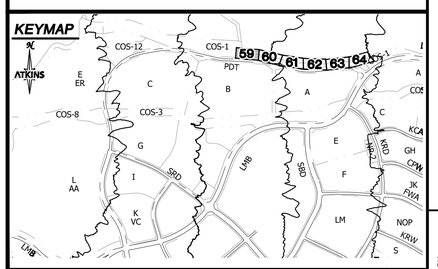



## SUMMARY OF QUANTITIES

| DESCRIPTION | QUANTITY | UNIT |
|---|---|---|
| FLOODWALL | | |
| FLOODWALL | 2,131 | LF |
| HANDRAIL | 2,131 | LF |
| CUT OFF WALL | 2,119 | LF |
| 6" CONCRETE PAVEMENT | 110 | SY |
| 2" PLANTMIX BITUMINOUS PAVEMENT | 3,251 | SY |
| 6" AGGREGATE BASE, TYPE II | 19 | CY |
| 4" AGGREGATE BASE, TYPE II | 362 | CY |

**NOTE:**
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.




GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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T21S,R59E,S03

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AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 06-30-25
CIVIL
No. 18849
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

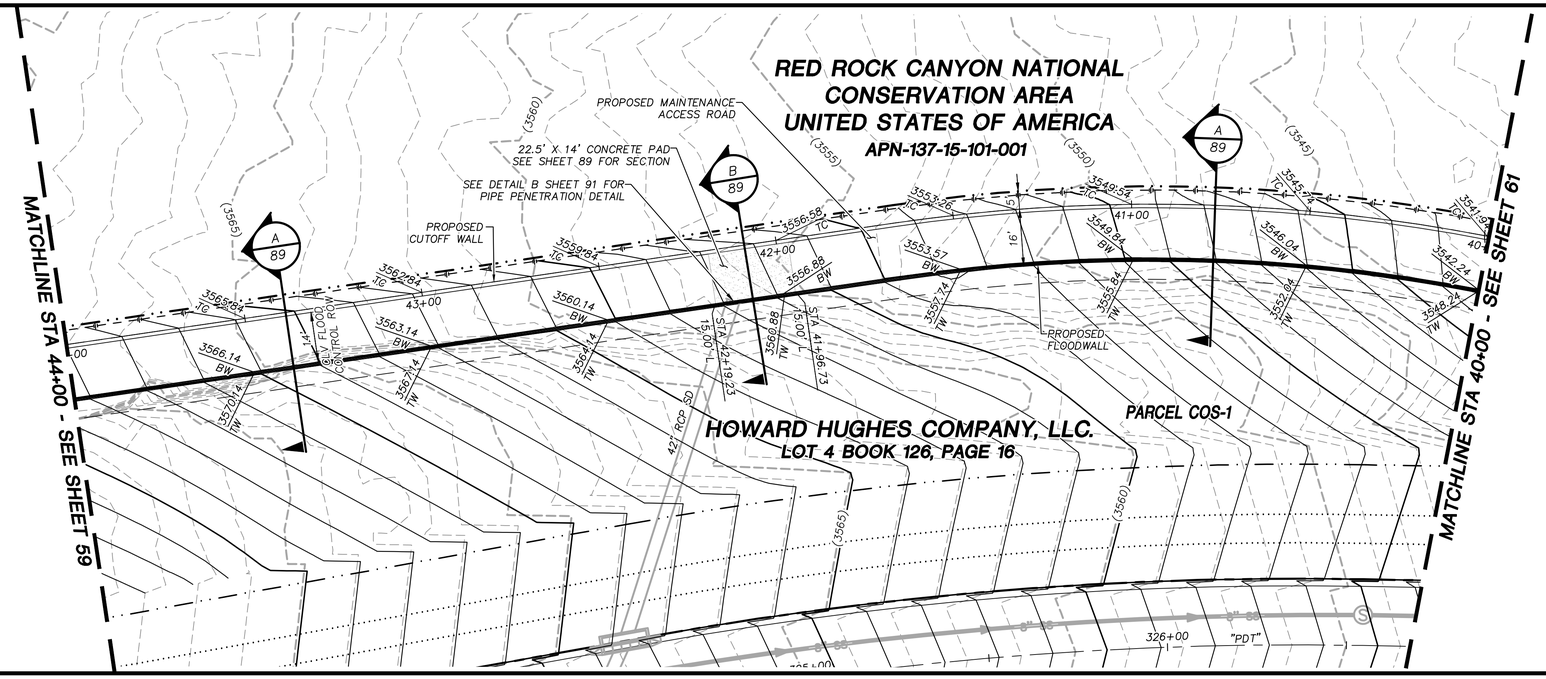
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

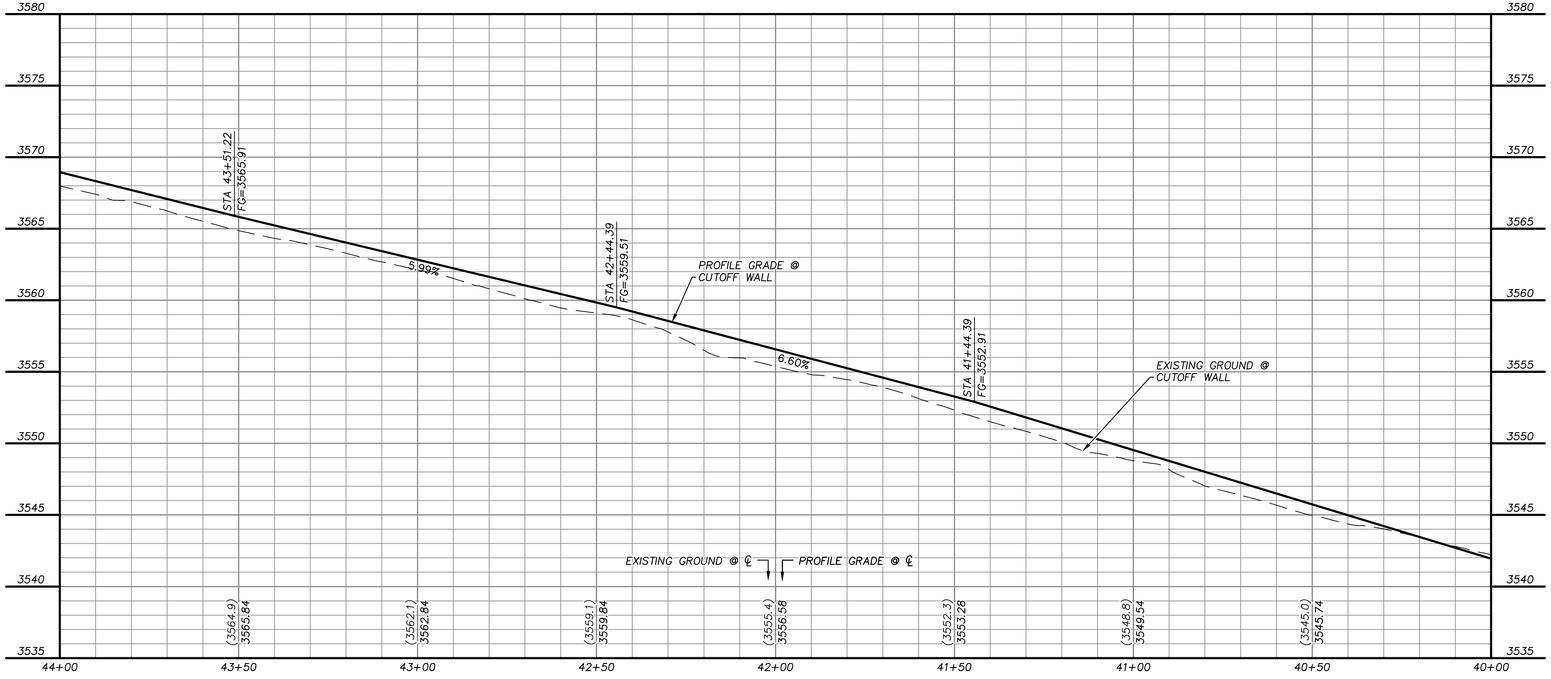
**CUTOFF WALL PLAN AND PROFILE**
**END TO STA 44+00**

DESIGNED BY: B. WOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BAROOS
HORIZ.: 1"=20'
VERT.: 1"=5'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 59/97
JOB NO. 100069316

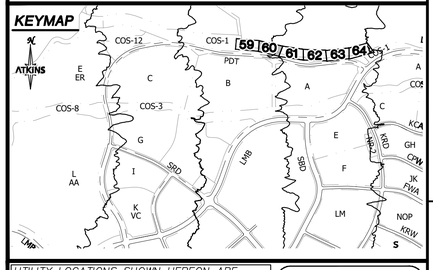
C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 57 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:51PM




**NOTE:**
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT. DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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PROFESSIONAL ENGINEER-SITE/CIVIL ANTHONY J. ORTIZ EXP. 12-31-23 CIVIL No. 18849 5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

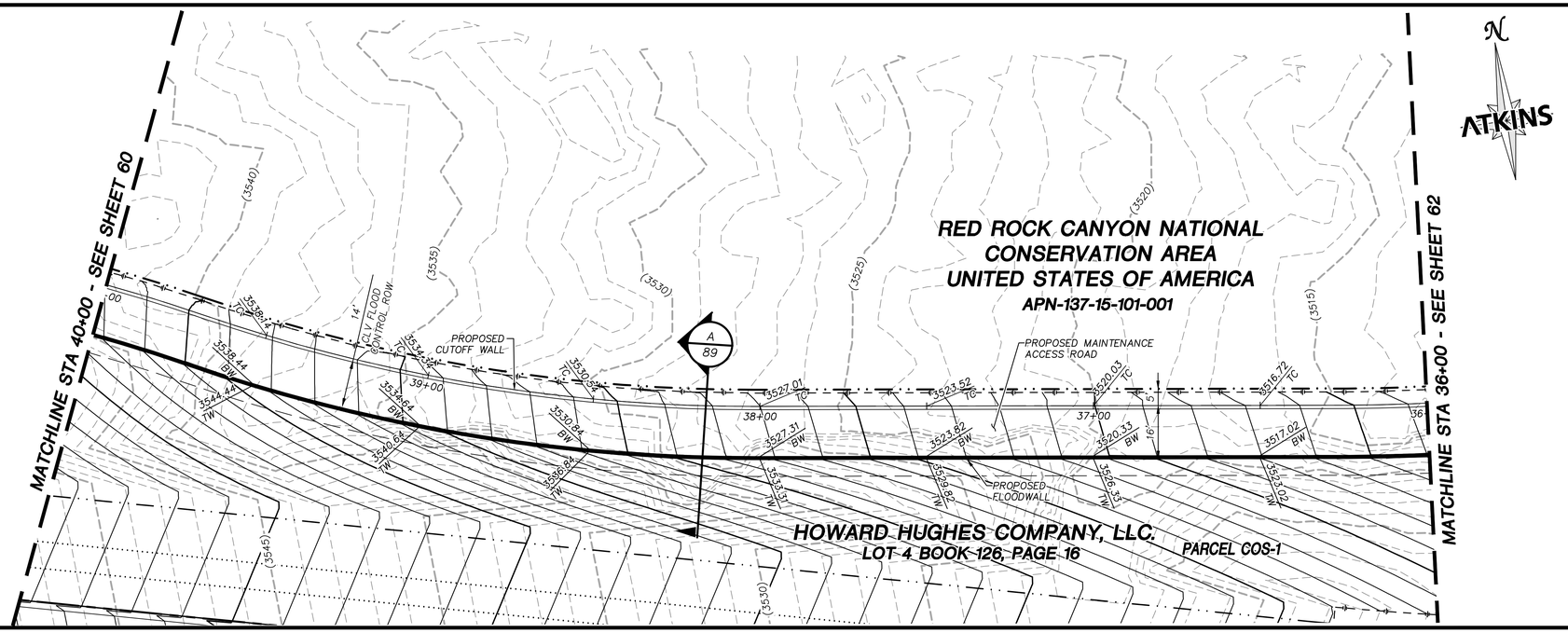
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

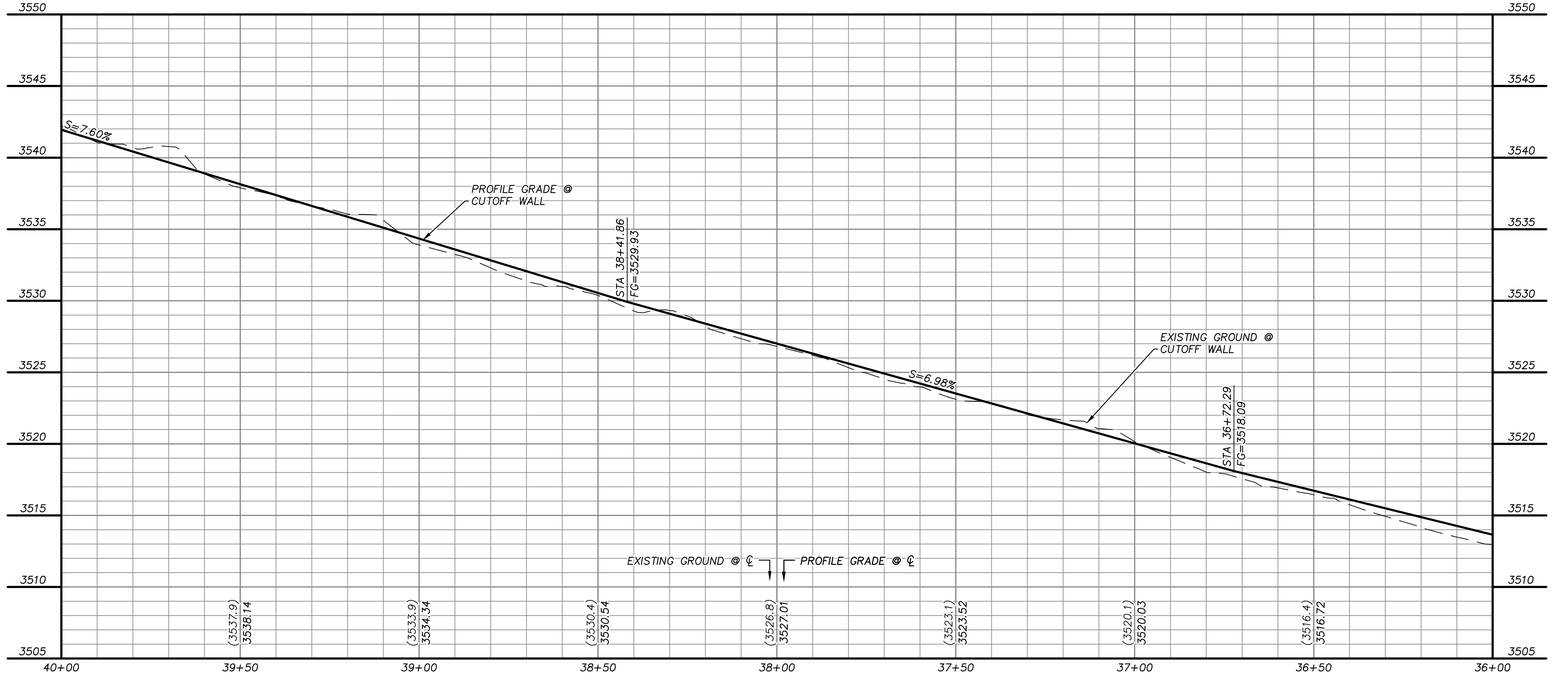
**CUTOFF WALL PLAN AND PROFILE**
**STA 44+00 TO STA 40+00**

DESIGNED BY: B. MOCHITVAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=5'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 60/97
JOB NO. 100069316

C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 58 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:51PM




GRAPHIC SCALE

20 0 10 20 40

HORIZONTAL: 1"=20'

5 0 2.5 5 10

VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008) NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET) FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN. 1215,859E,503

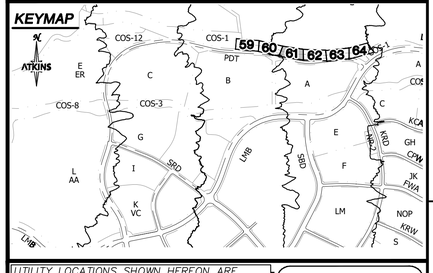
Call before you Dig AVOID CUTTING INTO UNDERGROUND UTILITY LINES. IT'S COSTLY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

**NOTE:**

NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.

**KEYMAP**




UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-SITE/CIVIL ANTHONY J. ORTIZ EXP. 12-31-23 CIVIL No. 18849 5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**

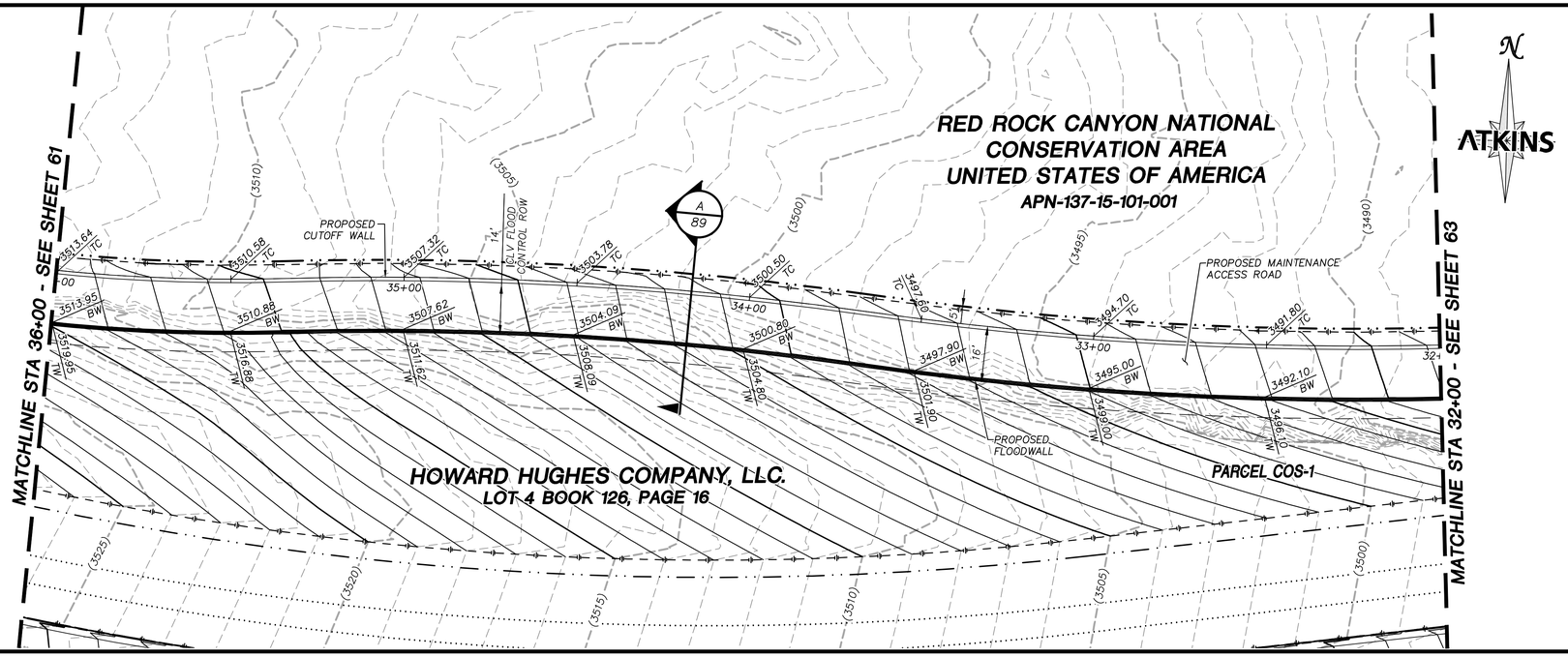
PARK DRIFT TRAIL

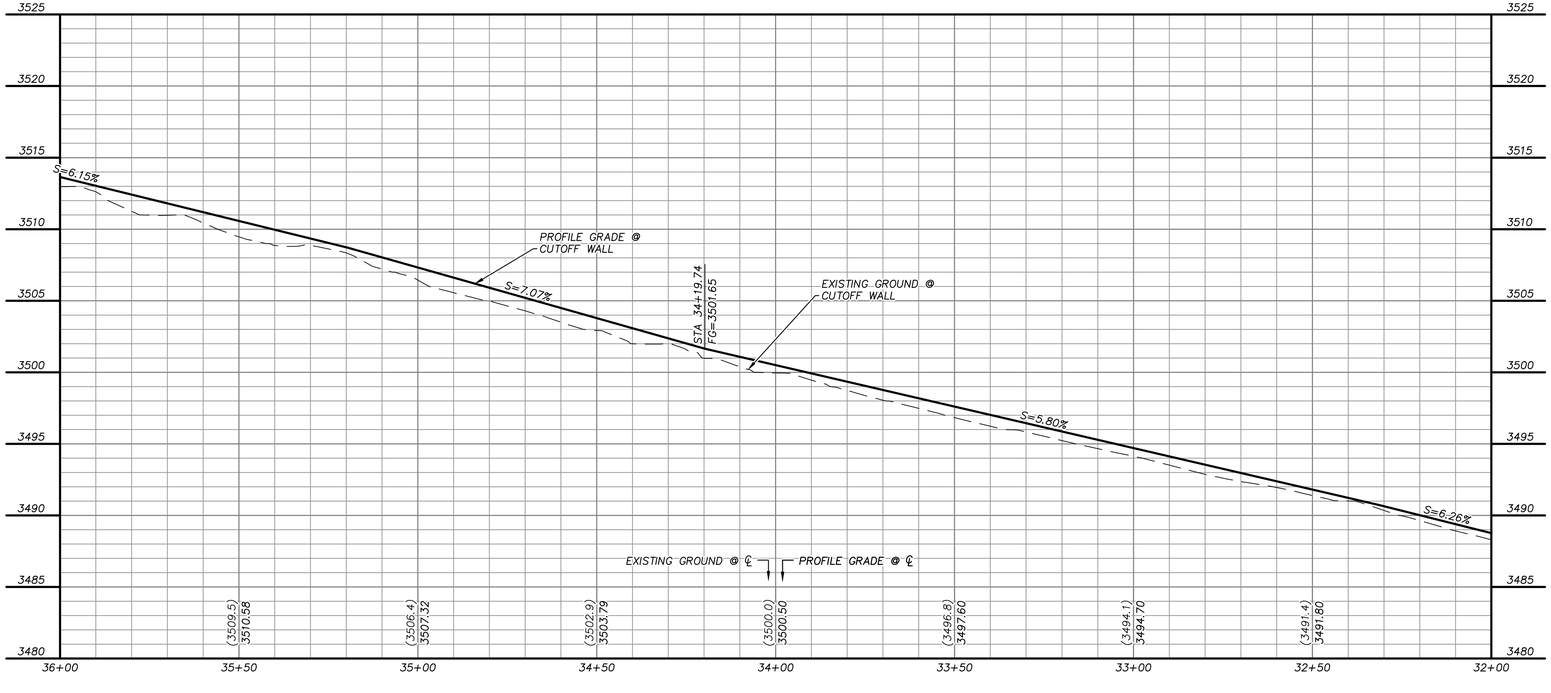
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**CUTOFF WALL PLAN AND PROFILE STA TO 40-00 TO STA 36-00**

| | |
|---|---|
| DESIGNED BY: | B. WOCHYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORIZ.: | 1"=20' |
| VERT.: | 1"=5' |
| 107V9664 L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 61/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 59 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:51PM




GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

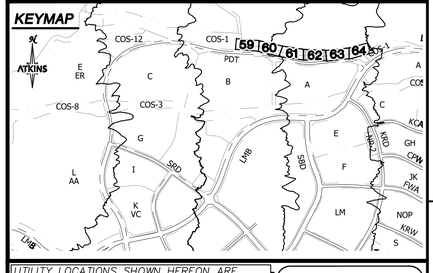
Call before you Dig AVOID CUTTING, BLASTING AND BOREHOLES UNTIL UTILITY LINES ARE CLEARLY MARKED
Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

**NOTE:**

NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.

**KEYMAP**




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PROFESSIONAL ENGINEER-SITE/CIVIL ANTHONY J. ORTIZ EXP. 12-31-23 CIVIL No. 18849 5/10/2023

| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

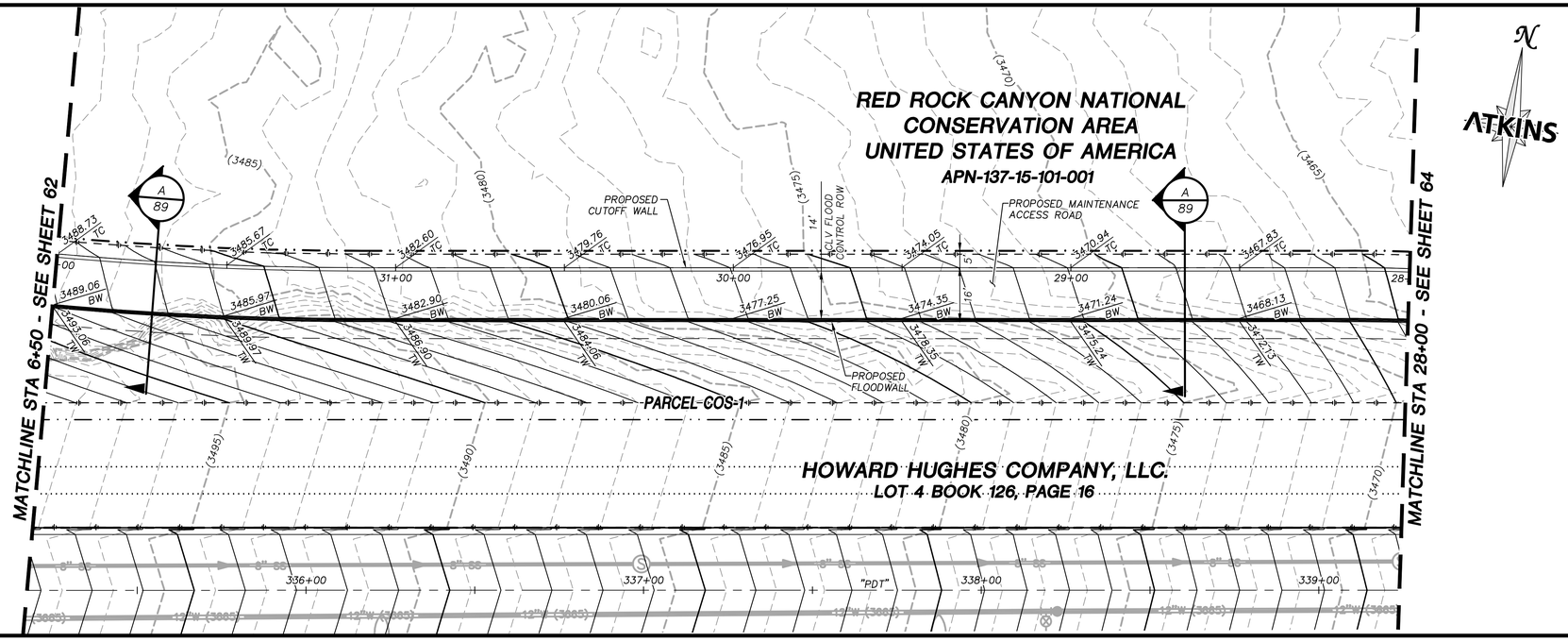
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

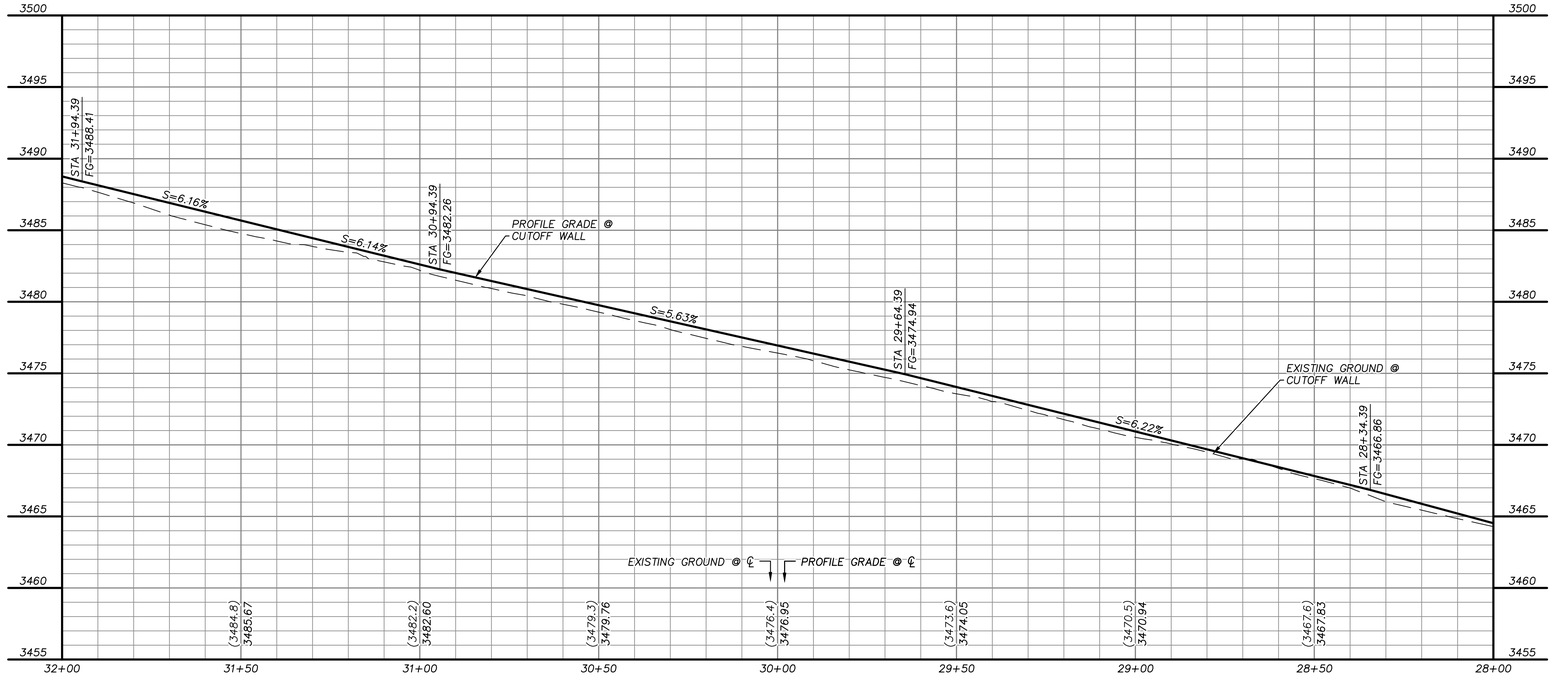
**CUTOFF WALL PLAN AND PROFILE**
**STA 36+00 TO STA 32+00**

DESIGNED BY: B. MOCHYTAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=5'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 62/97
JOB NO. 100069316

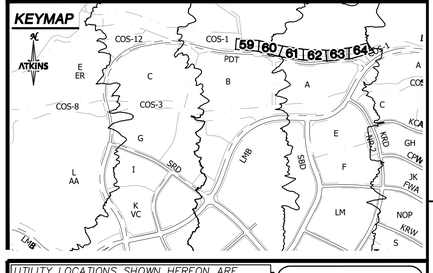
C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 60 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:51PM




**NOTE:**
NO CONSTRUCTION, EQUIPMENT, OR GRADING ALLOWED WITHIN RED ROCK CONSERVATION PROPERTY.

KEYMAP



GRAPHIC SCALE
20 0 10 20 40
HORIZONTAL: 1"=20'
5 0 2.5 5 10
VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022
DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig AVOID CUTTING INTO BURIED OR UTILITY LINES. ITS QUICK & EASY. Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS QUICK. CALL BEFORE YOU DO OVERHEAD 1-702-227-2929

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PROFESSIONAL ENGINEER-SITE/CIVIL ANTHONY J. ORTIZ EXP. 12-31-23 CIVIL No. 18849 5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

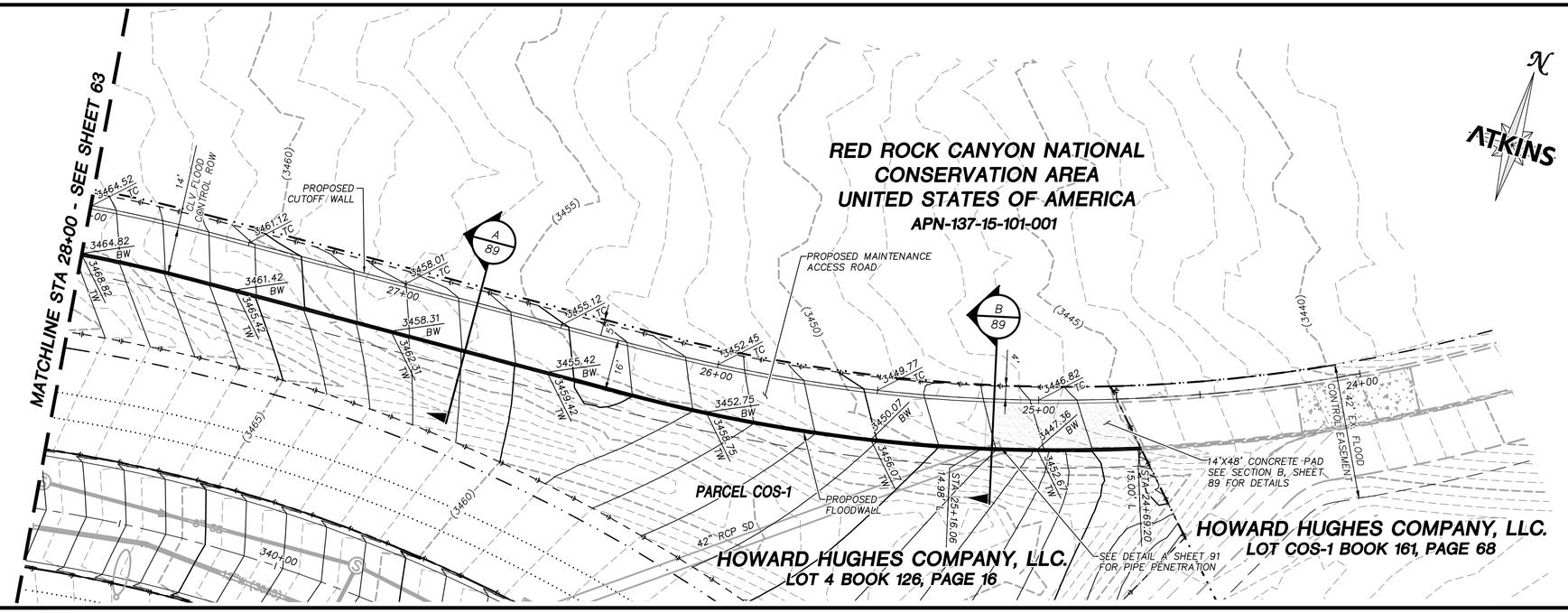
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

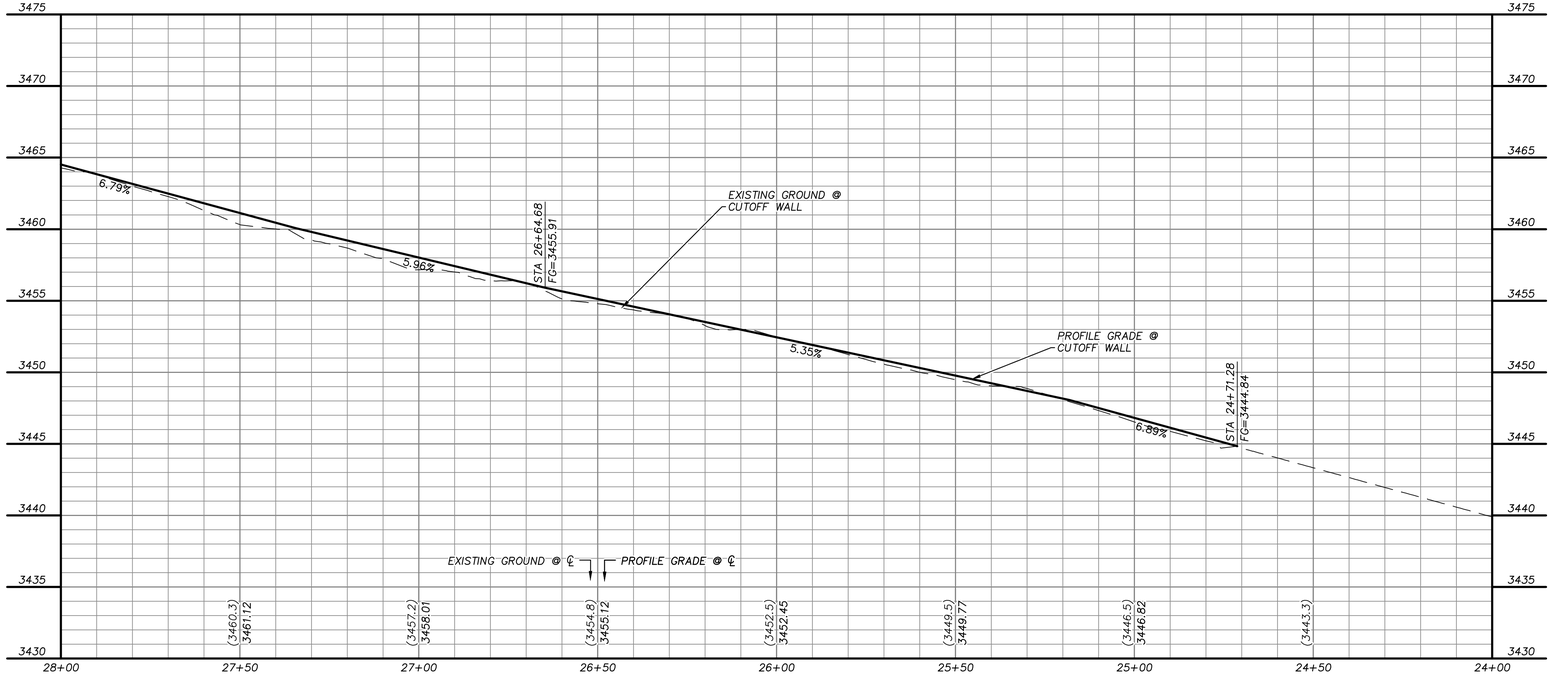
**CUTOFF WALL PLAN AND PROFILE**
**STA 32+00 TO STA 28+00**

DESIGNED BY: B. MOCHYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=5'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 63/97
JOB NO. 100069316

C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 61 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:51PM




GRAPHIC SCALE

HORIZONTAL: 1"=20'

VERTICAL: 1"=5'

**APPROVED FOR CONSTRUCTION**

LAS VEGAS VALLEY WATER DISTRICT PLANNING AND ENGINEERING SERVICES

PROJECT NO. 140581 FIRST APPROVED DATE: _____

LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDUAL

**GRADING PLAN CERTIFICATION**

ANTHONY J. ORTIZ PE#18849 8/18/2022 DATE

CERTIFY THAT THIS GRADING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

DS#5563

**BASIS OF BEARING**

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**BENCHMARK**

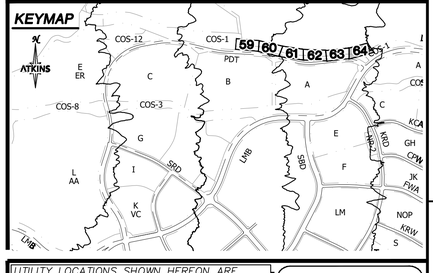
CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

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PROFESSIONAL ENGINEER-SITE/CIVIL
ANTHONY J. ORTIZ
EXP. 12-31-23
CIVIL
No. 18849
5/10/2023

| REVISIONS | | | | |
|---|---|---|---|---|
| REV. | DESCRIPTION | BY | DATE | APPROVAL |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7276
Fax: +1.702.263.7200

SUMMERLIN

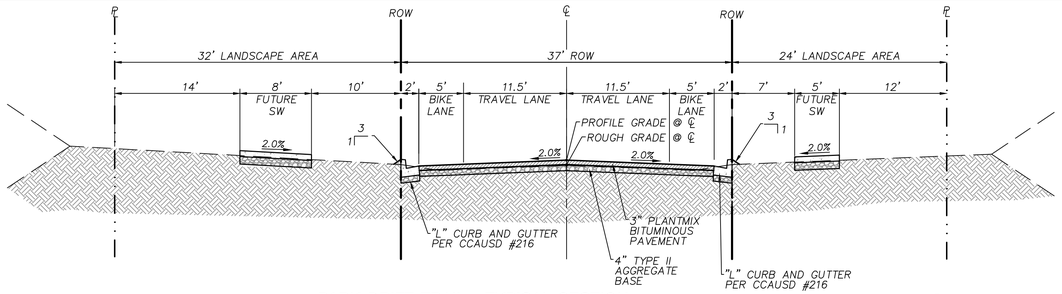
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**CUTOFF WALL PLAN AND PROFILE**
**STA 28+00 TO BEGIN**

DESIGNED BY: B. MOCHYNAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: 1"=20'
VERT.: 1"=5'

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 64/97
JOB NO. 100069316

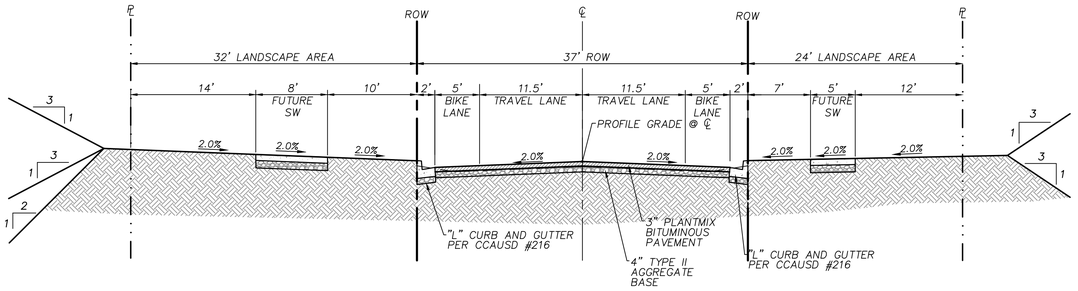
C:\pw_work\atkinsnv01\dms54862\69316-52-FLOODPLAN-F1.dwg LAYOUT: 62 FLOODWALL PLAN AND PROFILE May 10, 2023 - 2:52PM




## PARK DRIFT TRAIL - TYPICAL SECTION

N.T.S.

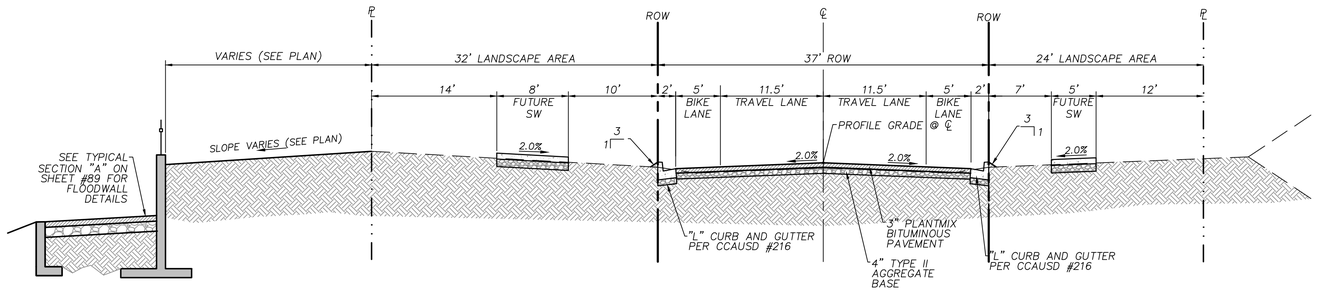
A 77




## PARK DRIFT TRAIL WITH LANDSCAPING - TYPICAL SECTION

N.T.S.

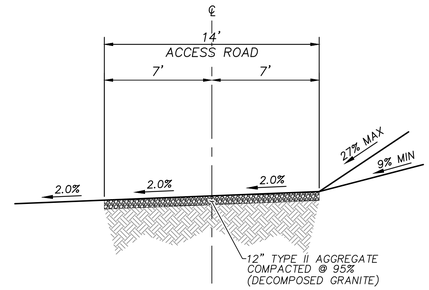
F 77




## PARK DRIFT TRAIL WITH FLOOD WALL - TYPICAL SECTION

N.T.S.

B 77



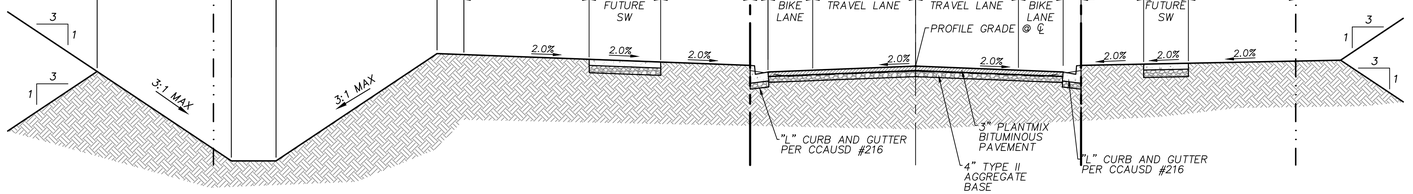

**NOTES:**

1. DRIVING SURFACE TO BE CAPABLE OF SUPPORTING H-20 LOADING PER GEOTECHNICAL ENGINEER, NATIVE SOILS ARE ACCETABLE. ANY MATERIAL OVER 1" IN DIAMETER MUST BE REMOVED.

## ACCESS ROAD - TYPICAL SECTION

N.T.S.

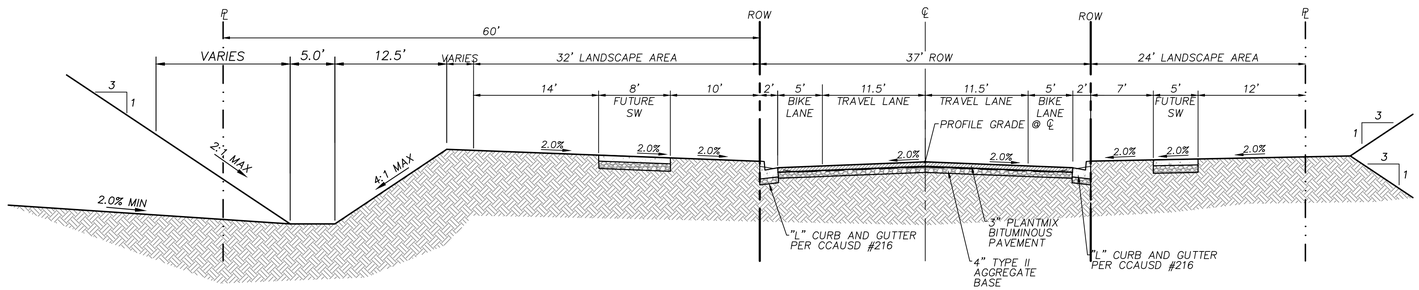
G 77




## PARK DRIFT TRAIL WITH LANDSCAPING AND SWALE - TYPICAL SECTION

N.T.S.

D 77




## PARK DRIFT TRAIL WITH LANDSCAPING AND SWALE - TYPICAL SECTION

N.T.S.

E 77

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
1215,R59E,S03

Call before you Dig
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Call 811 or 1-800-642-2444

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PROFESSIONAL ENGINEER-SITE/CIVIL
ANTHONY A. ORTIZ
Exp. 6-30-25
No. 18949
5/10/2023

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

REVISIONS

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

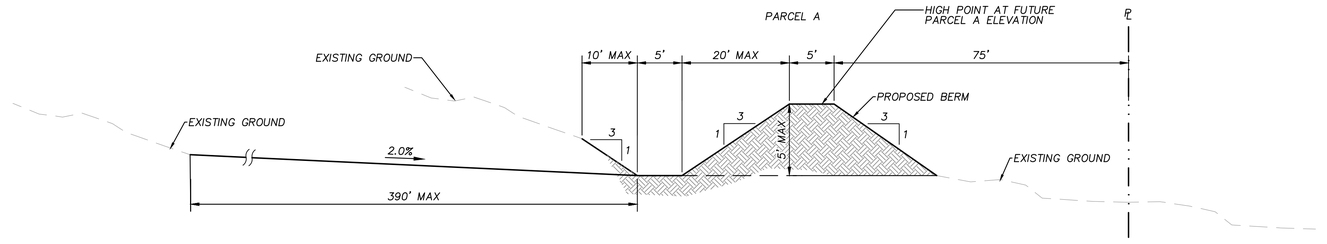
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**TYPICAL SECTIONS**

| | |
|---|---|
| 107V9664 | DESIGNED BY: B. MOCHTYAK |
| L22-01955 | DRAWN BY: K. HENDRY |
| DATE: May 2023 | CHECKED BY: N. BARCOS |
| DRAWING NO. 77/97 | HORIZ.: NONE VERT.: NONE |
| JOB NO. 100069316 | |

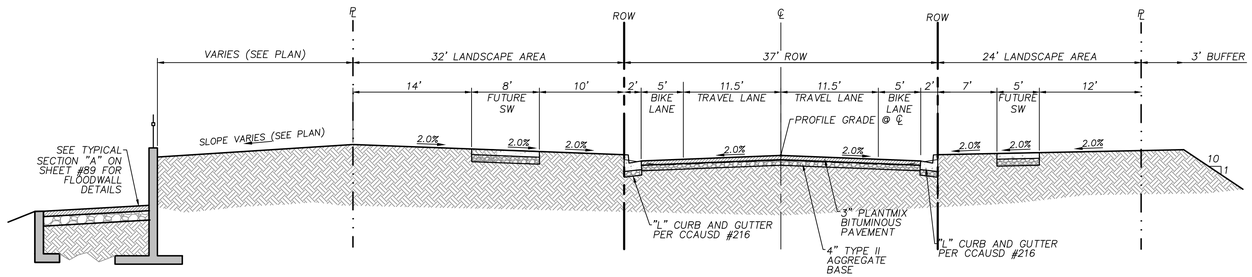
C:\pw_work\atkinsv01\dms54862\69316-DETL-01.dwg LAYOUT: 69 TYPICAL SECTIONS May 10, 2023 - 2:54PM




## PARCEL A PROPOSED BERM - TYPICAL SECTION

N.T.S.

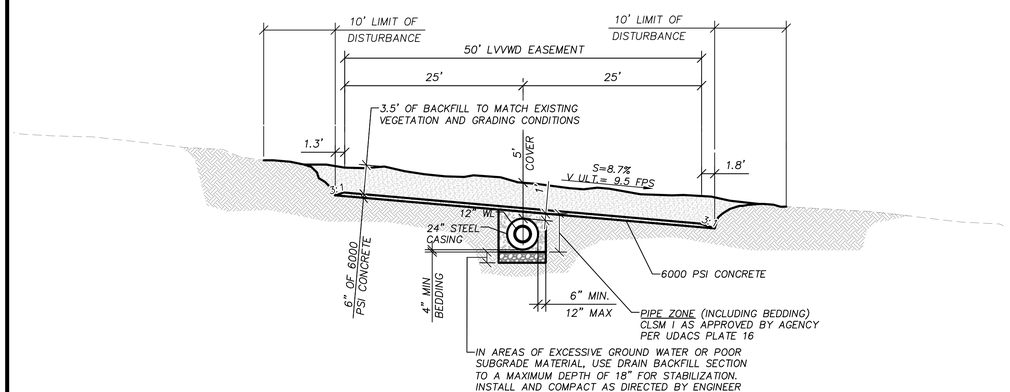
G / 78




## PARK DRIFT TRAIL WITH LANDSCAPING AND FLOODWALL - TYPICAL SECTION

N.T.S.

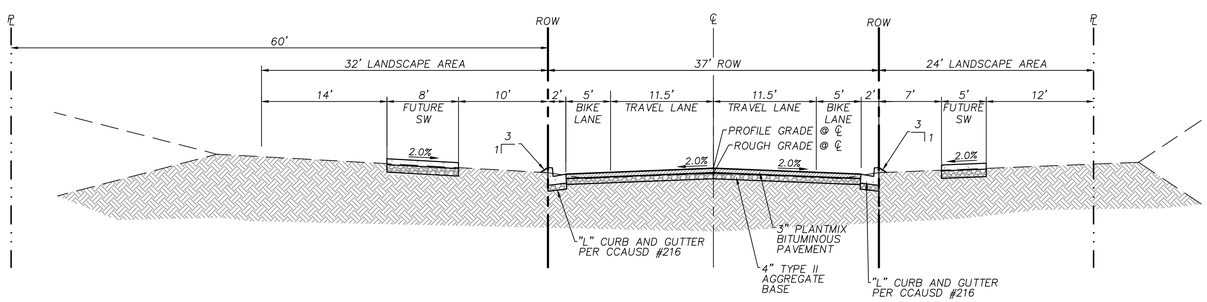
H / 78




## CONCERETE WATERLINE PROTECTION SECTION

SCALE 1"=10'

I / 78




## PARK DRIFT TRAIL - TYPICAL SECTION

N.T.S.

J / 78

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES ITS QUICK!
Call 811 OR 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. ITS QUICK!
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY ORTIZ
Exp. 6-30-25
CIVIL
No. 18949
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074
Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

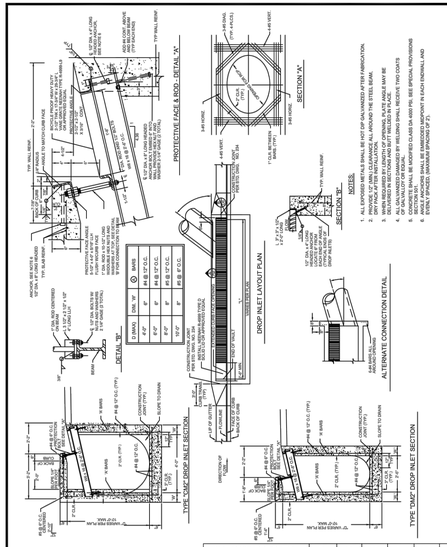
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**TYPICAL SECTIONS**

| | |
|---|---|
| DESIGNED BY: | B. MOCHTYAK |
| DRAWN BY: | K. HENDRY |
| CHECKED BY: | N. BARCOS |
| HORZ.: | NONE |
| VERT.: | NONE |
| 107/9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 78/97 |
| JOB NO. | 100069316 |

C:\pw_work\ctkronn01\dms54862\69316-DETL-D1.dwg LAYOUT: 78 - TYPICAL SECTIONS May 10, 2023 - 2:54PM




| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| SPECIFICATION REFERENCE | |
|---|---|
| 501 | CONCRETE |
| 501 | CONCRETE STRUCTURES |
| 501 | REINFORCING STEEL |
| 501 | STEEL |

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

TYPE "C-D" MODIFIED DROP INLET

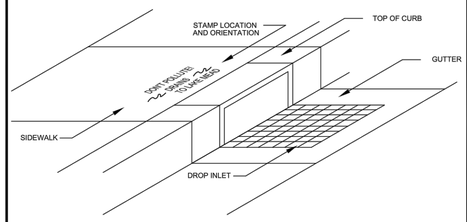
DATE 9-14-06 | DWG. NO. 412.1

## TYPE "C-D" MODIFIED DROP INLET

N.T.S.

A / 79

## STORMWATER INLET CONCRETE STAMP




NOTES:

1. MESSAGE OR SYMBOL SHALL BE AS SHOWN ON THE DRAWING OR ON THE VERTICAL CURB NEXT TO THE DROP INLET OR AS APPROVED BY THE APPROPRIATE CITY OR COUNTY ENGINEER.
2. LETTERS SHALL BE 1-7/16" IN HEIGHT. THE MESSAGE SHALL BE CENTERED ON THE BACK OF THE INLET OR ON THE TOP OF CURB.
3. CONCRETE SHALL BE STAMPED IN SUCH A WAY AS TO PROVIDE FOR A CLEAR AND LEGIBLE IMAGE. ( APPROXIMATE DEPTH OF 1/4").
4. ALL STAMPS SHALL BE APPROVED BY THE CITY OR COUNTY ENGINEER BEFORE BEING USED.
5. STAMP MAY BE PERMANENTLY CAST INTO CAST IRON FRAME OR PRE-CAST CONCRETE PORTIONS OF INLET.
6. WHERE RETROFITTING IS REQUIRED, AN EPOXIED PLACARD BEARING THE MESSAGE AND SYMBOL APPROVED BY THE APPROPRIATE CITY OR COUNTY ENGINEER SHALL BE PERMANENTLY AFFIXED ON THE TOP OF THE ADJACENT CURB.
7. THIS STANDARD IS REQUIRED IN THE LAS VEGAS VALLEY IN WHICH AREA WATER DRAINS TO LAKE MEAD.

| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| SPECIFICATION REFERENCE | |
|---|---|

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

STORM WATER QUALITY MANAGEMENT STAMP AND SIGN DETAIL

DATE 12-09-10 | DWG. NO. 421 | SHEET 1 OF 3

## STAMP MESSAGES AND SYMBOLS

16.5" MAXIMUM

5" MAX.

DON'T POLLUTE!
DRAINS
TO LAKE MEAD!

| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| SPECIFICATION REFERENCE | |
|---|---|

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

STORM WATER QUALITY MANAGEMENT STAMP AND SIGN DETAIL

DATE 12-09-10 | DWG. NO. 421 | SHEET 2 OF 3

4" PLACARD - COLORS = BLUE AND GREEN

THIS EPOXY PLACARD MESSAGE AND SYMBOL HAS BEEN APPROVED BY THE APPROPRIATE CITY OR COUNTY ENGINEER. ANY OTHER EQUIVALENT MESSAGE AND SYMBOL DESIGNS WILL REQUIRE PRIOR APPROVAL OF THE APPROPRIATE CITY OR COUNTY BEFORE INSTALLATION. THE PLACARD MATERIAL SHALL BE EITHER POLYCARBONATE OR METAL AND THE FINISH SHALL BE UV AND ABRASION RESISTANT.

STORM DRAIN MARKER

| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| SPECIFICATION REFERENCE | |
|---|---|

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

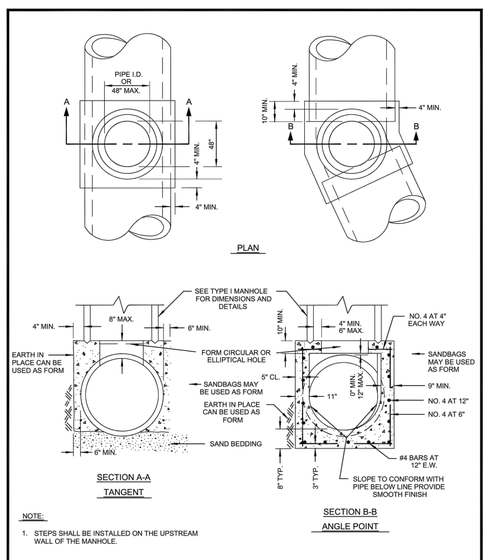
STORM WATER QUALITY MANAGEMENT STAMP AND SIGN DETAIL

DATE 12-09-10 | DWG. NO. 421 | SHEET 3 OF 3

## STORM WATER QUALITY MANAGEMENT STAMP AND SIGN DETAIL

N.T.S.

B / 79




NOTE:

1. STEPS SHALL BE INSTALLED ON THE UPSTREAM WALL OF THE MANHOLE.

| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| SPECIFICATION REFERENCE | |
|---|---|
| 501 | CONCRETE |
| 505 | REINFORCING STEEL |
| 609 | CATCH BASINS, MANHOLES & INLETS |

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

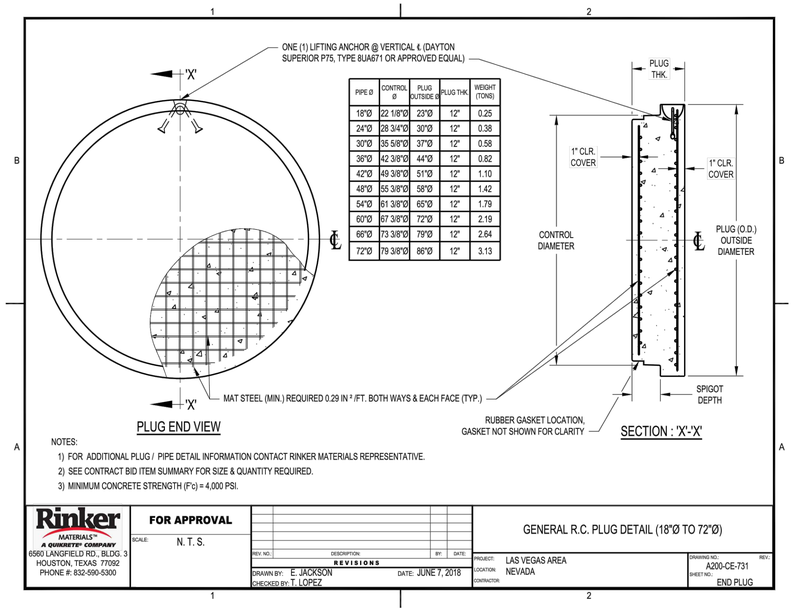
TYPE III MANHOLE

DATE | DWG. NO. 406

## TYPE III MANHOLE

N.T.S.

C / 79




| PIPE Ø | CONTROL Ø | PLUG OUTSIDE Ø | PLUG THK. | WEIGHT (TONS) |
|---|---|---|---|---|
| 18"Ø | 22 1/8"Ø | 23"Ø | 12" | 0.25 |
| 24"Ø | 28 3/4"Ø | 30"Ø | 12" | 0.38 |
| 30"Ø | 35 5/8"Ø | 37"Ø | 12" | 0.58 |
| 36"Ø | 42 3/8"Ø | 44"Ø | 12" | 0.82 |
| 42"Ø | 49 3/8"Ø | 51"Ø | 12" | 1.10 |
| 48"Ø | 55 3/8"Ø | 58"Ø | 12" | 1.42 |
| 54"Ø | 61 3/8"Ø | 65"Ø | 12" | 1.79 |
| 60"Ø | 67 3/8"Ø | 72"Ø | 12" | 2.19 |
| 66"Ø | 73 3/8"Ø | 79"Ø | 12" | 2.64 |
| 72"Ø | 79 3/8"Ø | 86"Ø | 12" | 3.13 |

NOTES:

1) FOR ADDITIONAL PLUG / PIPE DETAIL INFORMATION CONTACT RINKER MATERIALS REPRESENTATIVE.
2) SEE CONTRACT BID ITEM SUMMARY FOR SIZE & QUANTITY REQUIRED.
3) MINIMUM CONCRETE STRENGTH (Fc) = 4,000 PSI.

Rinker MATERIALS™ A CRH COMPANY
6560 LANGFIELD RD., BLDG. 3
HOUSTON, TEXAS 77092
PHONE #: 832-590-5300

FOR APPROVAL
SCALE: N. T. S.

REVISIONS
REV. NO. | DESCRIPTION | BY: | DATE:

DRAWN BY: E. JACKSON | DATE: JUNE 7, 2018
CHECKED BY: T. LOPEZ

PROJECT: LAS VEGAS AREA
LOCATION: NEVADA
CONTRACTOR:

GENERAL R.C. PLUG DETAIL (18"Ø TO 72"Ø)

DRAWING NO.: A200-CE-731 | REV:
SHEET NO.: END PLUG

## TYPICAL STORM DRAIN CAP

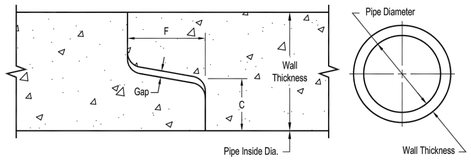
N.T.S.

D / 79

Rinker MATERIALS™

**Concrete Pipe Division**

**Reinforced Concrete Pipe**
**Tongue & Groove Joint**
**12" - 96" Diameter**




Section Thru Joint | Section Thru Barrel

Table of Dimensions and Weights

| Pipe Inside Diameter (Inches) | Wall Thickness (Inches) | C (Inches) | F (Inches) | Gap (Inches) | Length (Feet) | Weight (Lbs./Ft.) |
|---|---|---|---|---|---|---|
| 12 | 2 | 7/8 | 2 | 1/4 | 6 | 92 |
| 15 | 2 1/4 | 1 1/16 | 2 | 1/4 | 6, 8 | 127 |
| 18 | 2 1/2 | 1 3/16 | 2 | 1/4 | 6, 8 | 168 |
| 21 | 2 3/4 | 1 1/4 | 2 1/4 | 1/4 | 6, 8 | 214 |
| 24 | 3 | 1 5/16 | 2 1/2 | 1/4 | 6, 8 | 265 |
| 30 | 3 1/2 | 1 1/2 | 2 3/4 | 9/32 | 6, 8 | 384 |
| 36 | 4 | 1 13/16 | 3 | 9/32 | 6, 8 | 524 |
| 42 | 4 1/2 | 1 7/8 | 3 1/4 | 3/8 | 6, 8 | 685 |
| 48 | 5 | 2 | 3 3/4 | 3/8 | 6, 8 | 867 |
| 54 | 5 1/2 | 2 1/4 | 4 | 3/8 | 6, 8 | 1071 |
| 60 | 6 | 2 1/2 | 4 1/4 | 1/2 | 6, 8 | 1296 |
| 66 | 6 1/2 | 2 3/4 | 4 1/2 | 1/2 | 6, 8 | 1542 |
| 72 | 7 | 3 | 4 1/2 | 1/2 | 6, 8 | 1810 |
| 78 | 7 1/2 | 3 1/4 | 4 1/2 | 1/2 | 6, 8 | 2098 |
| 84 | 8 | 3 1/2 | 4 1/2 | 1/2 | 6, 8 | 2410 |
| 90 | 8 1/2 | 3 3/8 | 5 1/2 | 1/2 | 6, 8 | 2740 |
| 96 | 9 | 3 5/8 | 5 1/2 | 1/2 | 6, 8 | 3095 |

Pipe dimensions may vary depending on equipment availability.

Notes:
1. Pipe manufactured to meet current ASTM specifications.
2. Contact a Concrete Pipe Division representative for details not listed on this sheet.

Rinker 001

## TYPICAL RCP TONGUE & GROVE JOINT

N.T.S.

E / 79

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

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T21S,R59E,S03

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Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COURTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

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PROFESSIONAL ENGINEER - STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 06-30-25
CIVIL
No. 18849
5/17/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

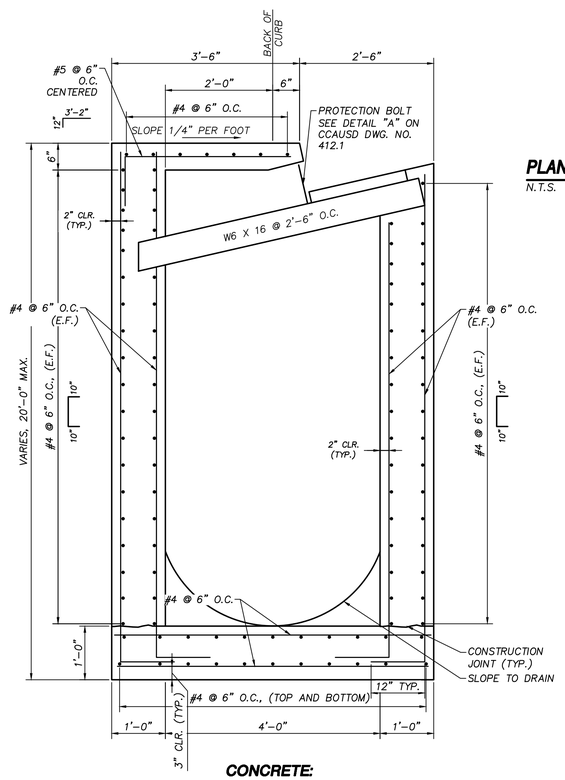
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**STORM DRAIN DETAILS**

DESIGNED BY: B. MOCHTYAK
DRAWN BY: K. HENDRY
CHECKED BY: N. BARCOS
HORIZ.: NONE
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 79/97
JOB NO. 100069316

C:\pw_work\atkinsn01\dms548621\69319-XX-DETAIL-01.dwg LAYOUT: 73 STORM DRAIN DETAILS May 17, 2023 - 3:16PM




### CONCRETE:

CONCRETE SHALL BE MODIFIED CLASS DA 5000 PSI, SEE SPECIAL PROVISIONS SECTION 501.

**NOTES:**

THIS DETAIL MODIFIES THE TYPE "CM2" DROP INLET SECTION PER CCAUSD DWG. NO. 412.1 FOR STRUCTURES WITH DEPTHS GREATER THAN 10'. ALL OTHER INFORMATION OF THE STANDARD DRAWING STILL APPLY, UNLESS OVERWRITTEN BY THIS DETAIL.

## SUPPLEMENT TO "CM2" DROP INLET (D>10')

A 80

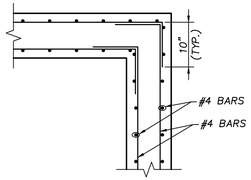
N.T.S.

## SPECIAL INSPECTION REQUIRED

PERFORM THIRD PARTY INSPECTION FOR RCB, JUNCTION STRUCTURES, AND STORM DRAIN STRUCTURES

1. INSPECTIONS SHALL BE PERFORMED BY AN ICC CERTIFIED INSPECTOR APPROVED BY CLARK COUNTY, EMPLOYED BY THE OWNER/DEVELOPER.
2. PROVIDE SPECIAL INSPECTIONS IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE FOR THE ITEMS LISTED BELOW.
   - A. MASONRY – PERIODIC
   - B. REINFORCING STEEL PLACEMENT – PERIODIC
   - C. GROUT – CONTINUOUS
   - D. CONCRETE PLACEMENT – CONTINUOUS
   - E. CONCRETE STRENGTH – CONTINUOUS
   - F. EPOXY FASTENED DOWELS – PERIODIC
3. THE INSPECTOR SHALL SUBMIT A STATEMENT TO THE OWNER/DEVELOPER, AND STRUCTURAL ENGINEER INDICATING COMPLIANCE WITH THE PLANS AND SPECIFICATIONS.
4. SPECIAL INSPECTION OF THE FILL AROUND THE (RCB, JUNCTION STRUCTURES, AND STORM DRAIN STRUCTURES) SHALL BE PROVIDED AT A FREQUENCY AS NECESSARY TO ENSURE THAT PROPER FILL AND COMPACTION IS ACHIEVED. COMPACTION TEST FOR EACH LIFT SHALL BE TAKEN PER CCAUSD 203.05.02. THE SPECIAL INSPECTOR SHALL SUBMIT A COMPLIANCE REPORT TO THE OWNER/DEVELOPER AND STRUCTURAL ENGINEER DOCUMENTING FILL TYPE AND PROCEDURES OF PLACEMENT.

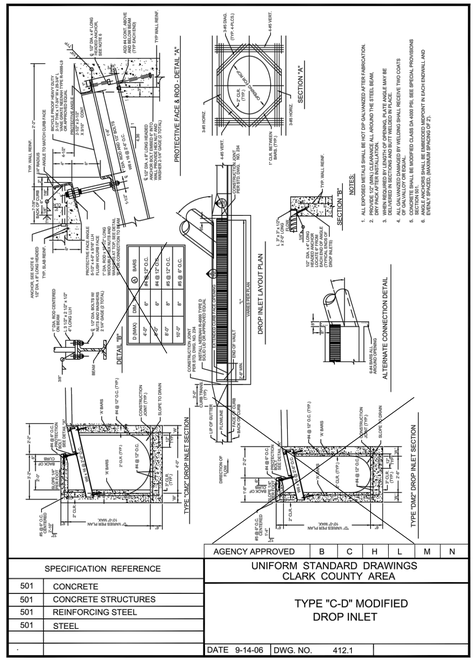
PROFESSIONAL ENGINEER-STATE OF NEVADA
NINGYU GAO
EXP. 06-30-23
CIVIL
No. 25098




## PLAN-DROP INLET TYPICAL WALL CORNER DETAIL

D 80

N.T.S.



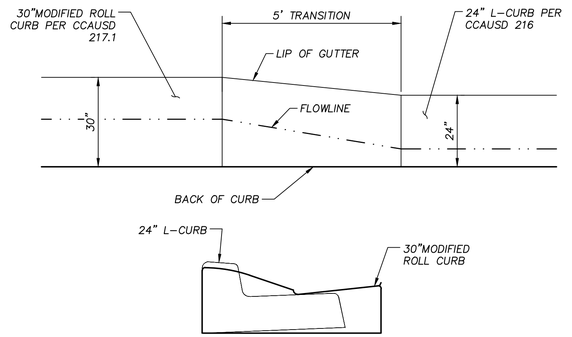

| AGENCY APPROVED | B | C | H | L | M | N |
|---|---|---|---|---|---|---|

| | SPECIFICATION REFERENCE |
|---|---|
| 501 | CONCRETE |
| 501 | CONCRETE STRUCTURES |
| 501 | REINFORCING STEEL |
| 501 | STEEL |
| | |
| | |

UNIFORM STANDARD DRAWINGS
CLARK COUNTY AREA

TYPE "C-D" MODIFIED
DROP INLET

DATE 9-14-06 | DWG. NO. 412.1




## 30" MODIFIED ROLL CURB TO 24" L-CURB TRANSITION

B 80

N.T.S.

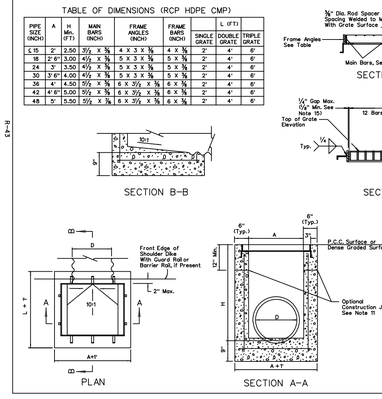
BILL OF MATERIALS (RCP HDPE CMP)

| PIPE SIZE (INCH) | SINGLE (ONE GRATE) * CONCRETE (CY) BASE QUAN. (IN MIN.) | ADD RATE (CY/FT) | * REINF. (LB.) BASE QUAN. (IN MIN.) | ADD RATE (LB/FT) | STR STEEL (LB) | DOUBLE (TWO GRATES) * CONCRETE (CY) BASE QUAN. (IN MIN.) | ADD RATE (CY/FT) | * REINF. (LB.) BASE QUAN. (IN MIN.) | ADD RATE (LB/FT) | STR STEEL (LB) | TRIPLE (THREE GRATES) * CONCRETE (CY) BASE QUAN. (IN MIN.) | ADD RATE (CY/FT) | * REINF. (LB.) BASE QUAN. (IN MIN.) | ADD RATE (LB/FT) | STR STEEL (LB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ≤15 | 0.71 | 0.19 | 36 | 10 | 211 | 1.06 | 0.28 | 50 | 13 | 397 | 1.41 | 0.33 | 70 | 17 | 583 |
| 18 | 0.89 | 0.20 | 40 | 10 | 306 | 1.31 | 0.28 | 56 | 13 | 574 | 1.72 | 0.35 | 77 | 18 | 842 |
| 24 | 1.08 | 0.22 | 58 | 12 | 349 | 1.56 | 0.30 | 80 | 15 | 652 | 2.04 | 0.37 | 105 | 20 | 956 |
| 30 | 1.28 | 0.24 | 63 | 12 | 390 | 1.83 | 0.31 | 86 | 16 | 729 | 2.38 | 0.39 | 113 | 20 | 1068 |
| 36 | 1.50 | 0.26 | 67 | 13 | 524 | 2.11 | 0.33 | 92 | 16 | 980 | 2.72 | 0.41 | 120 | 21 | 1435 |
| 42 | 1.71 | 0.28 | 90 | 15 | 575 | 2.39 | 0.35 | 120 | 18 | 1073 | 3.07 | 0.43 | 154 | 22 | 1571 |
| 48 | 1.94 | 0.30 | 95 | 15 | 707 | 2.68 | 0.37 | 127 | 18 | 1339 | 3.42 | 0.44 | 163 | 23 | 1951 |

*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

| PIPE SIZE (INCH) | A | H Min. (FT) | MAIN BARS (INCH) | FRAME ANGLES (INCH) | FRAME BARS (INCH) | L (FT) SINGLE GRATE | DOUBLE GRATE | TRIPLE GRATE |
|---|---|---|---|---|---|---|---|---|
| ≤ 15 | 2' | 2.50 | 3½ x ⅜ | 4 X 3 X ⅜ | 4 X ⅜ | 2' | 4' | 6' |
| 18 | 2'-6" | 3.00 | 4½ x ⅜ | 5 X 3 X ⅜ | 5 X ⅜ | 2' | 4' | 6' |
| 24 | 3' | 3.50 | 4½ x ⅜ | 5 X 3 X ⅜ | 5 X ⅜ | 2' | 4' | 6' |
| 30 | 3'-6" | 4.00 | 4½ x ⅜ | 5 X 3 X ⅜ | 5 X ⅜ | 2' | 4' | 6' |
| 36 | 4' | 4.50 | 5½ x ⅜ | 6 X 3½ x ⅜ | 6 X ⅜ | 2' | 4' | 6' |
| 42 | 4'-6" | 5.00 | 5½ x ⅜ | 6 X 3½ x ⅜ | 6 X ⅜ | 2' | 4' | 6' |
| 48 | 5' | 5.50 | 5½ x ⅜ | 6 X 3½ x ⅜ | 6 X ⅜ | 2' | 4' | 6' |




NOTES:

1. All concrete shall be class A or AA.
2. Reinforcing steel shall be No.4 bars with maximum spacing at 18 inch centers, wired tightly at all intersections and embedded 2 inches clear of all concrete surfaces.
3. Exposed edges of concrete shall be chamfered 1 inch.
4. Dimensions may be varied to fit local conditions if ordered by the engineer.
5. Commercial prefabricated gratings approved by the bridge division may be used in lieu of the field-welded grating shown.
6. Extreme low cover situations to be reviewed by hydraulics engineer.
7. Slope catch basin floors 10:1 from all directions toward outlet pipe. If basin is used as a junction, shape flow lines to outlet pipe and provide a 10:1 slope to flow lines.
8. See sheet R-2.9.1 for details if connecting HDPE pipe.
9. A single Type 2 drop inlet shall be constructed unless a double or triple is specified.
10. Single grate configuration shown for clarity. Outside dimensions of each grate shall measure 2 feet by A+4½".
11. Run rebar continuous thru construction joint. Joint must be a minimum of 3 inches from horizontal bars.
12. Weld one tab on ℄ of grate and remaining two tabs 6 inches from edge of frame. Six tabs per inlet, three tabs on each side
13. Weld tabs 6 inches from edge of frame. Four tabs per grate, two on each side.
14. For multiple grate installations, the station/offset is to the center of the concrete drop inlet structure.
15. Grate is to fit in the frame and be easily removed. If the gap between the grate and frame is greater than ½" on any side, the grate shall be modified, replaced, or repaired and reconstructed to the tolerances specified or, with approval of the engineer, a filler strip up to ½" in thickness may be welded flush to the top of the frame to reduce the gap to a maximum of ¼"
16. Additional pipe penetrations may be placed in any wall. Pipe penetrations are to be to the center of the structure wall unless specified otherwise.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

DROP INLET
TYPE 2

| R-4.2.1 | (609) | Signed Original On File |
|---|---|---|
| ADOPTED 9/78 | REVISED 10/18 | CHIEF HYDRAULICS ENGR. |

## DROP INLET TYPE 2 PER NDOT

C 80

N.T.S.

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

CITY OF LAS VEGAS BENCHMARK: D368 (REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS (3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.
Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

PROFESSIONAL ENGINEER-STATE OF NEVADA
ANTHONY J. ORTIZ
EXP. 6-30-23
CIVIL
No. 18948
5/17/2023

| REVISIONS REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7375
Fax: +1.702.263.7200

SUMMERLIN

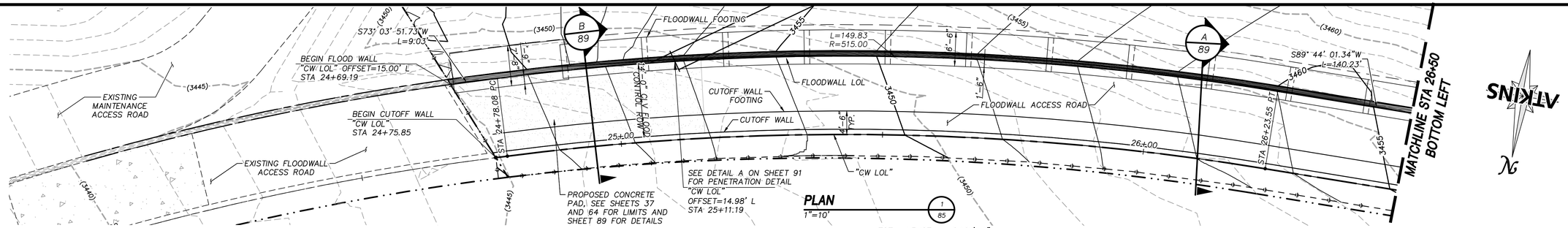
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**STORM DRAIN DETAILS**

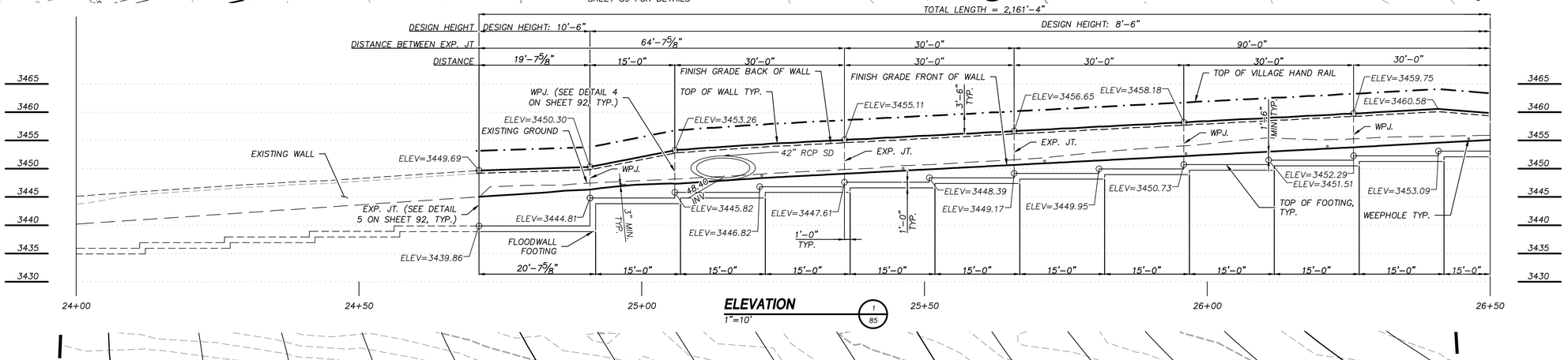
DESIGNED BY: B. MOCHTYAK
DRAWN BY: K. HENORY
CHECKED BY: N. BARCOS
HORIZ.: NONE
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 80/97
JOB NO. 100069316

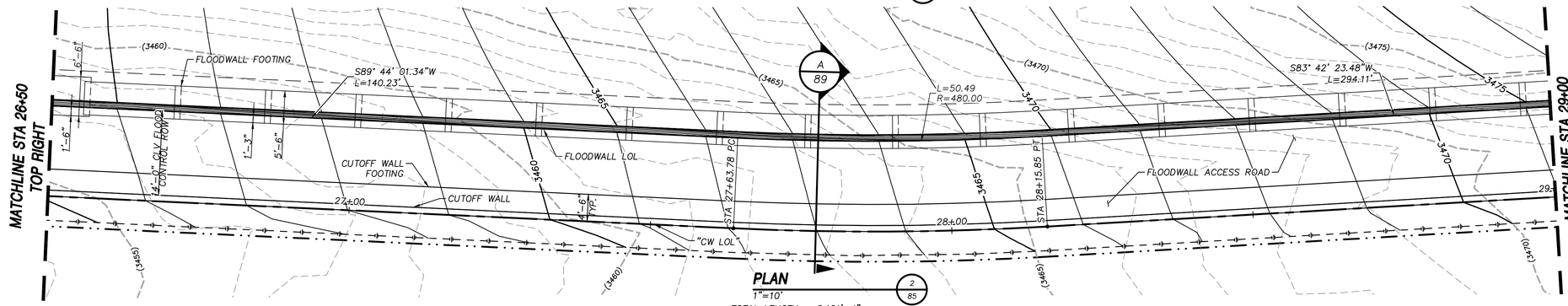
C:\pw_work\atkinsnv01\dms54862\69319-XX-DETAIL-D1.dwg LAYOUT: 7A STORM DRAIN DETAILS May 17, 2023 - 3:16PM




PLAN
1"=10'
1/85




ELEVATION
1"=10'
1/85




PLAN
1"=10'
2/85




ELEVATION
1"=10'
2/85

NOTES:
1. EXP.JT.: EXPANSION JOINT
   WPJ: WEAKENED PLANE JOINT
2. FOR CUTOFF WALL LOL DATA, SEE SHEET 5/95.
3. REFER TO SHEET 92 FOR FLOOD WALL TYPICAL SECTION; REFER TO SHEET 91 FOR CUTOFF WALL TYPICAL SECTION

GRAPHIC SCALE
10 0 5 10 20
HORIZONTAL: 1"=10'
10 0 5 10 20
VERTICAL: 1"=10'

**BASIS OF BEARING**

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**

CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
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(3,246.63 FEET)
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PROFESSIONAL ENGINEER - STATE OF NEVADA
NINGYU GAO
EXP. 06-30-25
CIVIL
No. 25095
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|


ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275Telephone:
Fax: +1.702.263.7200

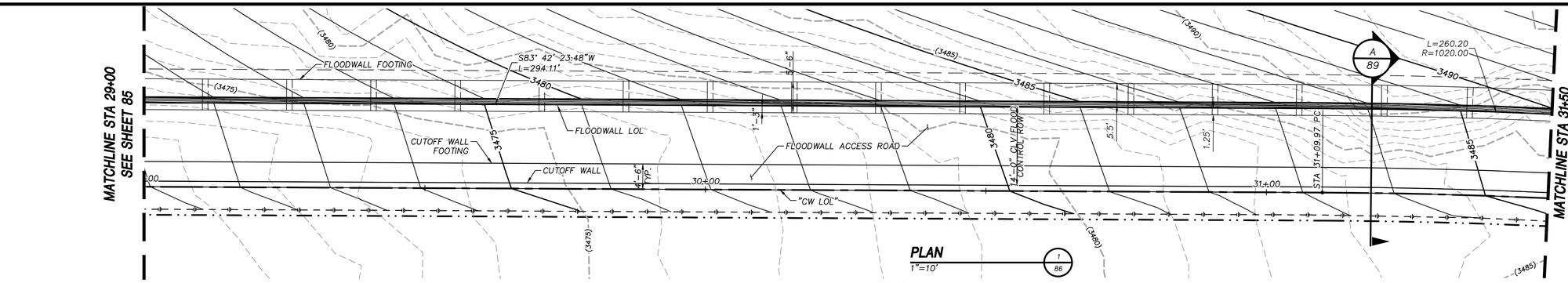

SUMMERLIN

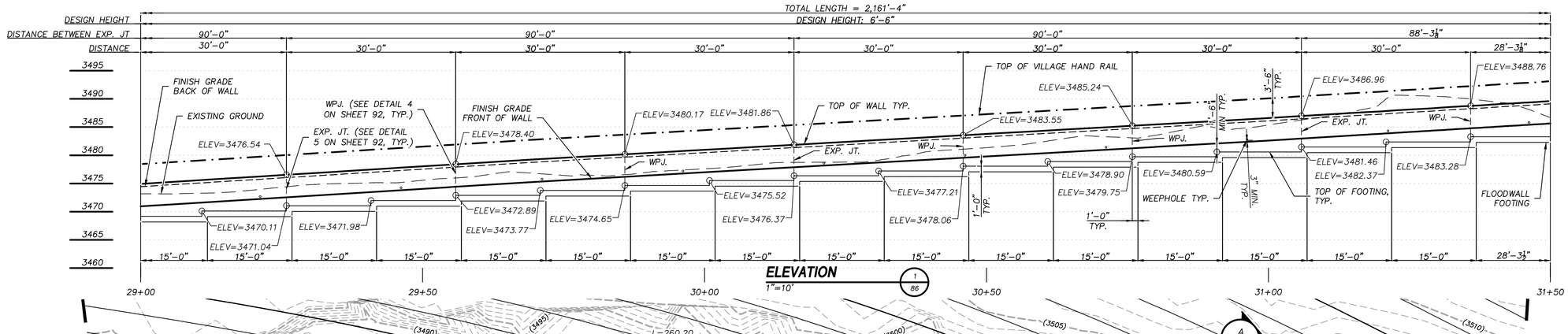
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

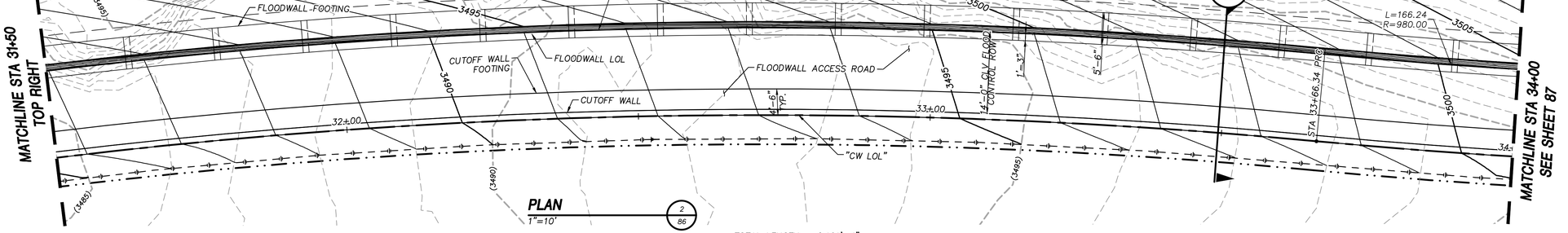
**FLOOD WALL PLAN AND ELEVATION SHEET 1 OF 8**

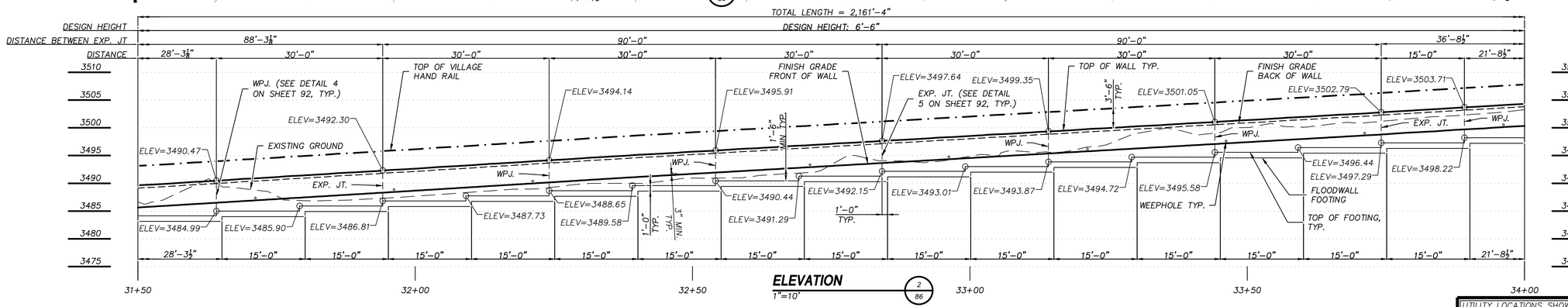
| | |
|---|---|
| DESIGNED BY: | N. GAO |
| DRAWN BY: | C. HONEY |
| CHECKED BY: | K. ALAGHYAWANA |
| HORIZ.: | 1" = 10' |
| VERT.: | 1" = 10' |
| JOB NO. | 100069316 |
| DRAWING NO. | 85/97 |
| DATE: | May 2023 |
| | 107/9664 |
| | L22-01955 |

C:\pw_work\ctkronn01\dms54862\69316-SXX-WALL-PE.dwg LAYOUT: 78 FLOOD WALL PLAN AND ELEVATION SHEET 1 OF 8 May 10, 2023 - 2:56PM




GRAPHIC SCALE

10 0 5 10 20

HORIZONTAL: 1"=10'

10 0 5 10 20

VERTICAL: 1"=10'

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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T21S,R59E,S03

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OR
1-800-642-2444

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PROFESSIONAL ENGINEER-STATE OF NEVADA
NINGYU GAO
EXP. 06-30-23
CIVIL
No. 25098
5/10/2023

NOTES:
1. EXP.JT.: EXPANSION JOINT
   WPJ: WEAKENED PLANE JOINT
2. FOR CUTOFF WALL LOL DATA, SEE SHEET 5/95.
3. REFER TO SHEET 92 FOR FLOOD WALL TYPICAL SECTION; REFER TO SHEET 91 FOR CUTOFF WALL TYPICAL SECTION

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275 Telephone:
Fax: +1.702.263.7200

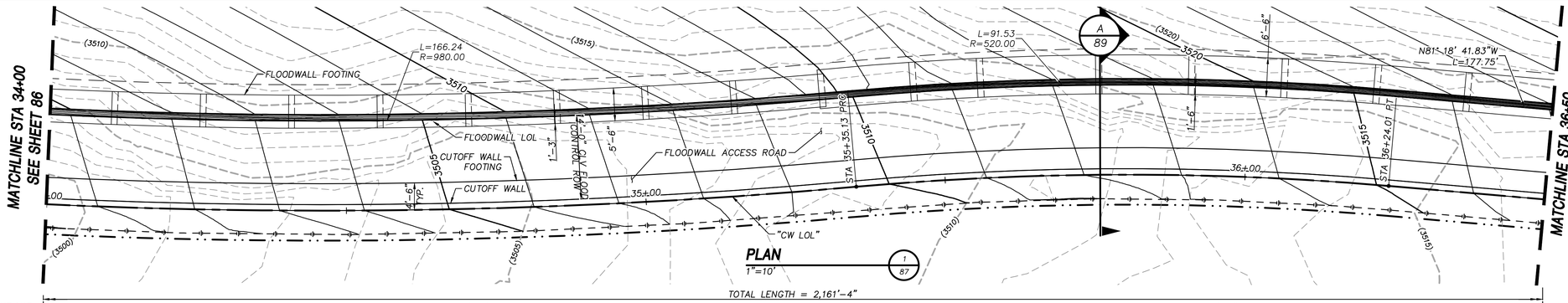
SUMMERLIN

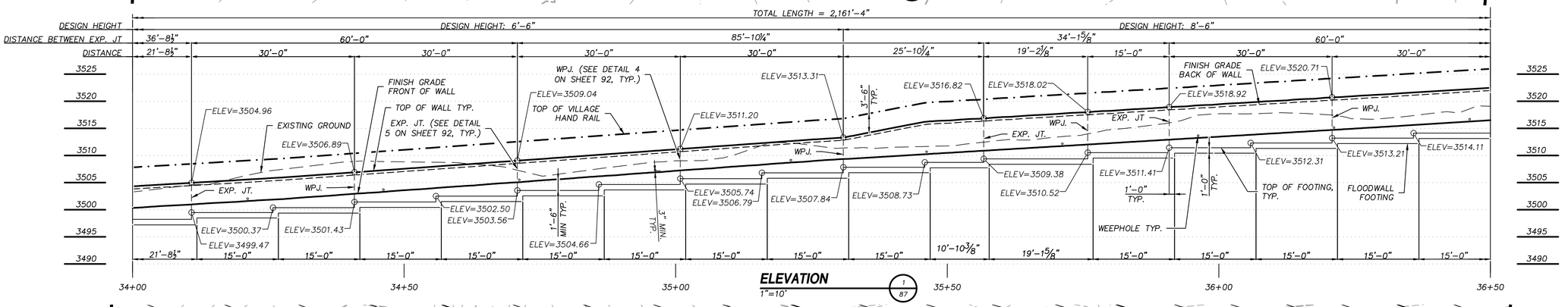
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

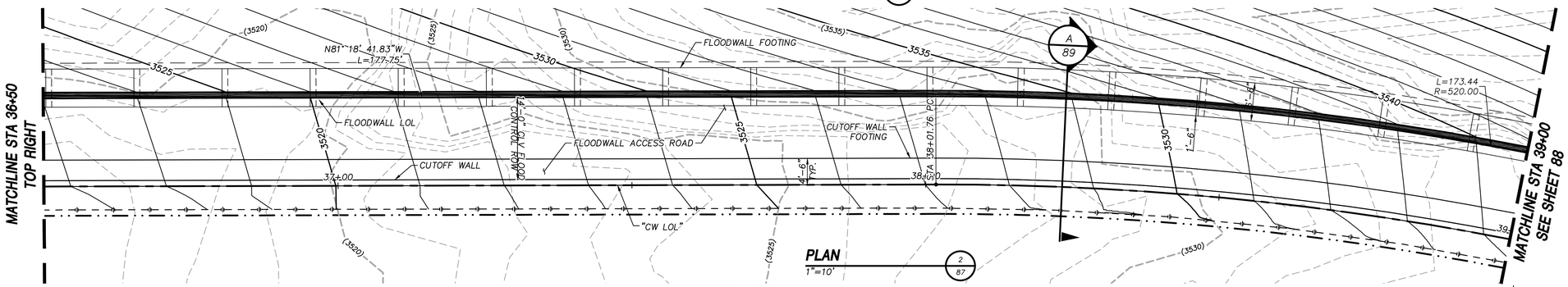
**FLOOD WALL PLAN AND ELEVATION SHEET 2 OF 8**

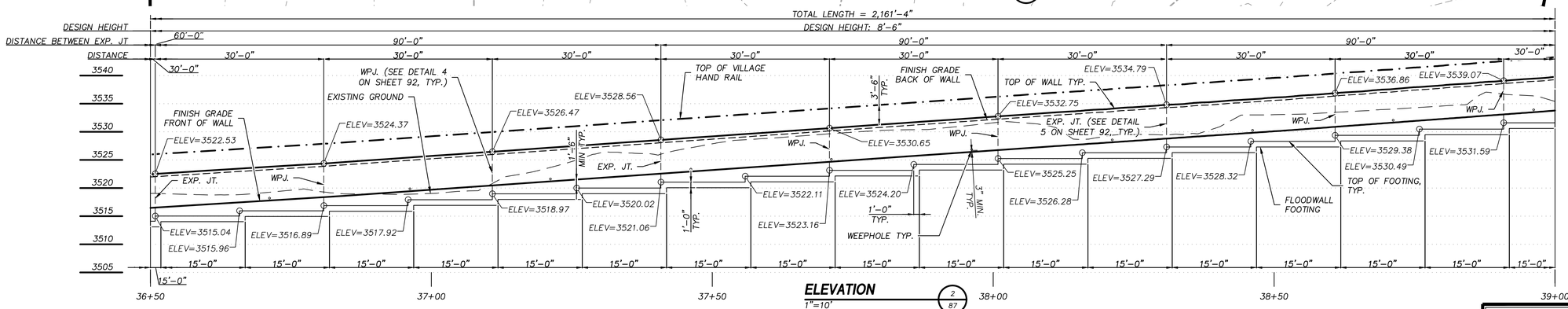
| | |
|---|---|
| DESIGNED BY: | N. GAO |
| DRAWN BY: | C. HONEY |
| CHECKED BY: | K. ALAGITAWANNA |
| HORIZ.: | 1" = 10' |
| VERT.: | 1" = 10' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 86/97 |
| JOB NO. | 100069316 |

C:\pw_work\atkinsnv01\dms54862\69316-SXX-WALL-PE.dwg LAYOUT: 79 FLOOD WALL PLAN AND ELEVATION SHEET 2 OF 8 May 10, 2023 - 2:56PM




NOTES:
1. EXP.JT.: EXPANSION JOINT
   WPJ: WEAKENED PLANE JOINT
2. FOR CUTOFF WALL LOL DATA, SEE SHEET 5/95.
3. REFER TO SHEET 92 FOR FLOOD WALL TYPICAL SECTION; REFER TO SHEET 91 FOR CUTOFF WALL TYPICAL SECTION

GRAPHIC SCALE

10 0 5 10 20
HORIZONTAL: 1"=10'

10 0 5 10 20
VERTICAL: 1"=10'

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

## BENCHMARK

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(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
T21S,R59E,S03

Call before you Dig
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Call 811 or 1-800-642-2444

AVOID HITTING OVERHEAD POWER LINES. IT'S COURTLY.
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1-702-227-2929

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PROFESSIONAL ENGINEER - STATE OF NEVADA
NINGYU GAO
EXP. 06-30-23
CIVIL
No. 25095
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

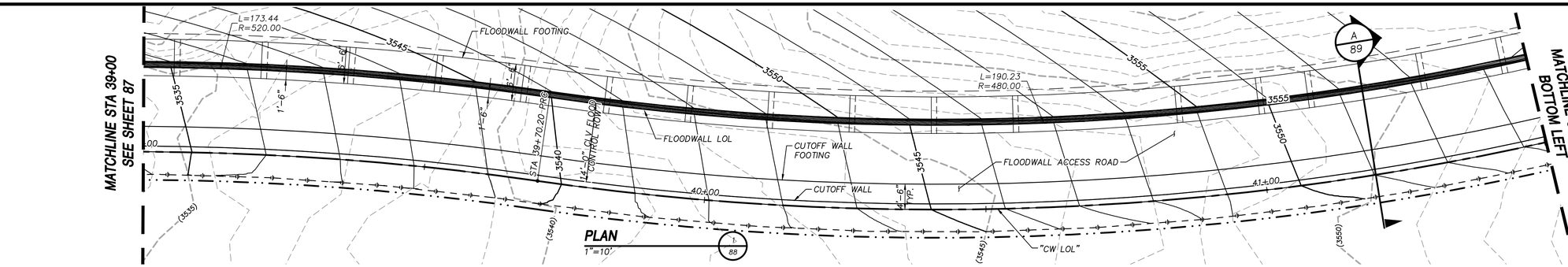
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

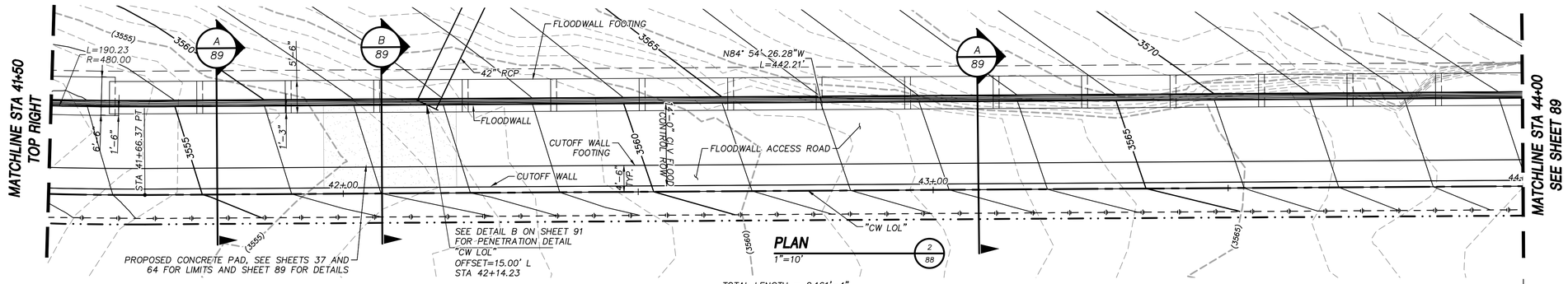
**FLOOD WALL PLAN AND ELEVATION SHEET 3 OF 8**

| | |
|---|---|
| DESIGNED BY: | N. GAO |
| DRAWN BY: | C. HONEY |
| CHECKED BY: | K. ALAGIYAWANNA |
| HORIZ.: | 1" = 10' |
| VERT.: | 1" = 10' |
| DATE: | May 2023 |
| DRAWING NO. | 87/97 |
| JOB NO. | 100069316 |

107Y9664
L22-01955

C:\pw_work\gknorn01\dms548621\69316-SXX-WALL-PE.dwg LAYOUT: 80 FLOOD WALL PLAN AND ELEVATION SHEET 3 OF 8 May 10, 2023 - 2:56PM




GRAPHIC SCALE

10 0 5 10 20

HORIZONTAL: 1"=10'

10 0 5 10 20

VERTICAL: 1"=10'

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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T21S,R59E,S03

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NOTES:
1. EXP.JT.: EXPANSION JOINT
   WPJ: WEAKENED PLANE JOINT
2. FOR CUTOFF WALL LOL DATA, SEE SHEET 5/95.
3. REFER TO SHEET 92 FOR FLOOD WALL TYPICAL SECTION; REFER TO SHEET 91 FOR CUTOFF WALL TYPICAL SECTION

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PROFESSIONAL ENGINEER - STATE OF NEVADA
NINGYU GAO
EXP. 06-30-25
CIVIL
No. 25098
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074-7770
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

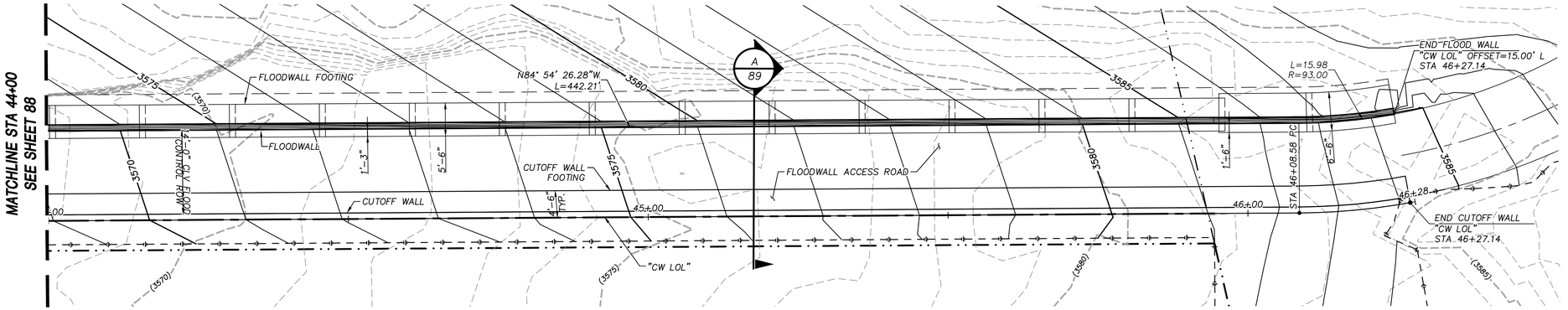
SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

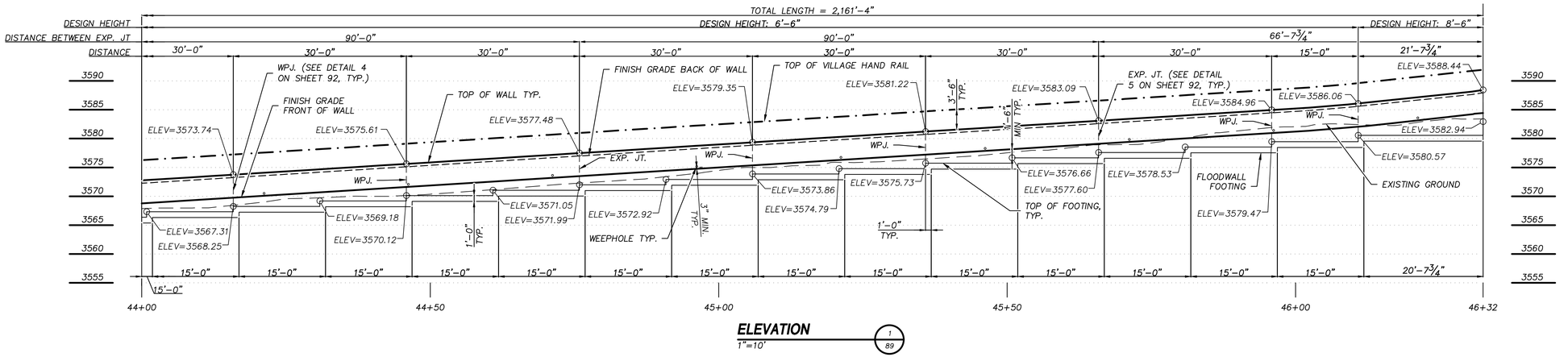
**FLOOD WALL PLAN AND ELEVATION SHEET 4 OF 8**

| | |
|---|---|
| DESIGNED BY: | N. GAO |
| DRAWN BY: | C. HONEY |
| CHECKED BY: | K. ALAGIYAWANNA |
| HORIZ.: | 1" = 10' |
| VERT.: | 1" = 10' |
| 107V9664 | |
| L22-01955 | |
| DATE: | May 2023 |
| DRAWING NO. | 88/97 |
| JOB NO. | 100069316 |

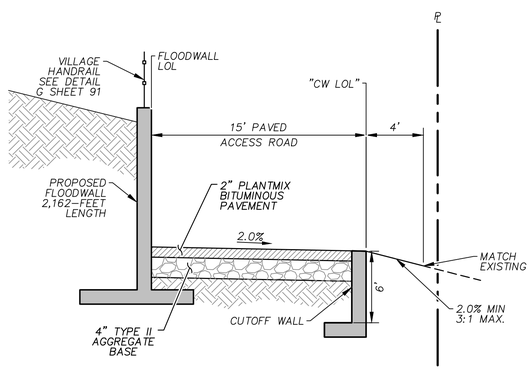
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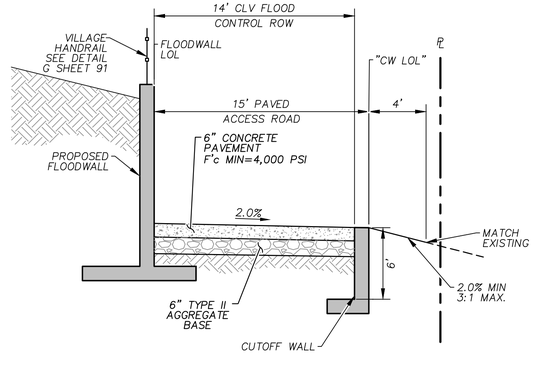

**PLAN**
1"=10' (1/89)




**ELEVATION**
1"=10' (1/89)




**PARK DRIFT TRAIL - PLANTMIX ACCESS ROAD & FLOODWALL TYPICAL SECTION** (A/89)
N.T.S. STA. 25+16.05 TO STA. 41+96.73 AND STA. 42+19.23 TO STA. 46+27.14




**PARK DRIFT TRAIL - CONCRETE ACCESS ROAD & FLOODWALL TYPICAL SECTION** (B/89)
N.T.S. STA. 24+69.19 TO STA. 25+16.05 AND STA. 41+96.73 TO STA. 42+19.23

NOTES:
1. EXP.JT.: EXPANSION JOINT
   WPJ: WEAKENED PLANE JOINT
2. FOR CUTOFF WALL LOL DATA, SEE SHEETS 4 & 5.
3. REFER TO SHEET 92 FOR FLOOD WALL TYPICAL SECTION; REFER TO SHEET 91 FOR CUTOFF WALL TYPICAL SECTION

GRAPHIC SCALE
10 0 5 10 20
HORIZONTAL: 1"=10'
10 0 5 10 20
VERTICAL: 1"=10'

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PROFESSIONAL ENGINEER-STATE OF NEVADA
NINGYU GAO
EXP. 06-30-23
CIVIL
No. 25095
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

ATKINS
2270 Corporate Circle
Suite 200 Henderson,
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+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**FLOOD WALL PLAN AND ELEVATION SHEET 5 OF 8**

DESIGNED BY: N. GAO
DRAWN BY: C. HONEY
CHECKED BY: K. ALAGHYAWANNA
HORIZ.: 1" = 10'
VERT.: 1" = 10'

107Y9664
L22-01955
DATE: May 2023
DRAWING NO. 89/97
JOB NO. 100069316

C:\pw_work\atkinsn01\dms54862\69316-SXX-WALL-PE.dwg LAYOUT: 82 FLOOD WALL PLAN AND ELEVATION SHEET 5 OF 8 May 10, 2023 - 2:56PM

1. DESIGN SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 2020, 9TH EDITION, INTERNATIONAL BUILDING CODE (IBC) 2018.

2. CONSTRUCTION SPECIFICATIONS: STATE OF NEVADA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2014" EXCEPT AS NOTED BELOW AND IN THE TECHNICAL AND SPECIAL PROVISIONS FOR THIS CONTRACT.

3. LIVE LOAD: PEDESTRIAN LOAD OF 90 PSF IS CONSIDERED AT THE TOP OF THE BACKFILL. LIVE LOAD SURCHARGE DURING SEISMIC EVENT, Y(EQ)=0..

4. SEISMIC LOAD: PER IBC 2018, SITE CLASS D IS ASSUMED FOR SEISMIC DESIGN, $S_{DS}$ = 0.44g,, $S_{D1}$ = 0.251g THE DYNAMIC (SEISMIC) LATERAL THRUST, $P_{AE}$, PER LINEAR FOOT OF WALL MAY BE DETERMINED AS $P_{AE}=\frac{3}{8}(Kh)H$ Y, Kh IS EQUAL TO $S_{DS}/2.5$ THE RESULTANT DYNAMIC FORCE ACTS AT A DISTANCE OF 0.6H ABOVE THE BASE OF THE WALL.

5. CONCRETE; ALL CONCRETE SHALL BE CLASS A MODIFIED (MAJOR) WITH AN ULTIMATE COMPRESSIVE CONCRETE STRENGTH, f'c = 4000 PSI AT 28 DAYS EXCEPT AS NOTED. ONLY TYPE V CEMENT SHALL BE USED FOR CONCRETE IN CONTACT WITH SOIL.

6. REINFORCING STEEL: ALL REINFORCING STEEL TO BE ASTM A615 GRADE 60, OR A706, GRADE 60 UNLESS OTHERWISE NOTED. DIMENSIONS RELATING TO BAR SPACING, ARE CENTER TO CENTER, BENDING DIMENSIONS ARE FROM OUT TO OUT OF THE BARS.

7. SOIL PARAMETERS: EQUIVALENT FLUID PRESSURES AND COEFFICIENT OF FRICTION PER GEOTECHNICAL REPORT:

| | |
|---|---|
| ACTIVE | 35 PCF |
| AT REST | 55 PCF |
| PASSIVE | 250 PCF |
| COEFFICIENT OF FRICTION | 0.45 |
| MODULUS OF SOIL REACTION | 1,500 PSI |
| UNIT WEIGHT OF BACKFILL (NATIVE SOILS) | 135 PCF |

ALLOWABLE BEARING PRESSURE FOR WINGWALL AND FLOOD WALL FOOTING: 4000 PSF FOR 1.5 ft. MIN. EMBEDMENT DEPTH. (FROM GROUND LEVEL TO TOP OF FOOTING)

8. GEOTECHNICAL DESIGN REPORT: "GEOTECHNICAL EXPLORATION REPORT, VILLAGE 27 ROADWAYS & WATERLINES, NORTH AND WEST OF LAKE MEAD BOULEVARD, LAS VEGAS, NEVADA". PREPARED BY NOVA GEOTECHNICAL & INSPECTION SERVICES, WITH NOVA PROJECT NO. G-20-059 DATED OCTOBER 7, 2020 AND UPDATED ON JUNE 16, 2022 BY UNIVERSAL ENGINEERING SCIENCES.

9. <u>STATEMENT OF SPECIAL INSPECTION:</u>
PER IBC 1704.3 AND 1705, THE SUMMARY OF SPECIAL INSPECTION IS BELOW. AT THE CONCLUSION OF WORK, THE STRUCTURAL OBSERVER SHALL SUBMIT A WRITTEN STATEMENT THAT THE SITE VISITS HAVE BEEN MADE AND IDENTIFY ANY REPORTED DEFICIENCIES, WHICH TO THE BEST OF THE STRUCTURAL OBSERVER'S KNOWLEDGE.

| SUMMARY OF SPECIAL INSPECTION | | | |
|---|---|---|---|
| **NO.** | **ITEM** | **CONTINUOUS INSPECTION** | **PERIODIC INSPECTION** |
| 1 | INSPECT REINFORCEMENT STEEL AND PLACEMENT | | YES |
| 2 | VERIFY USE OF REQUIRED DESIGN MIX | | YES |
| 3 | PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE | YES | |
| 4 | INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES | YES | |
| 5 | VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE TECHNIQUES | | YES |
| 6 | VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO REMOVAL OF SHORES AND FORMS OF FOUNDATION SLABS | | YES |
| 7 | INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED | | YES |
| 8 | VERIFY MATERIALS BELOW FOUNDATION SLABS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY | | YES |
| 9 | VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL | | YES |
| 10 | PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS | | YES |
| 11 | VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESS DURING PLACEMENT AND COMPACTION OF COMPACTED FILL | YES | |
| 12 | PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY | | YES |

10. REBAR LAP LENGTH

| BAR SIZE | CLASS | UNCOATED (IN) |
|---|---|---|
| #4 | B | 20 |
| #5 | B | 24 |
| #6 | B | 30 |
| #7 | B | 38 |
| #8 | B | 48 |
| #9 | B | 60 |
| #10 | B | 74 |
| #11 | B | 90 |

11. ABBREVIATIONS
WALL LOL: WALL LAYOUT LINE
EXP. JT: EXPANSION JOINT
WJP: WALL WEAKENED PLAN JOINT

## SHEET NUMBER

| SHEET NUMBER | SHEET TITLE |
|---|---|
| 85 | FLOOD WALL PLAN AND ELEVATION SHEET 1 OF 8 |
| 86 | FLOOD WALL PLAN AND ELEVATION SHEET 2 OF 8 |
| 87 | FLOOD WALL PLAN AND ELEVATION SHEET 3 OF 8 |
| 88 | FLOOD WALL PLAN AND ELEVATION SHEET 4 OF 8 |
| 89 | FLOOD WALL PLAN AND ELEVATION SHEET 5 OF 8 |
| 90 | FLOODWALL GENERAL NOTES SHEET 6 OF 8 |
| 91 | FLOOD WALL STRUCTURAL DETAIL SHEET 7 OF 8 |
| 92 | FLOOD WALL TYPICAL SECTION SHEET 8 OF 8 |

**BASIS OF BEARING**
GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

**BENCHMARK**
CITY OF LAS VEGAS BENCHMARK: D368
(REVISED 2008)
NAVD88 ELEVATION: 989.574 METERS
(3,246.63 FEET)
FND USC&GS DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.
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PROFESSIONAL ENGINEER-STATE OF NEVADA
NINGYU GAO
EXP. 06-30-25
CIVIL
No. 25095
5/10/2023

REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
|---|---|---|---|---|
| | | | | |

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2270 Corporate Circle
Suite 200 Henderson,
Nevada 89074 Telephone:
+1.702.263.7275
Fax: +1.702.263.7200

SUMMERLIN

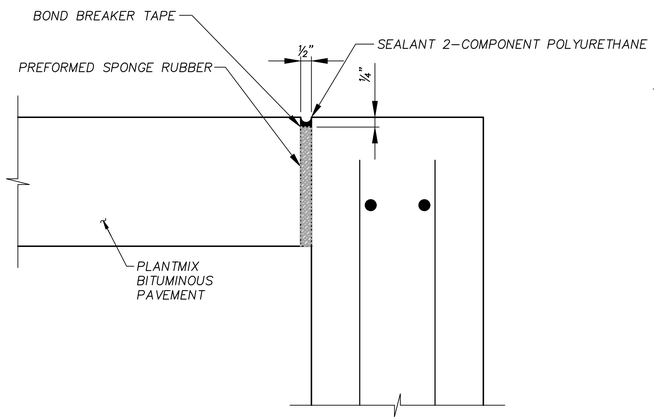
**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

**FLOODWALL GENERAL NOTES SHEET 6 OF 8**

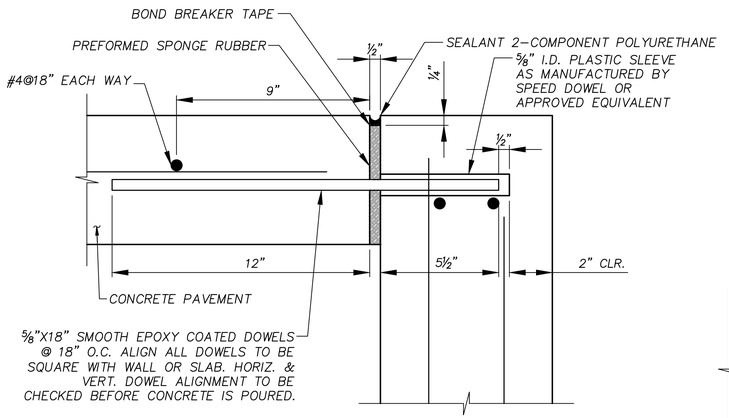
DESIGNED BY: N. GAO
DRAWN BY: J. TORRELLA
CHECKED BY: K. ALAGIYAWANNA
HORIZ.: NOTED
VERT.: NONE

107V9664
L22-01955
DATE: May 2023
DRAWING NO. 90/97
JOB NO. 100069316

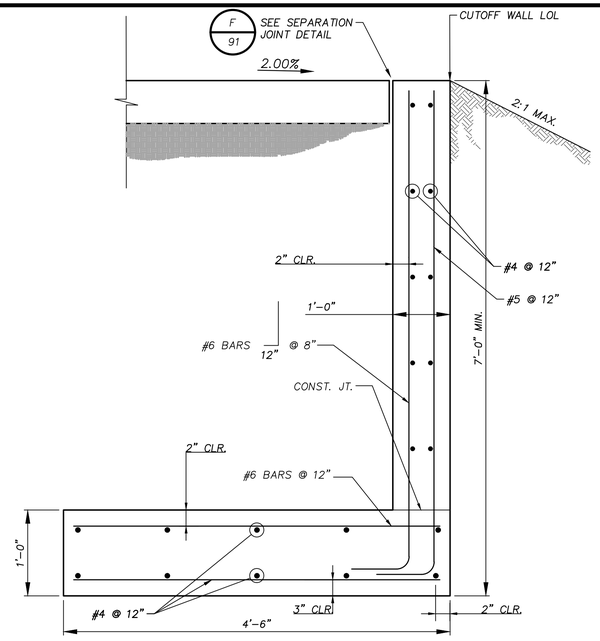
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## ASPHALT PAVEMENT SEPERATION JOINT



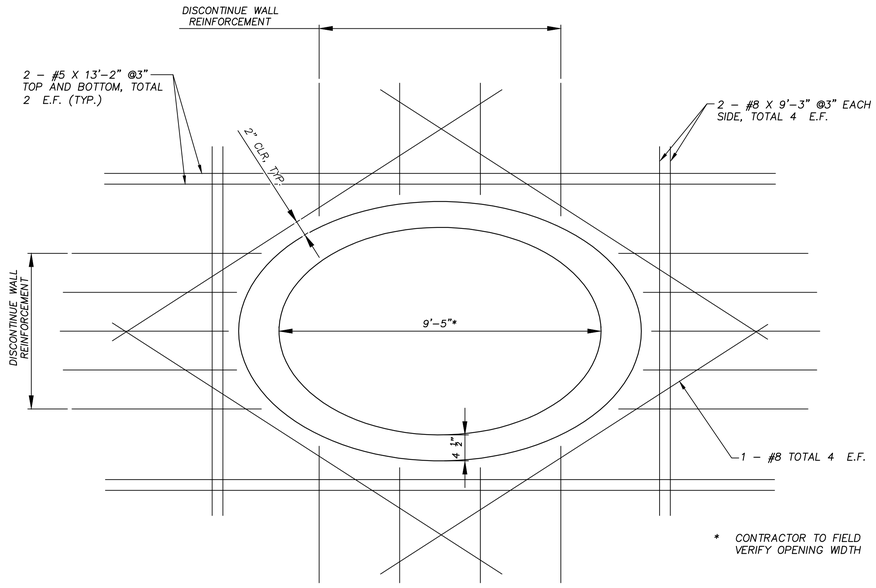

## CONCRETE PAVEMENT SEPERATION JOINT




## CUTOFF WALL TYPICAL SECTION

N.T.S.

C 91

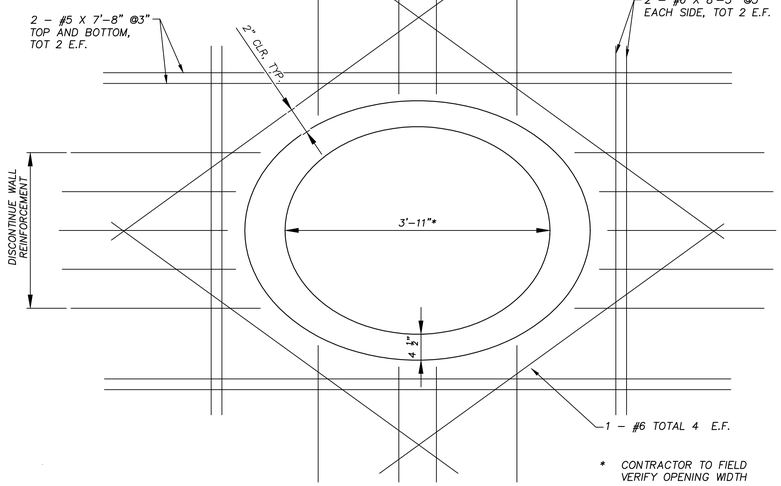



## 42" PIPE PENETRATION DETAILS @ "CW LOL" STA. 25+11.19, OFFSET 14.98'

SEE SHEET 45, 64 AND 85

N.T.S.

A 91

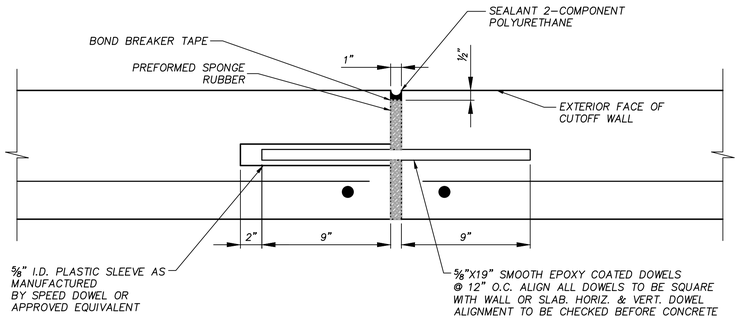



## 42" PIPE PENETRATION DETAILS @ "CW LOL" STA. 42+14.23, OFFSET 15'

SEE SHEET 37, 60 AND 88

N.T.S.

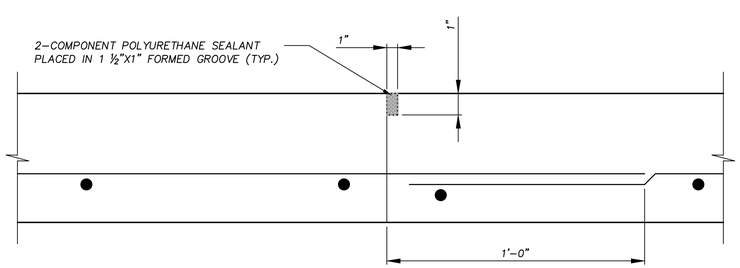
B 91




## SEPARATION JOINT DETAIL

N.T.S.

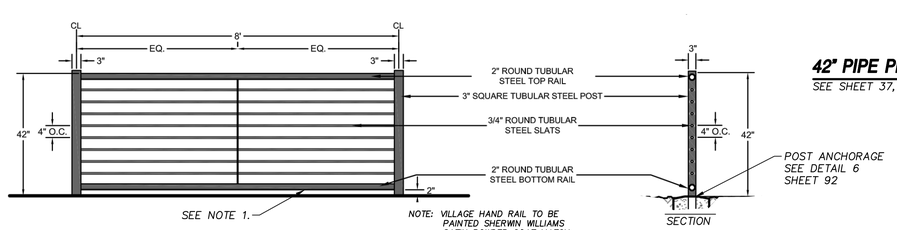
F 91




## CUTOFF WALL EXPANSION JOINT DETAIL

N.T.S.

D 91




## VILLAGE HAND RAIL DETAIL

N.T.S.

G 91

## CUTOFF WALL CONSTRUCTION JOINT DETAIL

N.T.S.

E 91

**NOTES:**

1. FOR CUTOFF WALL LAYOUT & PROFILE SEE CIVIL SHEETS 39–42
2. EXPANSION JOINTS SHALL BE PLACED AT 90' ON CENTERS. CONSTRUCTION JOINTS SHALL BE AT A MAXIMUM SPACING OF 30' ON CENTERS.

## BASIS OF BEARING

GRID NORTH AS DEFINED BY THE CENTRAL MERIDIAN OF THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS), LAS VEGAS HIGH ELEVATION ZONE, NORTH AMERICAN DATUM OF 1983; SAID MERIDIAN BEING COINCIDENT WITH 114°58' WEST OF THE GREENWICH MERIDIAN.

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PROFESSIONAL ENGINEER-STATE OF NEVADA
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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
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Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

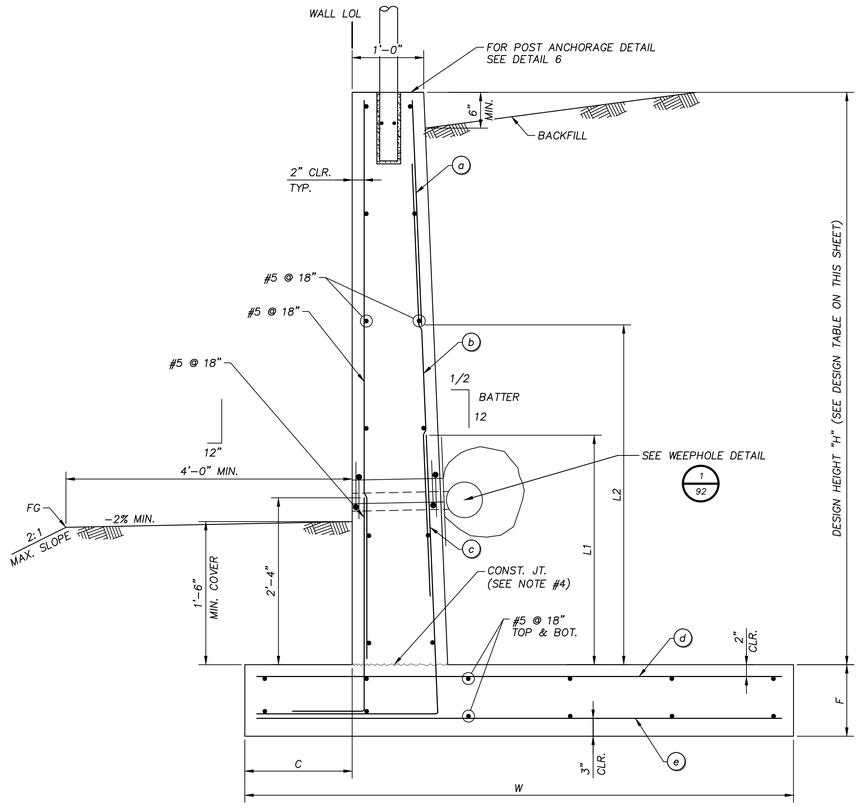
**FLOOD WALL STRUCTURAL DETAIL SHEET 7 OF 8**

| DESIGNED BY: | DRAWN BY: | CHECKED BY: | HORIZ.: NONE | VERT.: NONE |
|---|---|---|---|---|
| N. GAO | J. TORRELLA | K. ALAGITAWANNA | | |

| 107V9664 | DATE: May 2023 | DRAWING NO. | 91/97 |
|---|---|---|---|
| L22–01955 | | | |

JOB NO. 100069316

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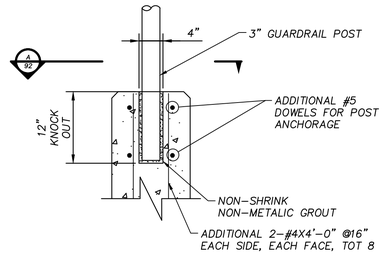

## TYPICAL FLOOD WALL SECTION

NOTE: FOR DIMENSIONS (W,F,C) AND BAR DEFINITIONS (a,b,c,d,e,L1,L2) SEE WALL DESIGN TABLE ON THIS SHEET

| TABLE OF DIMENSIONS AND REINFORCING STEEL | | | | |
|---|---|---|---|---|
| Layout and Reinforcement Data | Design Height H | 6'-6" | 8'-6" | 10'-6" |
| | W | 5'-6" | 6'-6" | 7'-8" |
| | F | 1'-0" | 1'-0" | 1'-4" |
| | C | 1'-3" | 1'-6" | 1'-9" |
| | Batter, Z | 1/2 | 1/2 | 1/2 |
| | a bars | - | - | - |
| | b bars | - | - | - |
| | c bars | #5@12" | #5@12" | #5@6" |
| | d bars | #5@12" | #5@12" | #5@6" |
| | e bars | #5@12" | #5@12" | #5@12" |
| | L1 | - | - | - |
| | L2 | - | - | - |

## WALL DESIGN TABLE

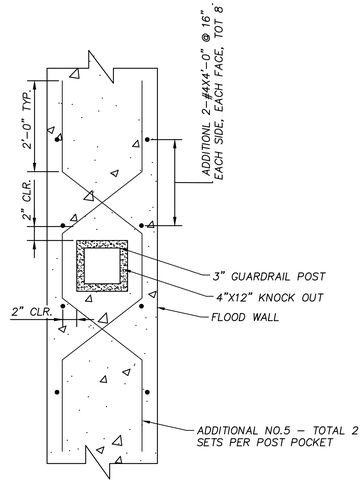
1 / 92




NOTE:
THE END POST SHALL BE INSTALLED AT 6" MIN. FROM BEGINNING AND END OF FLOOD WALL CONCRETE

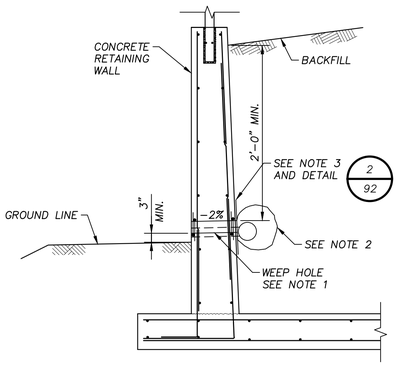
## POST ANCHORAGE DETAIL

6 / 92



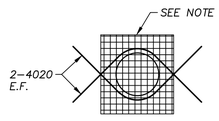

## SECTION

A / 92



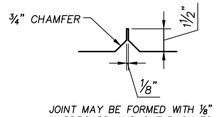

## WEEPHOLE DETAIL

1 / 92




## DETAIL

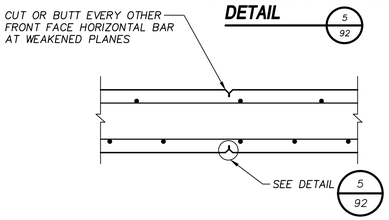
2 / 92




JOINT MAY BE FORMED WITH ⅛" HARDBOARD AND CUT BACK TO THE ROOT OF THE CHAMFER ON THE EXPOSED FACE

## DETAIL

5 / 92

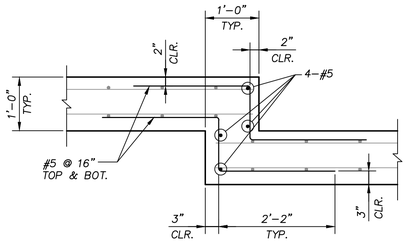



## WEAKENED PLANES

N.T.S.

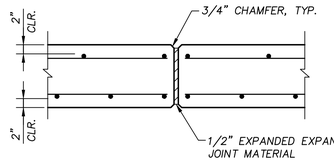
4 / 92

NOTE:
WEAKENED PLANES TO BE USED AS CONSTRUCTION JOINTS




## TYPICAL STEPPED FOOTING DETAIL

3 / 92




## EXPANSION JOINT DETAIL

5 / 92

NOTE:
EXCEPT AT CONNECTION TO EXISTING WALL, EXPANSION JOINT IS ONLY DOWN TO BOTTOM OF THE WALL STEM. NO EXPANSION JOINT AT WALL FOOTING

NOTES:

1. 4 INCH DIA. DRAINS AT 8 FEET MAXIMUM CENTER TO CENTER. EXPOSED DRAINS SHALL BE LOCATED 3 INCHES| ABOVE FINISH GRADE.
2. 2 CUBIC FEET OF TYPE 2 DRAIN BACKFILL ENCAPSULATED IN A GEOTEXTILE FABRIC SECURELY TIED. GEOTEXILE SHALL MEET THE FOLLOWING:
   A. MEET AT LEAST CLASS 2 STRENGTH REQUIREMENT PER AASHTO M288 TEST METHOD.
   B. HAVE AN AOS NOT GREATER THAN U.S. SIEVE NO. 40.
   C. HAVE A PERMITTIVITY OF AT LEAST 0.5 $SEC^{-1}$.
3. 6 INCH SQUARE ALUMINUM OR GALVANIZED STEEL WIRE MESH HARDWARE CLOTH (4 OPENINGS PER INCH AND MINIMUM WIRE DIAMETER 0.03 INCHES).
4. ROUGHEN CONSTRUCTION JOINT SURFACE TO ¼ INCH AMPLITUDE.

## BASIS OF BEARING

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PROFESSIONAL ENGINEER - STATE OF NEVADA
NINGYU GAO
EXP. 06-30-23
CIVIL
No. 25098
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REVISIONS

| REV. | DESCRIPTION | BY | DATE | APPROVAL |
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Fax: +1.702.263.7200

SUMMERLIN

**SUMMERLIN WEST VILLAGE 27**
PARK DRIFT TRAIL
V27 SUNSET RUN DRIVE TO V22 LAKE MEAD BOULEVARD

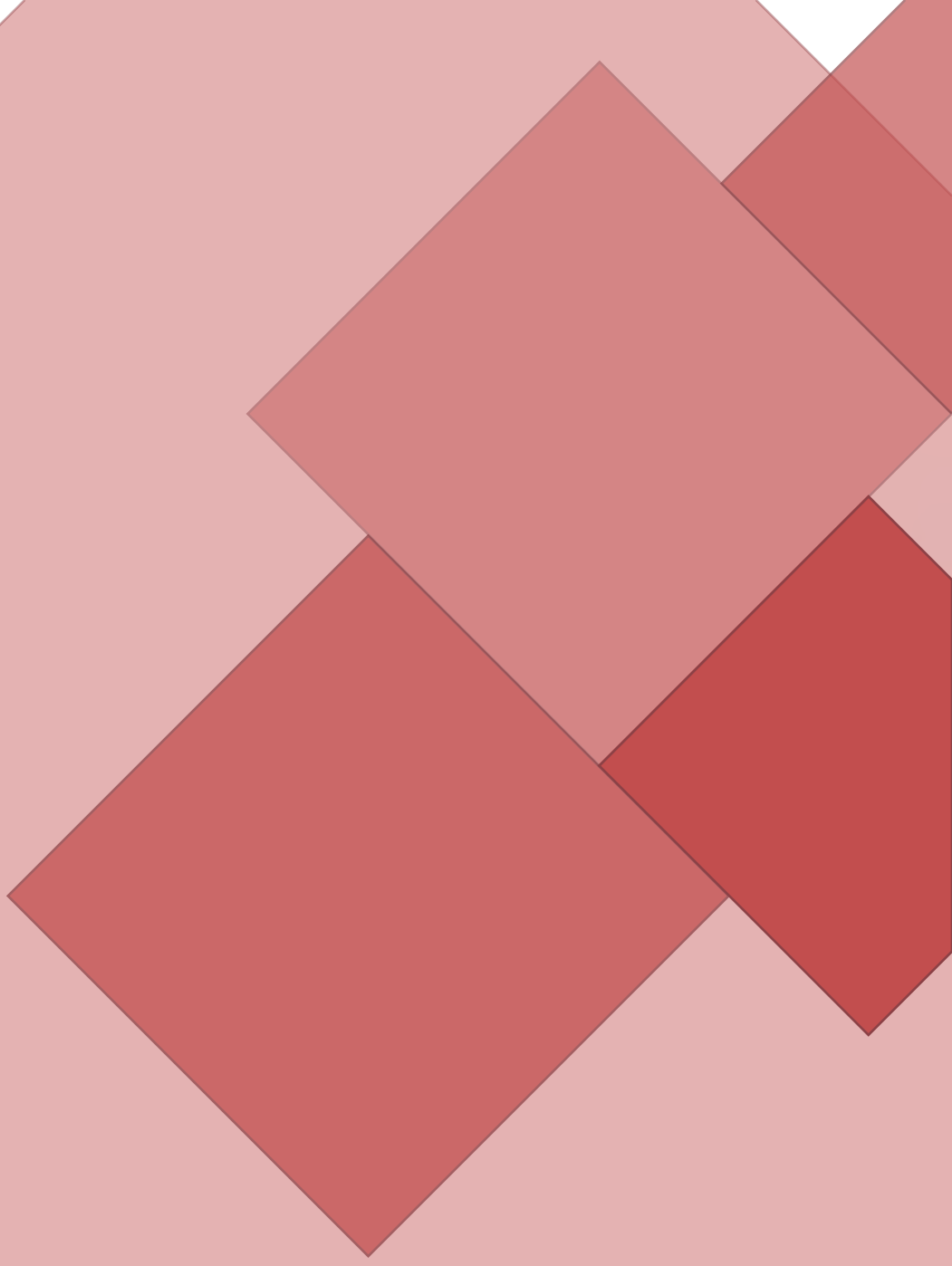
**FLOOD WALL TYPICAL SECTION SHEET 8 OF 8**

| DESIGNED BY: N. GAO | 107V9664 |
|---|---|
| DRAWN BY: J. TORRELLA | L22-01955 |
| CHECKED BY: K. ALAGITAWANNA | DATE: May 2023 |
| HORIZ.: NOTED | DRAWING NO. 92/97 |
| VERT.: NONE | |

JOB NO. 100069316

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# Appendix E. CD-ROM



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