



March 23, 2018

Diane Hoelzer, P.E.
Mark Goodwin & Associates
PO Box 90606
Albuquerque, NM 87199

**RE: Heritage Trails Subdivision
Drainage Report and Grading Plan
Engineers Stamp Date: 3/15/18
Hydrology File: N08D006F**

Dear Ms. Hoelzer:

Based on the information provided in your submittal received on 3/15/18, the Drainage Report and Grading Plan cannot be approved for Preliminary Plat or Grading Permit until the following are corrected and a revised Drainage Report and Grading Plan are submitted.

Prior to Preliminary Plat/Grading Permit:

1. The offsite swale under the powerline, west of 118th will need a new public drainage easement, granted by the owner of Parcel 2-B (Rio Bravo Partners & Peoria Car Wash).
2. The offsite swale will need an agreement and covenant to be maintained by the owner of the currently platted Tract A1 and B1 (KB Homes) and successors. This needs to be a named item under Unit 1 of the infrastructure list (offsite swale with agreement and covenant).
3. Extend the offsite swale 40 feet north to divert all the flows from the upstream basin into Pond #2, per the original Anderson Heights drainage report.
4. Include the single-A inlet and storm drain connection in Amole Mesa near the intersection of Messina on Unit 1 of the infrastructure list.
5. The following tracts in Unit 1 will need to be dedicated as public drainage easements maintained by the owners of the subdivision by using the easement language for "*Drainage Facilities and/or Detention Areas Maintained by Lot Owner*" defined in the DPM, Chapter 21, Section 4, Part A.:
 - a. Tract XX (first flush pond, required volume=20,683CF)
6. The following tracts in Units 2 and 3 will need to be dedicated as private drainage easements maintained by the owners of the subdivision by using the easement language for "*Drainage Facilities and/or Detention Areas Maintained by Lot Owner*" defined in the DPM, Chapter 21, Section 4, Part A.:
 - a. Tract A-2 (swale and storm drain)
 - b. Tract C (swale)



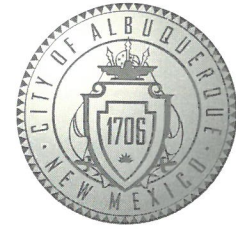
- c. Tract D (retention pond)
 - d. Tract F (first flush pond, volume required=3,826CF)
 - e. Tract L (swale)
 - f. Tract R (swale)
 - g. Tract X (swale)
 - h. Tract Y (retention pond)
 - i. Tract Z (swale)
 - j. Tract ZZ (first flush pond, volume required=28,857CF)
7. Cross-lot drainage easements are needed on the following lots/tracts:
- a. Unit 3, Block 1, Lots 9, 10, and 11 for the benefit of Tract A-2, to be maintained by the owners of Lots 9, 10, and 11, unless these lots are extended to include the corner of Tract A-2 at Colobel and 118th.
 - b. Unit 3, Block 1, Lots 1-9 for the benefit of Tract C, to be maintained by the owners of Lots 1-9, unless these lots are extended to contain the terraced portion of Tract C.
 - c. The drainage easement on Tract Q (near the memorial park) needs to a cross lot drainage easement for the benefit of Tract A1A to be maintained by the owner of Tract Q; not a stormdrain easement as currently shown.
8. Correct the pad elevation on Unit 3, Block 4, Lot 10.
9. Please add the dimensional data to the Tract Y pond, similar to the Tract D pond.
10. The waterblock on Tyler Peak Trail, north of Crest Trail Drive does not make sense with respect to the spot elevations provided, please correct.
11. Add a footnote to the infrastructure list that "If units 2 and 3 are developed separately, a revised phasing plan will need to be submitted and included the work order of the first unit to develop."
12. Between Unit 1, Block 3, Lot 28 and the memorial park. Provide a cross section here showing the retaining walls and their footers as contained on Lot 28.
13. Clarify Section E-E (the wall section along the boundary with Arrowhead Subdivision) to show that no new fill is being placed against the existing wall. Show and label the existing vs. proposed grades (typ.) and add a note that "no additional fill is to be placed against the existing wall".
14. Provide typical wall sections along Colobel and Amole Mesa showing property lines and horizontal and vertical dimensions. Show the existing perimeter wall to remain or to be removed; assuming it's just a garden wall, it may be appropriate to condition is removal on the grade change from one side to the other (<2' grade change for garden wall).
15. Add the typical swale detail as discussed (10:1.5 v-ditch, I believe) and callout where used.
16. Please provide the Curb and Gutter Exhibit (referenced on the infrastructure list footnotes).
17. Add a footnote to the infrastructure list that "storm drain sizes may be subject to change at DRC, pending Hydrology approval of the finalized HGL calculations."

PO Box 1293

Albuquerque

NM 87103

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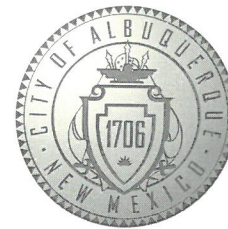


18. On Unit 1, Block 13, Lot 9, please put the easement and storm drain on the south side of the lot so that a more economic and hydraulically efficient storm drain can be built straight from the pond to the road.
19. Several of the inlets are shown crisscrossing over the trunk line with their connector pipes. Revise to provide straight connections to the manholes:
 - a. Inlets B6.
 - b. Inlet B11.
20. Many of the storm drain easements are too narrow for the required trenching prism, per DPM, Ch. 22.6.C.2:
 - a. The private easement across Tract B should be ~28' minimum. But this is private storm drain on a private tract, it may be better just to put a private drainage easement on the whole tract, then shift the stormdrain west several feet to allow for a sufficient trenching prism.
 - b. The private easement across Unit 2, Block 1, Lot 51 should be ~36' minimum. However if the storm drain alignment is straightened as recommended in comment 18, no easement would even be needed here.
 - c. The public easement across Unit 1, Block 13, Lot 9 needs to be ~30' minimum. Please reconfirm this trenching prism if the easement is shifted south as recommended in comment 18.
 - d. The public easement across Unit 1, Block 14, Lot 13 needs to be ~24' minimum.
 - e. The public easement across Unit 1, Block 14, Lot 20 needs to be ~24' minimum.
 - f. The public easement across Tract JJ (near the unit 1 pond) needs to be ~29' minimum and it needs to be realigned over the revised storm drain alignment.
21. The Public storm drain easements need to use the easement language for "*Dedication of Drainage Easements: City Constructs and Maintains*" defined in the DPM, Chapter 21, Section 4, Part B.

Prior to Work Order Approval:

A detailed drainage report will be required prior to submitting for Work Order. This report will need to address the following outstanding items, not addressed in this drainage report.

22. Capacity of the valley gutter on Emerald Peak Trail, south of Crest Trail Drive will need to be verified to justify the lack of a waterblock.
23. Capacity of the valley gutter on Tyler Peak Trail, south of Crest Trail Drive will need to be verified to justify the lack of a waterblock.
24. At DRC, waterblock height will be verified. If waterblocks are not designed to 0.87', the Drainage Report will need to be revised to demonstrate capacity similar to the previous two cases.
25. Please include the interim grading plan for Unit 2/3 in the work order set.
26. Provide stormdrain profiles showing finished grade, Q, V, and HGL.



27. All pipe hydraulics need to be analyzed. Either separate WSPGW models need to be created for these, or V depth calculations may be used per DPM, Chapter 22.D.2.c&d. The following pipes will need to be analyzed:

- a. Basin B Model. Between the B2 inlets and SDMH 23B.
- b. Basin B Model. Between sump inlet B12 and SDMH 10B. It may be more reasonable to connect one of these inlets directly to SDMH 24B instead.
- c. Colobel. Between Inlets 3D and SDMH 58E.
- d. Basin C Model. Between Inlet C8 and SDMH 4C.
- e. Basin C Model. Between Inlet C6 and SDMH 6C.
- f. Basin C Model. Between Inlet C5 and SDMH 7C.
- g. Basin C Model. Between Inlet C3 and SDMH 10C.

28. In order to expedite the review of this project for Preliminary Plat an in depth review of the WSPGW model was not conducted. Prior to Work Order, the model will be thoroughly reviewed and stormdrain sizes, alignments, and inlets may be subject to change.

29. Please include the first flush pond designs in the work order set; several design items will need to be addressed at such time: design of the outlet structures, retaining walls designed for saturated soils, end treatments for the inlet pipes, perimeter fencing, etc.

PO Box 1293

If you have any questions, please contact me at 924-3695 or dpeterson@cabq.gov.

Albuquerque

Sincerely,

NM 87103

www.cabq.gov

Dana Peterson, P.E.
Senior Engineer, Planning Dept.
Development Review Services



City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: Heritage Trails (AKA Anderson Heights Unit 4) Building Permit #: _____ City Drainage #: N8 / D006F
DRB#: 1002739 EPC#: _____ Work Order#: _____
Legal Description: Tract A-1-A and tract B-1, Anderson Heights Unit 4
City Address: 118th street and Amole Mesa Avenue

Engineering Firm: MARK GOODWIN AND ASSOCIATES, PA Contact: Diane Hoelzer, PE
Address: PO BOX 90606, ABQ, NM 87199
Phone#: 828-2200 Fax#: _____ E-mail: diane@goodwinengineers.com

Owner: KB Home New Mexico Inc. Contact: Morris Barbera or Bo Johnson
Address: 7807 E Peakview Avenue, Ste. 300, Centennial, Colorado, 80111
Phone#: (303)908-0575 or (505)450-4616 Fax#: _____ E-mail: _____

Architect: N/A Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: N/A Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

DEPARTMENT:

- ☒ HYDROLOGY/ DRAINAGE
☐ TRAFFIC/ TRANSPORTATION
☐ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:

- ☐ ENGINEER/ ARCHITECT CERTIFICATION
☐ CONCEPTUAL G & D PLAN
☒ GRADING PLAN
☐ DRAINAGE MASTER PLAN
☒ DRAINAGE REPORT
☐ CLOMR/LOMR
☐ TRAFFIC CIRCULATION LAYOUT (TCL)
☐ TRAFFIC IMPACT STUDY (TIS)
☐ EROSION & SEDIMENT CONTROL PLAN (ESC)
☐ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: ☒ Yes ☐ No

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

- ☐ BUILDING PERMIT APPROVAL
☐ CERTIFICATE OF OCCUPANCY
☒ PRELIMINARY PLAT APPROVAL
☐ SITE PLAN FOR SUB'D APPROVAL
☐ SITE PLAN FOR BLDG. PERMIT APPROVAL
☐ FINAL PLAT APPROVAL
☐ SIA/ RELEASE OF FINANCIAL GUARANTEE
☐ FOUNDATION PERMIT APPROVAL
☒ GRADING PERMIT APPROVAL
☐ SO-19 APPROVAL
☐ PAVING PERMIT APPROVAL
☐ GRADING/ PAD CERTIFICATION
☐ WORK ORDER APPROVAL
☐ CLOMR/LOMR
☐ PRE-DESIGN MEETING
☐ OTHER (SPECIFY) _____

DATE SUBMITTED: March 15, 2018 By: Diane Hoelzer, PE

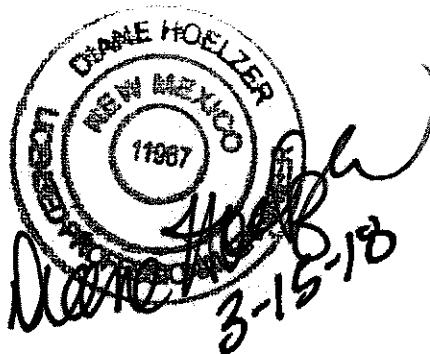
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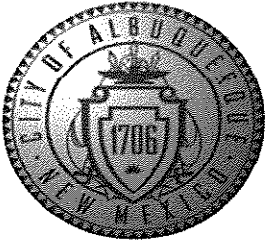
*Heritage Trails
(Residential Subdivision)*

Drainage Management Plan

*Prepared by
Mark Goodwin & Associates, P.A.*

March 15, 2018





City of Albuquerque

Planning Department
Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: Heritage Trails (AKA Anderson Heights Unit 4) Building Permit #: _____ City Drainage #: N8 / D006F
DRB#: 1002739 EPC#: _____ Work Order#: _____
Legal Description: Tract A-1-A and tract B-1, Anderson Heights Unit 4
City Address: 118th street and Amole Mesa Avenue

Engineering Firm: MARK GOODWIN AND ASSOCIATES, PA Contact: Diane Hoelzer, PE
Address: PO BOX 90606, ABQ, NM 87199
Phone#: 828-2200 Fax#: _____ E-mail: diane@goodwinengineers.com

Owner: KB Home New Mexico Inc. Contact: Morris Barbera or Bo Johnson
Address: 7807 E. Peakview Avenue, Ste. 300, Centennial, Colorado, 80111
Phone#: (303)908-0575 or (505)450-4616 Fax#: _____ E-mail: _____

Architect: N/A Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: N/A Contact: _____
Address: _____
Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

DEPARTMENT:

- ☒ HYDROLOGY/ DRAINAGE
☐ TRAFFIC/ TRANSPORTATION
☐ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:

- ☐ ENGINEER/ ARCHITECT CERTIFICATION
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- ☒ PRELIMINARY PLAT APPROVAL
☐ SITE PLAN FOR SUB'D APPROVAL
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☐ PAVING PERMIT APPROVAL
☐ GRADING/ PAD CERTIFICATION
☐ WORK ORDER APPROVAL
☐ CLOMR/LOMR
- ☐ PRE-DESIGN MEETING
☐ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: ☒ Yes ☐ No

DATE SUBMITTED: March 15, 2018 By: Diane Hoelzer, PE

COA STAFF: _____ ELECTRONIC SUBMITTAL RECEIVED: _____

Heritage Trails

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D. Mark Goodwin & Associates, P.A.
Consulting Engineers

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~ 2012 ACEC/NM Award Winner for Engineering Excellence ~
~ 2008 ACEC/NM Award Winner for Engineering Excellence ~
~ 2017 ENR Landscape/Urban Development Award of Merit~

March 15, 2018

Mr. Dana Peterson
Hydrology Department
City of Albuquerque
PO Box 1293
Albuquerque, NM 87103

Re: Heritage Trails Subdivision – (DRB 1002739)
Request Approval of Drainage Report and Grading Plan
File: N08D006F

Dear Mr. Peterson:

In response to your comment letter dated January 31, 2018:

HYDROLOGY:

1. *Runoff from Tract D will flow to a small retention pond within the tract. The maximum WSEL for the 100 year-10 day storm is 0.6 feet.*

Runoff from Tract Y will flow to a small retention pond within the tract. The volume retained include the offsite sloped area adjacent to the east side of 118th street ROW. The maximum WSEL for the 100 year-10 day storm is 1.0 feet. The west triangular portion of Tract Z and Tract X also drains into this pond through a shallow 1' deep gravel lined swale.

Runoff from the east triangular portion of Tract Z will flow into landscape areas and ultimately into Amole Mesa Avenue. All Landscape Tract will include a drainage covenant which will be included on the infrastructure list.

2. *Offsite drainage west of 118th street are offsite flows and do not enter our project site. The ultimate drainage plan for all flows west of 118th street was to be directed to the northern most powerline pond #2 as shown in the CLOMR/LOMR for the 118th Street Powerline Ponds. This plan was approved by the City and FEMA and the City has a copy of this report and study and as built. These ponds were design to accept the flows from these offsite areas. A sheet has been added to this grading plan showing a well defined swale that will be graded to insure runoff west of 118th street and Amole Mesa Avenue ROW will be directed to the existing rundown apron as was previously designed.*

A temporary berm should not be necessary. My recollection is that the City maintains these ponds, so no drainage covenant should be necessary.

3. This report is an amendment to the previously approved drainage report. Up until now there was never a requirement for a storm drain or inlet in Amole Mesa. Another project constructed Amole Mesa Road. The ultimate section is constructed at the eastern end of our site. It has been brought to my attention that there is a storm drain at the east end of Amole Mesa, with a possible stubout for an inlet on the south side of the road. It appears that the construction of this inlet was overlooked. If there is a stubout for an inlet our project can construct the inlet. The capacity of the road was checked and found to be adequate for the entire length.
4. The east half of Tract Z has been regraded to runoff towards the landscape area and ultimately to Amole Mesa ROW.
5. There was and still is a waterblock on Emerald Peak trail north of Crest Trail Drive. There is no waterblock on the south side of Crest Trail Drive. To add a 0.87' waterblock in this area would be difficult to create and would unnecessarily increase the slope in the road south of Crest Trail. There is such a small amount of runoff that may go down this road that it would be best not to change the existing plan. The valley gutter grades around the curb return radius can be manipulated in this area so that most if not all of the small amount of runoff down Crest Trail Drive. We can work this out at DRC.
6. Refer to answer #5. This also applies to Tyler Peak Trail.
7. Crest Trail Drive is the high point at the intersection with Three Rivers Road. There is a slight high point just north of Crest Trail Drive. Ultimately Three Rivers Road flows north, north of Crest Trail Road and Three Rivers Road flows south, south of Crest Trail Road.

Additional flow arrows have been added to the plans for clarification.

8. Street capacities for this project were analyzed in great detail as presented in Table 2 Street Capacity Summary. There should be no problem with waterblocks working.
9. Deer Horn Peak Trail was reviewed and standard C&C is now shown in the area where the knuckle begins. Street capacity should not be an issue. The valley gutter was removed at this intersection as requested. The small amount of flow in this area should decrease the concern of a split flow scenario.
10. Inconsistency noted and corrected.

GRADING PLAN:

11. The site is already protected with numerous onsite temporary retention ponds that were sized for the undeveloped drainage conditions. Unit 1 is at the downstream end of the development so the downstream infrastructure will be constructed first and will support and connected to the later Units. The existing topography showing the existing retention ponds are included in this resubmittal along with an overall plan showing how these ponds work into the Unit 1 phase of development.
12. All the existing information requested has been provided on the grading plan. The proposed grading plan is within 12 inches of the existing top of retaining wall grades. No additional retaining walls are proposed. A private 4.0' garden wall will need to be constructed within all the lots along the eastern boundary because the existing garden walls constructed with the adjacent subdivision do not extend high enough to provide proper safety. The proposed garden wall should probably be offset about 4 feet from the existing property line but the exact design should be determined by a licensed structural engineer.

13. Retaining walls are shown where required with top of wall (TW) and bottom of wall (BW) grades. More detail has been added around the perimeter boundary. At this time, it is unclear whether the client will keep or remove the perimeter wall. In some areas it may require removal and replacement in order to match this design. Regardless what the client decides, there will be a perimeter wall around the entire site.
14. Tract A and C have been regraded. Runoff from these areas will pass into the adjacent lots as shown on the revised grading plan. Additional grades and a typical wall section has been added to the plan.
15. Double retaining walls have been detailed in Block 2 of Unit 3.
16. Double retaining walls have been detailed in Block 3 of Unit 3.
17. Double retaining walls have been detailed in Block 1 of Unit 2 and Unit 3.
18. The double retaining wall has been revised to be contained within the boundary of Lot 28.
19. Proposed grades for the Memorial Park have been added to the plan. There will be a wall constructed between the City memorial park and the residential lot backyards.
20. Grading detail has been added to Tract R along with a 1.0' deep swale that is to convey runoff to either Amole Mesa to the north or Crag Peak to the south.
21. Tract M has been graded in more detail. Retaining walls have been added that have negated the use of a swale.
22. Tract L has been graded in more detail, Retaining walls have been added and a swale created ten feet north of Lot 6, Block 10, that directs runoff down to Alta Peak Trail.
23. The street name has been corrected on all sheets to be Crest Trail Drive.
24. Finished pad elevation has been provided for Lot 16, Block 11.
25. Lot 10, Block 12 has been revised. The easement in this area has been removed since the storm drain layout has changed. The plat and the grading plan lot lines match now.
26. Additional spot elevations and retaining walls have been added between Block 13 and 14 and Colobel Avenue.
27. Done..
28. Done.
29. Done.
30. A valley gutter was added across Three Rivers road on the north side at Crest Trail Drive but not on the south side. The runoff will turn south here so it is not necessary.
31. Done.
32. Done.
33. Done.

34. Done

STREET FLOW CAPACITY:

- 35. Footnote added about 8" curb height. Isn't this standard? I have never been required to call out curb height before, it has always been understood. Only on commercial sites is 6" curb used.
- 36. Mid points street capacities are analyzed to determine where mountable to standard curb and gutter transitions should occur. As an example, on Bord Peak, at 8.16 cfs at 2.40% slope the transition from mountable to standard G&G occurs as shown on the grading plan. This is typically done throughout the street capacity analysis table. All of the original hydrology peak flows have now changed after updating precipitation values using NM Atlas 14.
- 37. Again, this is where the transition from mountable to standard C&G begins.
- 38. Refer to explanation #36.
- 39. Refer to explanation #36.
- 40. Refer to explanation #36. There is a transition from mountable to standard curb and gutter at this location.
- 41. No one told me that the City memorial park was draining into our site. I have been given the approved plan now and have added their peak flow into our design, so it is now accounted for.
- 42. With the revised hydrology analysis, this is no longer a problem. The 0.87' is not exceeded.
- 43. The sump inlet at the intersection of Horseshoe Lake Road and Winsor has been revised. Now, only one double C inlet will be required. There is a rather large radius of curvature at this location, so they should be able to construct a double. If not, this can be worked out to (2) single C during DRC.
- 44. Colobel Avenue street capacity calculation have been added to Table 2. Yes, all of the runoff will be picked up at the last two eastern most inlets.

WSPGW Analysis

- 45. Done.
- 46. The storm drain in Colobel Avenue has been revised. The storm drain in Unit 2 has been completely redesigned to pass through internally to and through Unit 1 before connecting to Colobel storm drain from Quail Canyon Road.
- 47. Curvilinear pipe has been removed.
- 48. This is understood.
- 49. All of this information is shown in Table 2.
- 50. Done.

51. This level of detail is for DRC construction plans. The construction plans are not available until the Infrastructure list is approved. The storm drain is designed based on rough grading spot elevation on the grading plan. As stated previously storm drain sizes "are subject to change" during the DRC design process.

Table 3 is a summary of the WSPGW, that gives "estimated" rim elevations at each manhole and the WSEL for the 100 year storm. This will be reanalyzed during the DRC process.

52. As we discussed previously, these short sections of pipe from the inlet to the manhole are analyzed using Mannings equation. This should be adequate for these short reaches of pipe

53. Runoff from Tract A1B has been added to this project sites drainage plan.

54. All storm drain manhole labels have been revised and should be consistent now between drawings and summary tables.

55. Existing storm manholes have an "E" after the number.

56. Refer to response #52.

57. Refer to response #52.

58. Refer to response #52.

59. Done.

60. The storm drain model have been updated.

61. Refer to response #52.

62. Refer to response #52.

63. This model has been revised and updated.

64. The storm drain model has been revised and updated. Results are summarized in Table 3 and on Sheet 3, Preliminary Storm Drain layout.

65. Refer to response #63.

66. The required volume for first flush pond retention have been added to each of the Units at the downstream end of the storm drain system as shown on the revised grading plan. Volume calculations are in the appendix for each of the ponds. No credit is being taken for retaining first flush volume on the individual lots.

67. Acknowledged.

68. At our meeting it was decided that offsite flows from Colobel Avenue, which would also include Amole Mesa and 118th street would not be part of our first flush volume requirement.

69. The storm drain in this area has been revised. There is no longer a need for an easement in this area. Refer to revised storm drain layout.

70. A 20 foot wide drainage easement is shown on the plat through Tracts JJ and XX.

71. The drainage easement is labeled and can be revised during final plat.

72. Okay, revised.

73. Okay, revised.

74. Refer to Note 7 on the preliminary plat. A private drainage easement is called out and to be maintained by the HOA. No designation is made between surface and subsurface, but as noted earlier, the infrastructure will reflect that all storm drain pipe is private. If there are additional adjustments in language, hopefully this can be a condition of final plat approval when the time comes.

Sincerely,

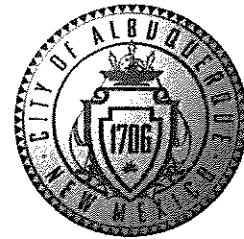
MARK GOODWIN & ASSOCIATES, PA



Diane Hoelzer, PE
Senior Engineer

DLH/dlh

CITY OF ALBUQUERQUE



January 31, 2018

Diane Hoelzer, P.E.
Mark Goodwin & Associates
PO Box 90606
Albuquerque, NM 87199

**RE: Heritage Trails Subdivision
Drainage Report and Grading Plan
Engineers Stamp Date: 1/16/18
Hydrology File: N08D006F**

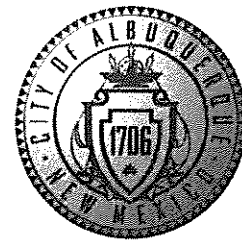
Dear Ms. Hoelzer:

Based on the information provided in your submittal received on 1/16/18, the Drainage Report and Grading Plan cannot be approved for Preliminary Plat or Grading Permit until the following are corrected and a revised Drainage Report and Grading Plan are submitted.

If providing an additional Drainage Report prior to Work Order approval, only the items in bold will need to be addressed for Preliminary Plat/Grading Permit.

Hydrology:

1. **What is the drainage plan for tracts D, Y, and Z? These seem to drain to low areas, but not onto 118th. Please define low areas and size for the contributing drainage (these tracts are not part of the other defined subbasins). These should be sized for the 10-day, 100 year volume and accompanied by with a drainage covenant.**
2. **Offsite drainage is not adequately addressed with regard to flows entering 118th St north of the powerline ponds and at the intersection of 118th and Amole Mesa. Provide analysis of flows entering in these areas; a temporary berm, with covenant is likely necessary to keep flows from entering the road in these areas.**
3. **How are flows along Amole Mesa being addressed? Construction of the south half street needs to provide adequate street capacity. It seems that a storm drain plug was left at Messina and Amole Mesa for the purpose of intercepting the south half street with a new inlet once constructed.**
4. **The east half of Tract Z is graded to drain into Tract A-1-B. Please grade to drain to Amole Mesa or retain on-site. If cross-lot drainage is necessary, a new easement will need to be granted by the owner of Tract A-1-B.**
5. **Add 0.87' high waterblocks on Emerald Peak Trail, north and south of Crest Trail Drive to contain Subbasin 17 on Crest Trail Drive.**



6. **Add 0.87' high waterblocks on Tyler Peak Trail, north and south of Crest Trail Drive to contain Subbasin 17 on Crest Trail Drive.**
7. **Add 0.87' high waterblocks on Three Rivers Road, north and south of Crest Trail Drive to contain Subbasin 21 on Crest Trail Drive.**
8. **At DRC, waterblock height will be verified. If waterblocks are not designed to 0.87', the Drainage Report will need to be revised to address the new subbasins and potential split flows.**
9. **It is unclear how flows in the south half street of Crest Trail Drive are turned south onto Deer Horn Peak Trail in Subbasin 3. It seems as though the valley gutter crossing Deer Horn Peak should be deleted and the grades around the SW corner of the intersection be adjusted to prevent a split flow scenario here.**
10. **In the AHYMO Model, the summary table for subbasin 2 reports %impervious as 52.94% but the input file and the excel table for subbasin 2 report only 45% land treatment D. Please recheck land treatments and resolve. This issue may also be the cause of the inconsistent street capacity analysis at analysis point "Bord Peak -26-MTB-2.40%" and the sump at Bord Peak and Banner Peak described below.**

Grading Plan:

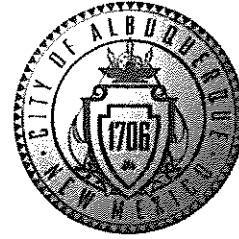
11. **Provide a phasing plan for each unit demonstrating how offsite, undeveloped flows will be managed. Demonstrate that the downstream units will not be impacted by the temporary lack of upstream drainage infrastructure. Items such as ponds, berms and swales will need to be included on the infrastructure list of the downstream phase, with Drainage Covenants signed by the underlying landowner.**
12. **Provide wall sections along the boundary with Arrowhead Subdivision showing: property lines, existing grades, finished grades, existing retaining wall/garden wall, proposed retaining wall/garden wall, footers, and dimensional data. Demonstrate that the adjoining properties are not damaged or constrained in their use by the new grade at property line.**
13. **Provide typical sections around the entire perimeter of this project showing property lines and horizontal and vertical dimensions. Show the existing wall to remain or to be removed.**
14. **Please define the swales along Tracts A and C. Show cross sections, slopes, and capacity to demonstrate that these will be able to safely convey flows out to the streets and will not cause damage along the backs of the residential lots and their walls. These swales need to be included on the Infrastructure List with Drainage Covenants.**
15. **Unit 3, Block 2. A double retaining wall may be more desirable between Lots 1-5 and 6-10 to support the 6-7' grade change, plus garden wall.**
16. **Unit 3, Block 3. A double retaining wall may be more desirable along the backs of Lots 10-12 and 17-19 to support the 6'+ grade change, plus garden wall.**
17. **Unit 2, Block 1. A double retaining wall may be more desirable between Lots 36-44 and Colobel to support the 5'-11' grade change, plus garden wall.**

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18. Unit 1, Block 3, Lot 28. The double retaining wall is shown crossing the property line and onto Tract A-1-B. Please revise to show as contained on Lot 28 and provide a cross section here.
19. In anticipation of grading for the park on Lot A-1-B, provide proposed grades on Tract A-1-B and how they will support grading along Unit 1, Block 3, Lots 44-49. Presumably the temporary pond will be filled and grades restored to where retaining walls/ cross lot drainage is not necessary here.
20. Tract R is graded towards the backs of Unit 2, Block 11, Lots 1-6. Please provide a swale with Drainage Covenant to divert stormwater south to Crag Peak and include on the Infrastructure List.
21. Tract M appears to slope towards the side-yard of Unit 2, Block 9, Lot 19. Please provide a swale with Drainage Covenant to divert stormwater east to Alta Peak Trail and include on the Infrastructure List.
22. Tract L appears to slope towards the side-yard of Unit 2, Block 10, Lot 6. Please provide a swale with Drainage Covenant to divert stormwater east to Alta Peak Trail and include on the Infrastructure List.
23. On sheet 1 of the Grading Plan between Tracts C and Tract R and on sheet 2 of the Grading Plan, between Tracts N and I, the road is called "Hawkins Peak Way"; on the Plat it is "Crest Trail Drive". Please resolve.
24. Unit 2, Block 11, Lot 16. Provide the Finished Pad elevation.
25. Unit 1, Block 12, Lot 10. The north lot line does not match the Plat and the pad size may be too wide for the sideyard setbacks.
26. On sheet 3 of the Grading Plan, please provide bottom of wall grades between Blocks 13 and 14 and the Colobel ROW, similar to sheets 1 and 2.
27. Provide valley gutter across Tyler Peak Trail, north and south of Crest Trail Drive.
28. Provide valley gutter across Tyler Peak Trail, north of Basin Peak Way.
29. Provide valley gutter across Crest Trail Drive, east and west of Alta Peak Trail.
30. Provide valley gutter across Three Rivers Road, north and south of Crest Trail Drive.
31. Provide valley gutter across Quail Canyon Road, north of Colobel.
32. Provide valley gutter across Quail Canyon Road, south of West Fork Road.
33. Provide valley gutter across Gold Hill Road west of Grass Mountain Road.
34. Provide valley gutter across Rider Ridge Drive, south of Amole Mesa.

Street Flow Capacity:

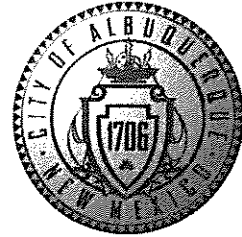
35. Add a footnote to the infrastructure list that all curb and gutter shall be 8" standard, unless adequate street capacity has been demonstrated.
36. Analysis point "Bord Peak -26-MTB-2.40%" has a known Q of 9.00 cfs but subbasin 2 reports a peak runoff of 10.12 cfs. Additionally, the sump at the junction of Banner Peak and Bord Peak Trail reports a peak flow of only 20.98cfs whereas the sum of the peak flows from the contributing subbasins 1 and 2 is 22.10 cfs. 1.12 cfs appears to be unaccounted for; if true, 1.12 cfs will also need to be added to the WSPGW model.
37. At analysis point "Banner Peak-26-MTB-2.70%", flow depth exceeds the curb height. Either add inlets on Banner Peak or use standard curb.

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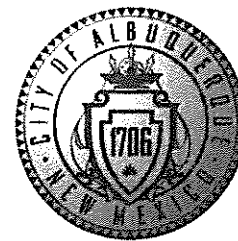
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38. At analysis point "Bord Peak-26-MTB-1.0%", flow depth exceeds the curb height. Either add inlets on Bord Peak or use standard curb.
39. At analysis point "Costilla Peak-26-MTB-2.55%", flow depth exceeds the curb height. Either add inlets on Costilla Peak or use standard curb.
40. At analysis point "Deer Horn-26-MTB-4.0%", the EGL exceeds 0.53'. However it seems unlikely that 10 cfs is generated at this point in the subbasin when the entire subbasin runoff is only 15.59 cfs. Consider reducing the estimated flow, otherwise an inlet or standard curb will be required on this street.
41. Where does the runoff from the proposed park on Tract A-1-B go? It is not accounted for at analysis point "Crag Peak-26-Std-3.2%". Assuming these flows (4.80cfs) route here, the street capacity analysis will need to be updated at this analysis point and all the downstream analysis points until there are no bypass flows to account for (all the way to the sump at Alta Peak and Basin Peak). The WSPGW model will then need to be updated as well.
42. **The EGL in Basin Peak Way exceeds 0.87'. Extend stormdrain and add inlets along Basin Peak Way upstream of inlet B3, in the vicinity of Block 1, Lot 40, to keep the EGL from entering residential lots in this area.**
43. Please relook the street capacity analysis and grading at Windsor Trail Street and Horseshoe Lake Road. There appear to be a few unintended sump points around this corner on the grading plan and it is difficult to tell what the intended sump is. Two single-A inlets appear to be planned for this point, but only one inlet is shown. Also consider the constructability of building anything bigger than a single-C around a curve.
44. **Please include the Colobel street capacity results. Will the Colobel inlets near the Morrissey intersection be in sumps or are they adequately sized to remove all flows prior to the intersection?**

WSPGW Analysis:

45. **Add a footnote to the Infrastructure List that stormdrain sizes are subject to change at DRC, pending Hydrology approval of the HGL calculations.**
46. **Provide a single storm drain for Colobel, sized to carry existing, System-A, and System-B flows. Parallel pipes are not desirable, if the existing pipe is now overcapacity, it should be replaced with a larger one. Alternately, provide trenching prisms showing the location of the new and old pipe, the new inlet laterals, other utilities, and ROW.**
47. **Do not show curvilinear pipe in Colobel.**
48. **The storm drain in Colobel will need to be constructed prior to paving Colobel, please update the infrastructure list to reflect.**
49. Include an inlet summary table describing inlet size, type, inlet ID, inflow, and downstream manhole/inlet.
50. In the WSPGW printouts, label the structures.
51. Provide stormdrain profiles showing finished grade, Q, V, and HGL.



Basin B Model

52. Provide hydraulic analysis for the 24" pipe connecting SDMH #2B and SDMH 8B. As discussed in above in the street flow capacity analysis, additional inlets are also needed in Basin Peak Way (EGL over 0.87'), which will likely lengthen this section of pipe and add a new manhole.
53. Bypass flows originating from Tract A1B, which were not considered in the street capacity analysis, will need to be added to the Basin B model.
54. SDMH 8B appears to be erroneously called 51E in Table 3.

Basin C Model

55. In Table 3, Add descriptors that the first several manholes are existing, part of Anderson Heights Unit 2, and not the same as the new manholes having the same IDs in Heritage Trails.
56. Please provide hydraulic analysis for the stormdrain pipe connecting SDMH #4C and south Inlet #C14 under West Fork Road.
57. Please provide hydraulic analysis for the stormdrain pipe connecting SDMH #6C and south Inlet #C12 under Gold Hill Road.
58. Please provide hydraulic analysis for the stormdrain pipe connecting SDMH #7C and south Inlet #C11 under Crest Trail Drive.
59. Add inflows from Inlets #C5 separately at SDMH 16C and SDMH 17C.
60. It appears SDMH 19C was not modeled and its inlet inflows were instead added at SDMH 18C; 19C should be at Sta. 4625.80, according to Table 3.
61. Please provide hydraulic analysis for the stormdrain pipe connecting SDMH #23C and south Inlet #C2 under Diamond Peak Way.
62. Please provide hydraulic analysis for the stormdrain pipe connecting SDMH #23C and north Inlet #C2 under Diamond Peak Way.

Basin A Model

63. This model will need to be updated to show the single stormdrain in Colobel.
64. According to the Basin C model, 110.86 cfs are added at SDMH-57; according to this model 140.04 cfs are added here. Please quantify and clarify what flows are being added at this junction and where they are coming from.
65. Please provide hydraulic analysis for the stormdrain system upstream of SDMH 21.

First Flush Ponding:

66. **The first flush ponding on individual lots cannot be used towards meeting the first flush requirement; a central pond(s) or payment of fee-in-lieu is required.**
67. **The proposal to deepen Pond 10 in order to meet first flush requirements cannot be accepted. This pond is publicly maintained; meaning the on-going maintenance of the increased size would become the city's responsibility. On-site ponding with private maintenance of the pond(s) is required.**
68. **Include subbasin 33 and the new impervious section of subbasin 32 in the first flush volume calculations.**

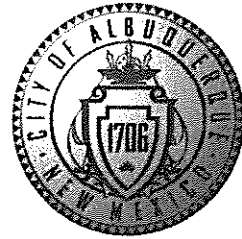
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Preliminary Plat:

69. A storm drain easement is required across Block 11, Lot 18 and Block 12, Lot 11 for the proposed storm drain running from Pine Town Way to South Peak Road.
70. A storm drain easement is required across Block 14, Lot 38 and Tract JJ for the proposed storm drain running from Grass Mountain Road to Colobel Road.
71. Please label the new 25' drainage easement across Tract Q and move the easement language to the easement notes to be consistent with the other easements.
72. All drainage easements within Units 2 and 3 need to be private drainage easements.
73. All drainage infrastructure within Units 2 and 3 need to be private, and stated as private on the Infrastructure List
74. Tract WW needs to be noted as a private surface and subsurface drainage easement, to be maintained by the HOA.

If you have any questions, please contact me at 924-3695 or dpeterson@cabq.gov.

Sincerely,

Dana Peterson, P.E.
Senior Engineer, Planning Dept.
Development Review Services

PO Box 1293

Albuquerque

NM 87103

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I. PROJECT DESCRIPTION

The Heritage Trails project site covers an area of approximately 87 acres. It was formerly known as Anderson Heights Unit 4, 6 and 9, (drainage file: N-8/D006F) and was part of a larger development also known as Anderson Heights. The site is located at the southeast corner of the intersection of Amole Mesa and 118th street SW.

This project is an amendment to the previously approved Drainage Management Plan for Anderson Heights Unit 4 that consisted of 474 lots. This project proposes to develop 425 single family residential lots, in three phases or Units as shown on the amended preliminary plat. Unit 2 and 3 is still a private gated community with private streets that are encumbered with a private storm drain easement and public water and sanitary sewer easements (ABCWUA). There is an internal 1.0 acre private park along with substantial community open space areas. Unit 2 and 3 will be graded at the same time, so an interim temporary pond design was not required at this time.

The project will tie into existing roads and existing water, sanitary sewer and storm drain infrastructure located in Amole Mesa to the north, 118th street to the west and to Colobel Avenue to the south. There are existing subdivisions to the north, south and east of this project. On a larger scale, this project is located between Gibson Blvd. and Dennis Chavez Blvd. and west of 98th street in the southwest part of Albuquerque.

II. DESIGN CRITERIA AND PREVIOUS DEVELOPMENT

The design criteria used in this report was in accordance with Section 22.2 Hydrology of the Development Process Manual, Volume 2, Design Criteria, January 1993 edition. The 100-year 6-hour storm event was analyzed to determine street capacities and sizing of the storm drain system using $P(1 \text{ hr})=1.81"$, $P(6 \text{ hr})=2.31"$. The onsite Land Treatment values used were based on Table A-5, in the DPM.

A. HISTORY

This project site was formerly known as Anderson Heights Unit 4 and 6 and Unit 9. Upon initial DRB approval of the grading and drainage plan and preliminary plat for Units 4, 6 and 9, the site was mass graded. At a later date, the lot layout was changed for Unit 4 and 6 and a new grading and drainage plan and preliminary plat was submitted and approved but the site was never regraded to this new layout configuration. The client moved forward with Unit 9, completing construction plans and filing the plat but no construction was ever initiated beyond rough grading. And then development was suspended indefinitely due to the poor economy. In 2007-2008, an interim grading plan was approved with interim ponds to retain onsite runoff for the purpose of protecting downstream development. This grading plan was implemented and certified. Under current conditions, the project site reflect the original grading scheme and the interim ponds. The interim pond plan has been added to this submittal.

In March of 2015, a bulk land plan was approved and recorded that dissolved all internal lot, tract and right of way lines and created two new parcels: Tracts A-1 and B-1. In June of 2017, a 2 acre parcel was

separated from Tract A-1 for the purpose of letting the City create a Memorial Park.

A LOMR was approved by FEMA for the 118th street ponds that ultimately took this project site out of the floodplain (refer to Figure 3 – FEMA panel 35001C0317).

The original Master Drainage Plan for Anderson Heights included drainage solutions for all the Units (1 thru 9) in Anderson Heights, which included detention ponds and storm drain systems. The drainage plan for the proposed site involves collection of all the onsite runoff to the southeast corner where it is to be intercepted by an existing 72"-78" RCP storm drain and conveyed south through Gault Trail in the existing Anderson Heights Unit 3 subdivision to an existing regional detention pond (POND 10). The construction plan for this existing storm drain can be found in Appendix. There is also an existing storm drain in Colobel Avenue that was constructed to intercept flows at several locations along the southern boundary of the project site. This storm drain will require some modification to accommodate the new layout configuration. The RECORD DRAWING as built can be found in the Appendix.

III. EXISTING DRAINAGE CONDITIONS

Under existing drainage conditions, onsite runoff is conveyed to a number of onsite temporary retention ponds. The topography in the area is generally in an eastward direction. **There are no offsite flows that enter the site.** The 118th street powerline ponds along the western boundary (approved by FEMA and the City and certified) intercept offsite flows from the major arroyos to the west and convey runoff south to the existing concrete channel located along the north side of Dennis Chavez Blvd. There is an existing storm drain in Colobel Avenue and in Gault Trail that was designed to intercept all the runoff from this site and discharge into the existing Pond 10. The RECORD DRAWING as built for these existing storm drains can be found in Appendix C.

The offsite basins just north of Amole Mesa and west of 118th street were designed and approved by the City and FEMA to intercept flows into the northern most Powerline Pond #2. There is an existing concrete runoff to accept the flows from a swale, that presently is very ill defined and others (?) have actually created berms and obstructed runoff from reaching the pond.

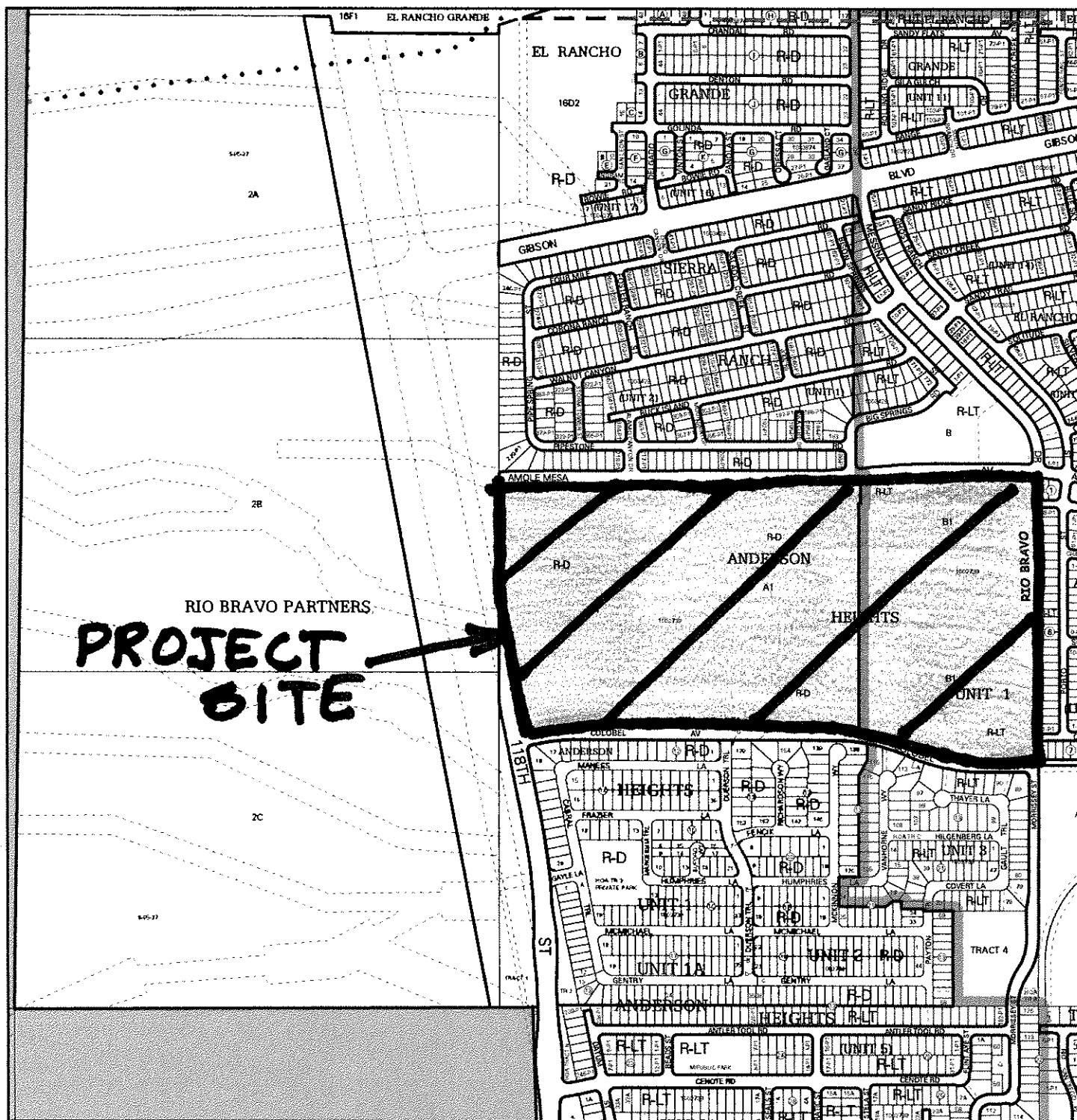
There is also an existing storm drain at the far east end (our project eastern most boundary) of Amole Mesa, where the full build out road is completed along with an inlet on the north side of the road. There is rumor that a lateral stub out existing to the south side with no inlet. If this stub out is verified to exist, then our project site will construct an inlet and connect to it.

IV. DEVELOPED DRAINAGE CONDITIONS

Under developed conditions, onsite runoff will be conveyed as surface street flow within the street right of way. At the point that runoff approached top of curb, inlets and an underground storm system is designed to intercept and convey the runoff to a First Flush Pond located in each of the three Unit2. Outfalls from each pond spills over and back into a storm drain system that then carries runoff to the Regional Pond 10 located in the existing Anderson Heights Unit 3 subdivision.

First Flush pond volumes, both required and provided are detailed in the Appendix.

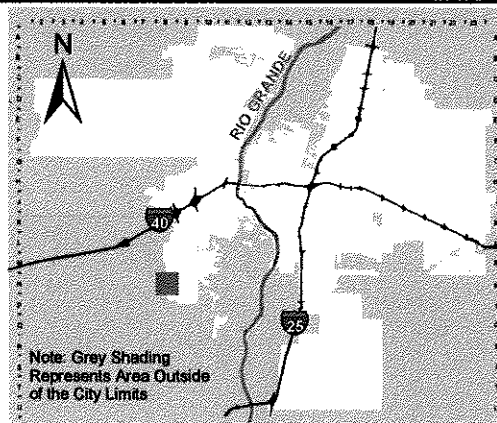
An unimproved swale along the west side of 118 th street will be improved to carry the offsite flows from just north of Amole Mesa intersection south and into Powerline Pond #2. The details of this pond can be found on sheet 4.



For more current information and details visit: <http://www.cabq.gov/gis>



Map amended through: 1/28/2016



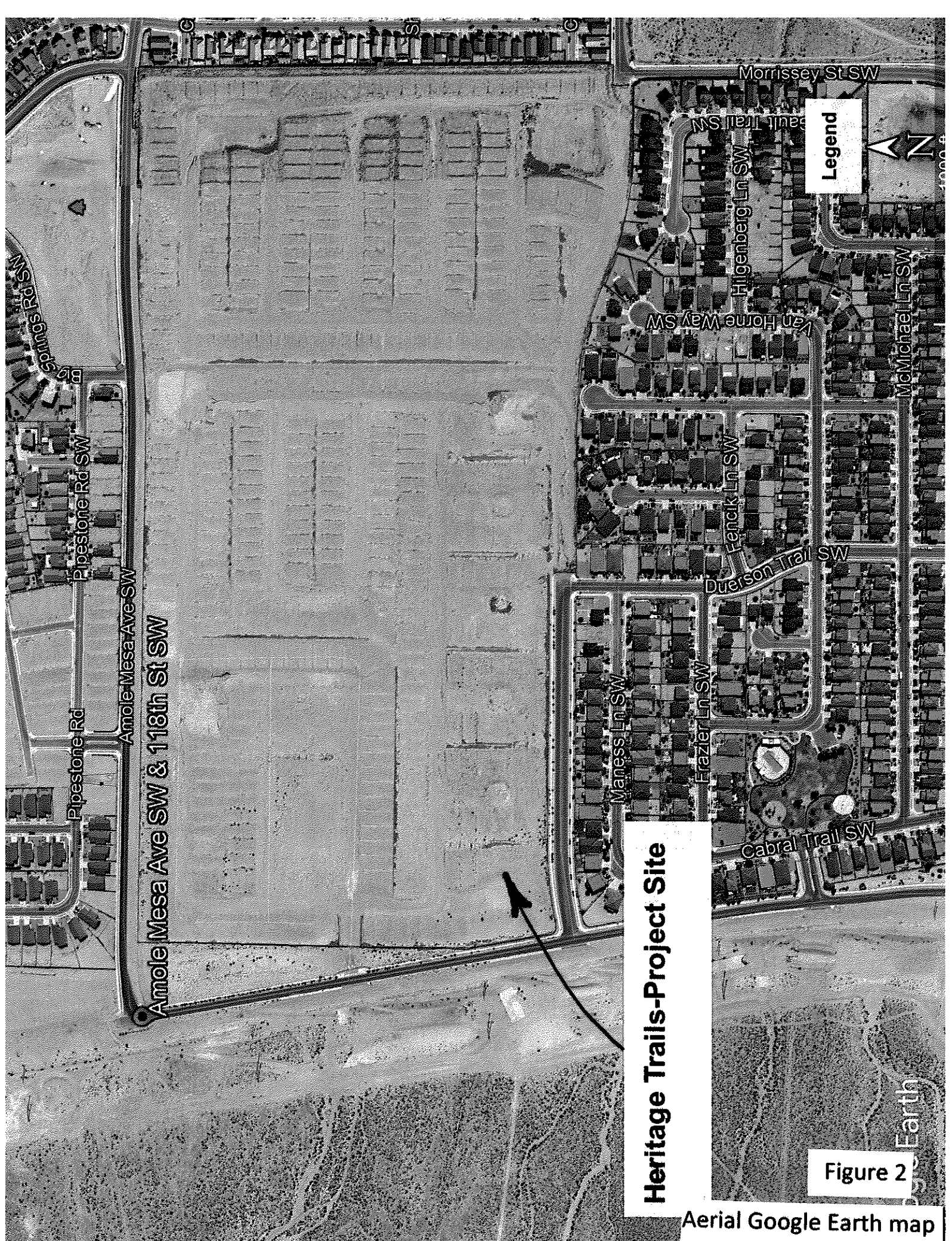
Zone Atlas Page:

N-08-Z

Selected Symbols

-  **SECTOR PLANS**
 Design Overlay Zones
 City Historic Zones
 H-1 Buffer Zone
 Petroglyph Mon.
-  Escarpment
 2 Mile Airport Zone
 Airport Noise Contours
 Wall Overlay Zone

Figure 1 Vicinity Map

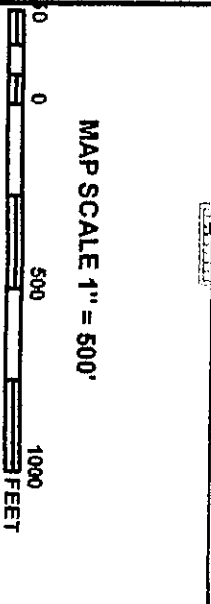
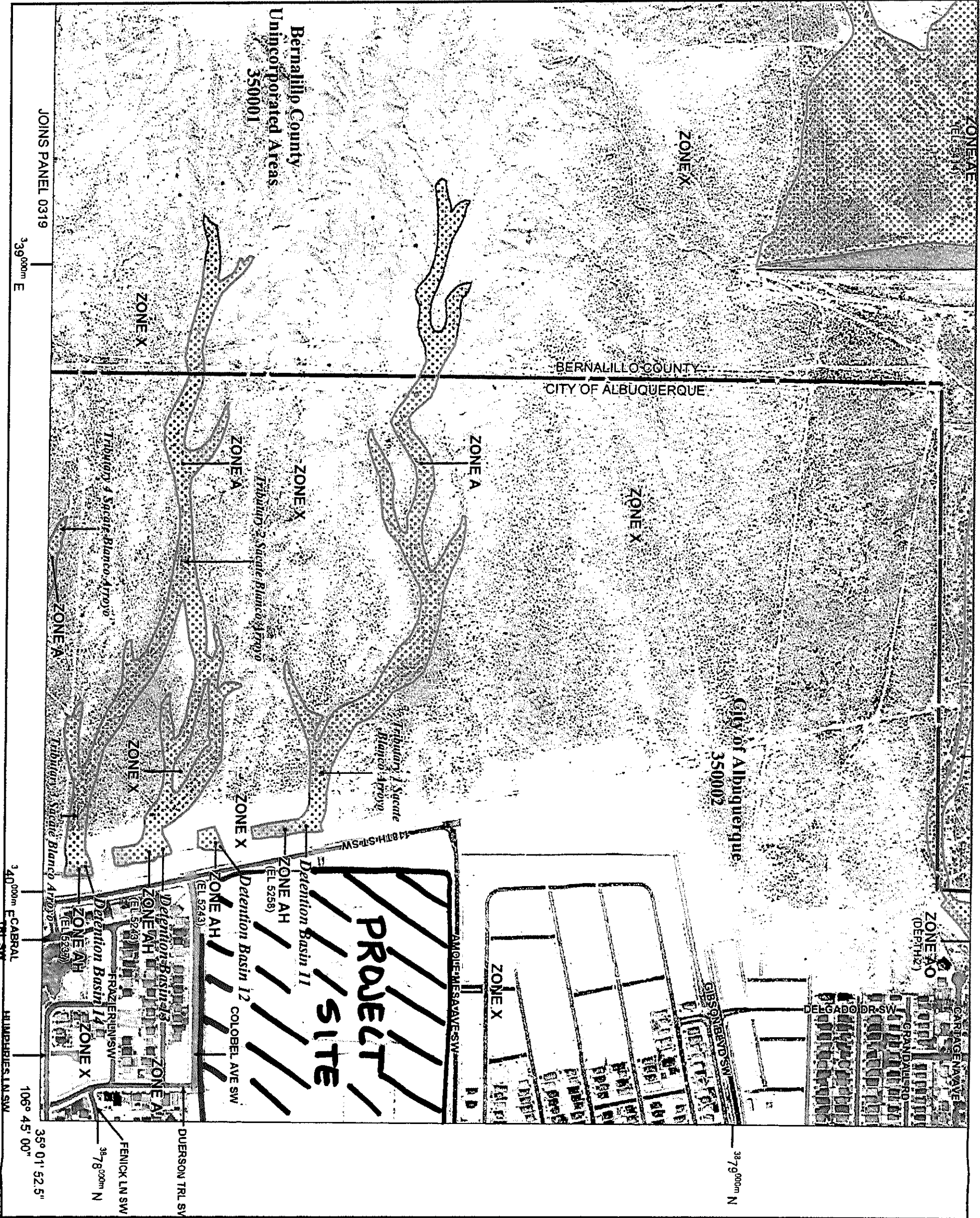


Heritage Trails-Project Site

Legend

Figure 2

Aerial Google Earth map



NFIP
PANEL 0317H

FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS
PANEL 317 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS
COMMUNITY NUMBER PANEL SHEET
ALBUQUERQUE CITY OF 35002 0317 H
BERNALILLO COUNTY UNINCORPORATED AREAS 35001 0317 H

NOT TO SCALE: This map shows project to be used with other maps and information. It is not a legal document and should be used in conjunction with the applicable laws and regulations.



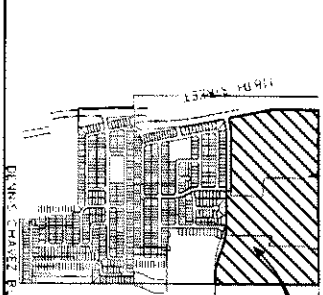
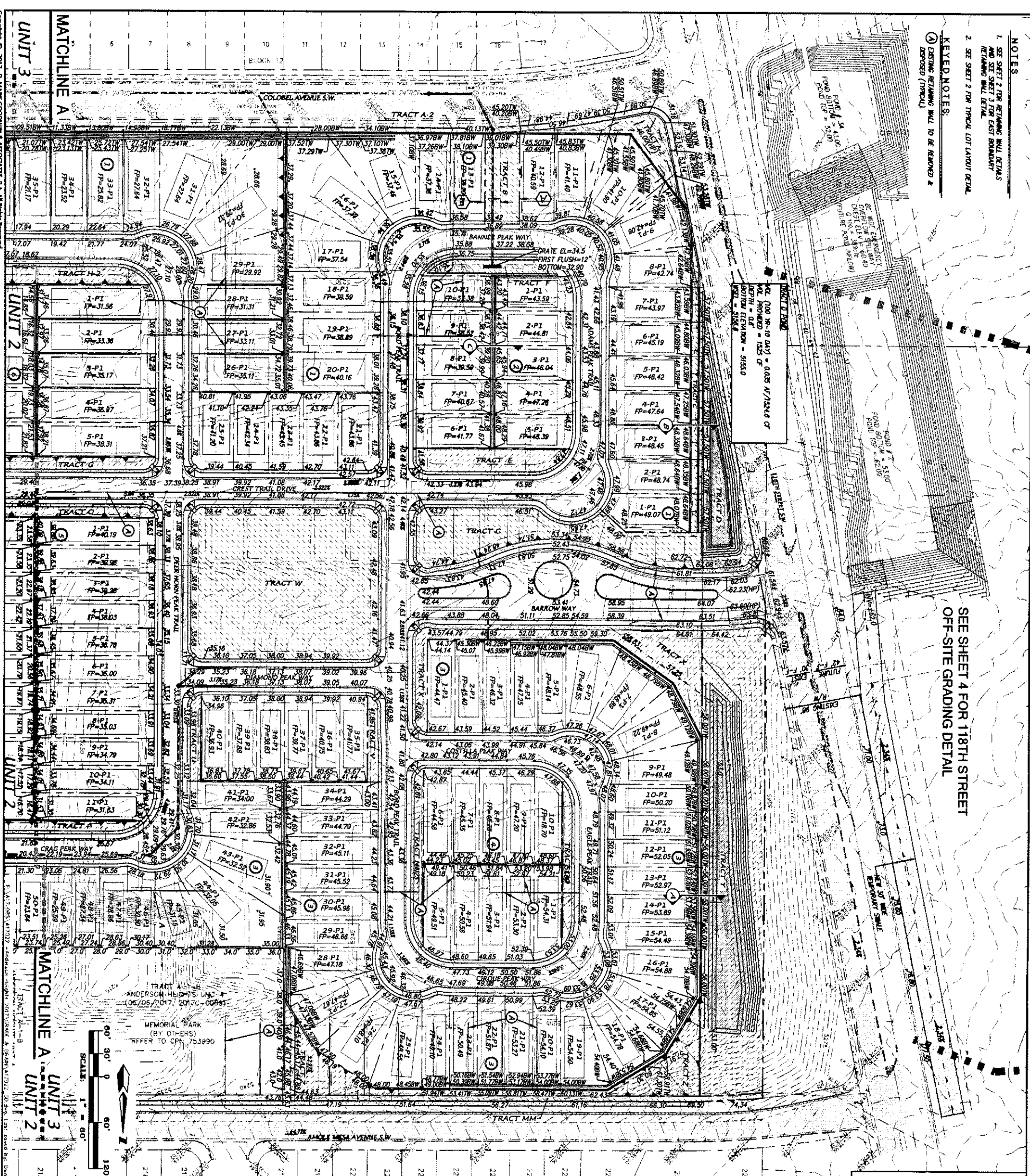
MAP NUMBER
35001C0317H
MAP REVISED
AUGUST 16, 2012
Federal Emergency Management Agency

FIGURE 3
FEMA Map

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

- NOTES**
1. SEE SHEET 2 FOR RETAINING WALL DETAILS AND SEE SHEET 3 FOR EAST BOUNDARY RETAINING WALL DETAIL.
 2. SEE SHEET 2 FOR TYPICAL LOT LAYOUT DETAIL.
- KEYED NOTES:**
1. EXISTING RETAINING WALL TO BE REMOVED & RECONSTRUCTED (TYPICAL)

SEE SHEET 4 FOR 118TH STREET OFF-SITE GRADING DETAIL



LEGEND

EXISTING CONTAIN (MAJOR)
EXISTING SPOT ELEVATION
EXISTING TOP OF CURB/TOWNLINK ELEVATION
EXISTING TOP OF RETAINING WALL ELEVATION
EXISTING TOP OF EAST RETAINING WALL ELEVATION
EXISTING BOTTOM OF EAST RETAINING WALL ELEVATION
EXISTING SHADY/SIDE STREET MANHOLE
EXISTING FIRE HYDRANT
EXISTING ELECTRIC TRANSFORMER
EXISTING POWER POLE
EXISTING GAS LINE
EXISTING STORM DRAIN
EXISTING SANITARY
EXISTING WATER LINE
NEW ADJUSTABLE CURB & GUTTER
NEW STANDARD CURB & GUTTER
NEW SIDEWALK (THIS PROJECT)
NEW BOOM-OF-WAY
NEW CONCOURSE
NEW LOT LINES
NEW EASEMENTS
NEW SPOT ELEVATIONS
NEW TOP OF WALL ELEVATION
NEW BOTTOM OF WALL ELEVATION
NEW FLOW DIRECTION
NEW FLOW DIRECTION
NEW SLOPE
NEW HIGH POINT
NEW SIDEWALK MILET
ZONE BOUNDARY LINE
NEW SHADE RETAINING WALL
NEW DOUBLE RETAINING WALL
NEW DRIVE RETAINING WALL
NEW POINT OF VERTICAL INTERSECTION
NEW STORM DRAIN
NEW STORM DRAIN MANHOLE
EXISTING ASPHALT PAVEMENT
EXISTING CONCRETE
NEW OFF-SITE PAVEMENT

APPROVED GRADING PLAN

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

**HERITAGE TRAILS SUBDIVISION
OVERALL GRADING & DRAINAGE PLAN**

DESIGN REVIEW COMMITTEE CITY ENGINEER APPROVAL

DESIGNER: MARK GOODMAN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90808
ALBUQUERQUE, NEW MEXICO 87199
OFFICE (505) 263-1200 FAX (505) 781-8238

DATE: 10/17

REMARKS: REVISIONS

DESIGNED BY: DLH DATE: 10/17
DRAWN BY: DER DATE: 10/17
CHECKED BY: DMG DATE: 10/17

ENGINEER'S SEAL: [Seal of Mark Goodman & Associates, P.A.]

SURVEY INFORMATION

FIELD NOTES

NO. BY DATE

BENCH MARKS

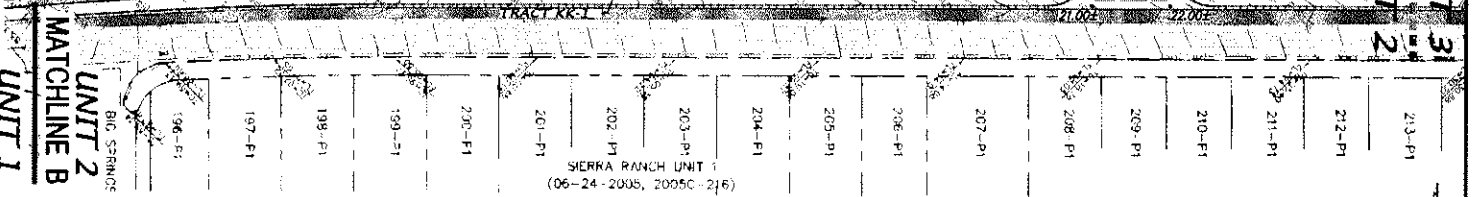
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G=0.999978466
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ELEVATION=5307.250
(NAD83/NAVD88)

AS BUILT INFORMATION

CONTRACTOR: [Blank]
DATE: [Blank]
DESIGNED BY: [Blank]
DATE: [Blank]
CHECKED BY: [Blank]
DATE: [Blank]
RECORDED BY: [Blank]
DATE: [Blank]

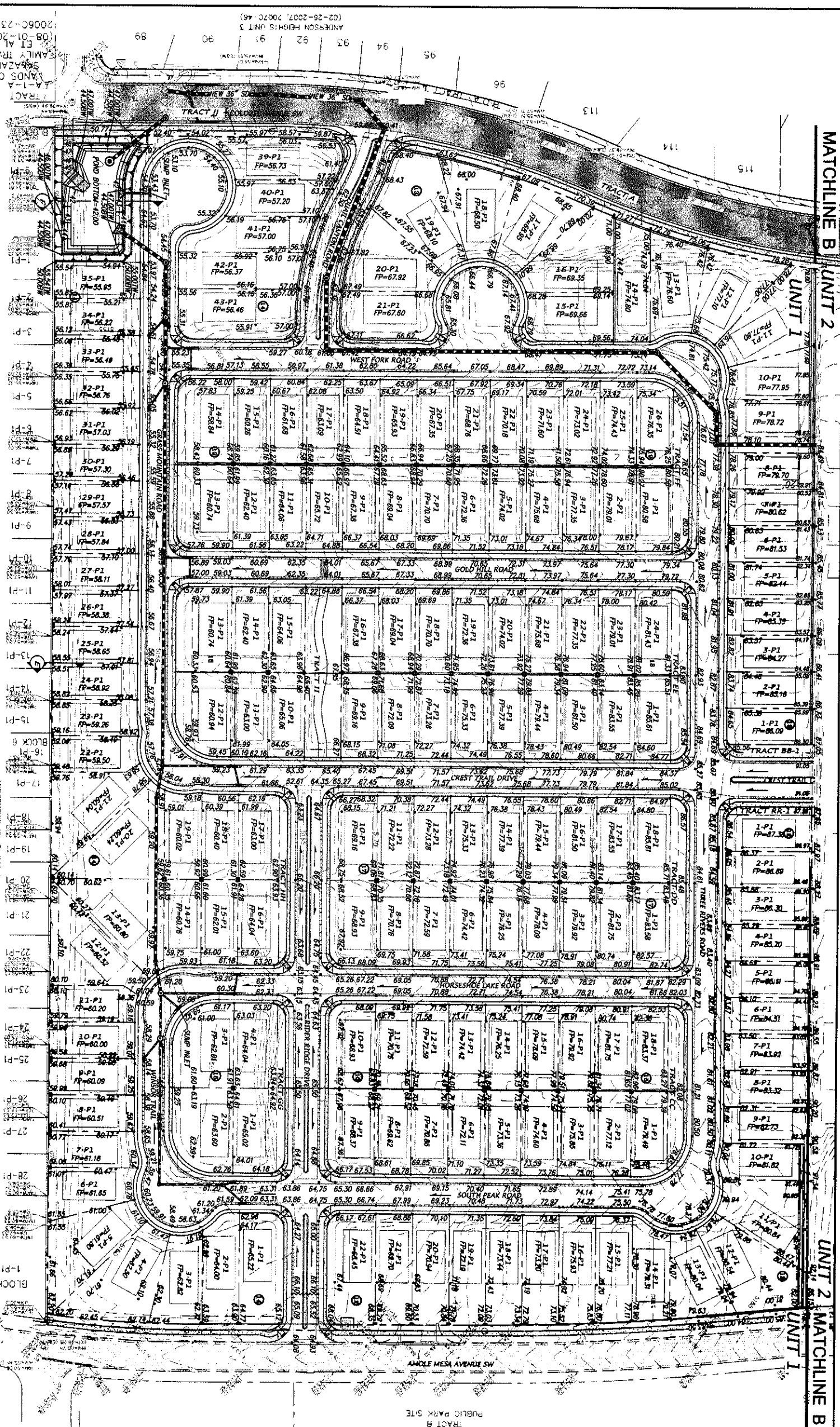
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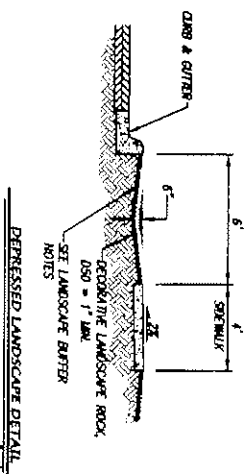
[illegible]

LANDS OF
SARAZAR
FAMILY TRUST
(08-01-2006)
2006C-237

ARCHITECT: J. L. S. JR.
(06-23-2006, 2006C-199)

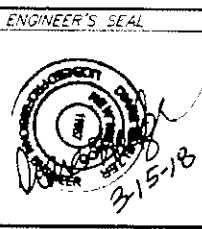


MATCHLINE B UNIT 2
UNIT 1
UNIT 2 MATCHLINE B
UNIT 1

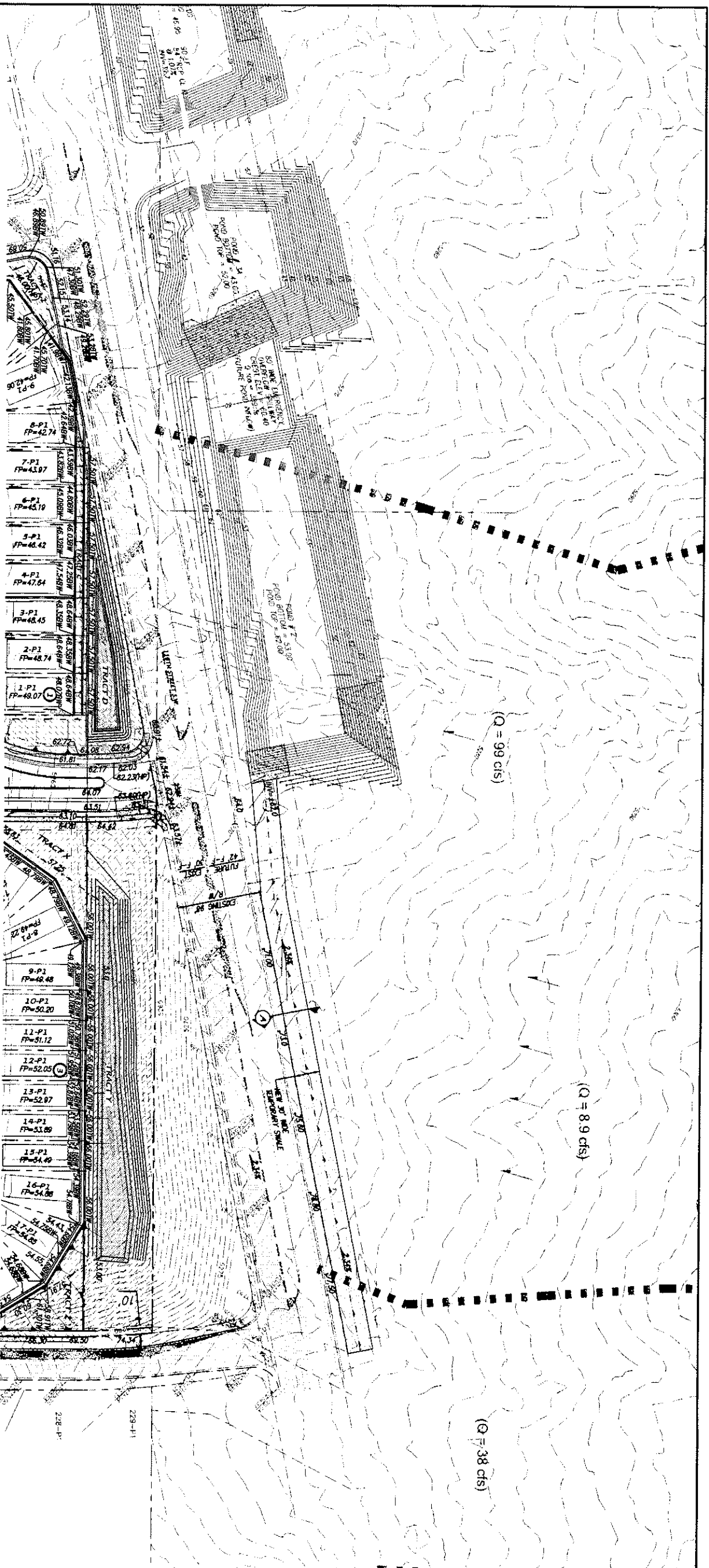


- NOTES**
- SEE SHEET 2 FOR REMAINING RAIL DETAILS
 - SEE SHEET 4 FOR SECTION B ROAD DETAIL
- KEYED NOTES:**
- ① EXISTING RETAINING WALL TO BE REMOVED & RECONSTRUCTED (IN PLACE)

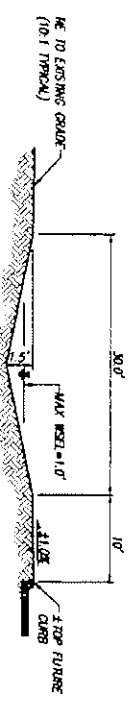
dmg MARK GOODWIN & ASSOCIATES, P.A. P.O. BOX 8000 COLUMBIA, MISSOURI 65208 OFFICE (660) 880-2800, FAX (660) 271-4038		CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT	
TITLE HERITAGE TRAILS SUBDIVISION OVERALL GRADING & DRAINAGE PLAN		DESIGN REVIEW COMMITTEE CITY ENGINEER APPROVAL DATE: 10/17/2017 BY: [Signature]	
DESIGNER DATE: 10/17/2017 BY: [Signature]		CHECKED BY DATE: 10/17/2017 BY: [Signature]	
PROJECT NO. N-8-Z		SHEET 3 OF 4	



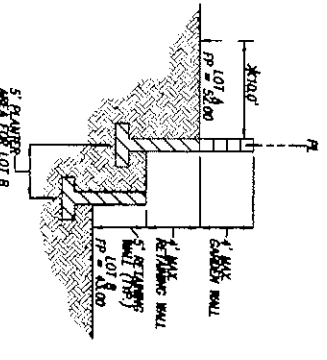
SURVEY INFORMATION			BENCH MARKS		AS BUILT INFORMATION	
FIELD NOTES			AGRS MONUMENT & BENCHMARK "1-NB"		CONTRACTOR	
NO.	BY	DATE	N=1470741.879, E=1486701.820		WORK STARTED BY	DATE
			G-C=0.999678466		ACCEPTED BY	DATE
			delta=-001727.70"		VERIFICATION BY	DATE
			CENTRAL ZONE		CORRECTED BY	DATE
			ELEVATION=5307.250		MICRO-FILM INFORMATION	
			(NAD83/NAVD88)		RECORDED BY	DATE
					NO.	



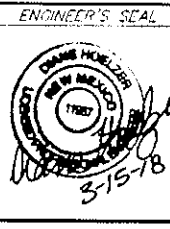
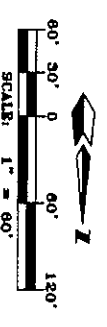
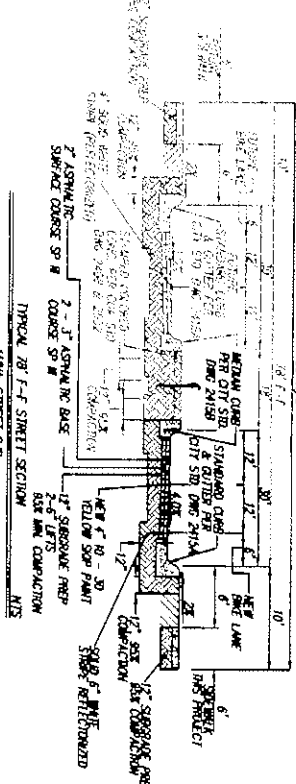
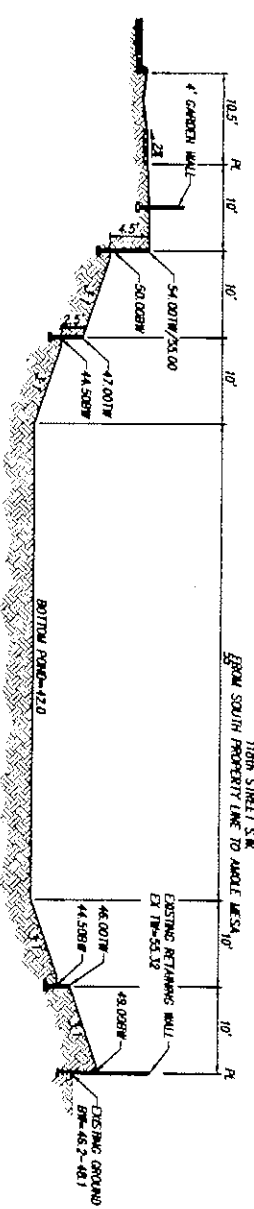
SECTION A - TEMPORARY SWALE DETAIL
SCALE: 1"=10'



TYPICAL DOUBLE RETAINING WALL DETAIL
NTS



SECTION E - POND DETAIL
SCALE: 1"=10'



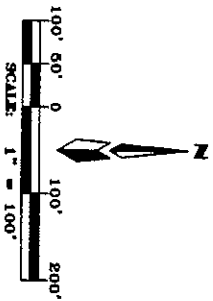
SURVEY INFORMATION			BENCH MARKS		AS BUILT INFORMATION	
FIELD NOTES			AGRS MONUMENT & BENCHMARK "1-N8"		CONTRACTOR	
NO.	BY	DATE	N=1470741.879, E=1488701.820		WORK	DATE
			G-G=0.999676468		STARTED BY	
			Δα = -001°27.70"		INSPECTOR'S	DATE
			CENTRAL ZONE		ACCEPTANCE BY	
			ELEVATION=5307.250		FIELD	DATE
			(NAD83/NAVD88)		VERIFICATION BY	
					DRAWN BY	DATE
					CHECKED BY	
					MICRO-FILM INFORMATION	
					RECORDED BY	DATE
					NO	

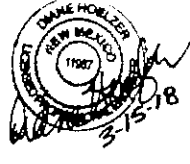
MARK GOODWIN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 30808
ALBUQUERQUE, NEW MEXICO 87196
OFFICE (505) 263-2200, FAX (505) 787-8539

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
HERITAGE TRAILS SUBDIVISION
118TH STREET OFF-SITE GRADING & DRAINAGE PLAN

DESIGN REVISIONS		CITY PROJECT NO.		ZONE MAP NO.		SHEET	
NO.	DATE	REMARKS					
DESIGNED BY	DLH	DATE	10/17				
DRAWN BY	DER	DATE	10/17				
CHECKED BY	DMG	DATE	10/17				

BERM XXXX
EXISTING SWALE



 CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT		HERITAGE TRAILS UNIT 1 INTERIM GRADING - UNIT 2/3	
DESIGN REVIEW COMMITTEE CITY DEPARTMENT APPROVAL		DATE: 10/17	
LAST DESIGN UPDATE		DATE: 10/17	
DESIGNED BY: DLH		DATE: 10/17	
DRAWN BY: DER		DATE: 10/17	
CHECKED BY: DMG		DATE: 10/17	
CITY PROJECT NO. N-8-Z		SHEET 1 OF 1	
ENGINEER'S SEAL 		SURVEY INFORMATION FIELD NOTES NO. BY DATE	
BENCH MARKS AGRS MONUMENT & BENCHMARK "1-NB" N=1470741.879, E=1488701.820 G=0.999876466 Δσ = -00°17'27.70" CENTRAL ZONE ELEVATION=5307.250 (NAED3/NAVD88)		AS BUILT INFORMATION CONTRACTOR WORK STARTED BY ACCEPTANCE BY FIELD VERIFICATION BY DRAWN BY MICRO-FILM INFORMATION RECORDED BY DATE	

APPENDIX A - HYDROLOGY

*Table 1 Summary of Hydrologic Parameters
Sub Basin Boundary Exhibit*

AHYMO Input file

AHYMO Summary files (100y-6h)

Precip Values NOAA Atlas 14

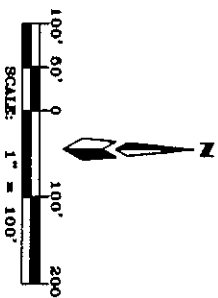
TABLE 1

Heritage Trails Residential
Summary of Hydrology Parameters

Sub Basin ID	Location Descript Unit ?	Area sq.ft	Area acre	Area sq.mi.	Land Treatment Values				Runoff Volume acre-ft	Runoff Volume acre-ft	Discharge value cfs	Discharge value cfs
					A	B	C	D	100yr 6 hr	Totals	100-yr 6-hr	Totals
1	3	136,116.0	3.12	0.004882	0.0	25.0	15.0	60.0	0.415		11.39	
2	3	118,581.0	2.72	0.004254	0.0	37.0	18.0	45.0	0.321	0.736	9.17	20.56
3	2/3	184,551.0	4.24	0.006620	0.0	29.5	19.5	51.0	0.527		14.81	
4	2	124,767.0	2.86	0.004475	0.0	29.4	19.4	51.2	0.357		10.02	
5	2	124,416.0	2.86	0.004463	0.0	29.3	19.3	51.4	0.357		10.01	
6	2	174,647.0	4.01	0.006265	0.0	32.6	21.7	45.7	0.479		13.65	
7	3	142,490.0	3.27	0.005111	0.0	25.0	15.0	60.0	0.435		11.92	
8	3	136,839.0	3.14	0.004908	0.0	25.0	15.0	60.0	0.418		11.45	
9	3	63,185.0	1.45	0.002266	0.0	23.0	12.0	65.0	0.200		5.41	
10	3	36,818.0	0.85	0.001321	0.0	25.0	15.0	60.0	0.112		3.09	
11	3	47,544.0	1.09	0.001705	0.0	63.0	30.0	7.0	0.088		2.95	
12	2/3	159,689.0	3.67	0.005728	0.0	25.0	15.0	60.0	0.487		13.36	
13	2	112,524.0	2.58	0.004036	0.0	25.0	15.0	60.0	0.343		9.41	
14	2	81,491.0	1.87	0.002923	0.0	37.0	18.0	45.0	0.221		6.30	
15	2	214,811.0	4.93	0.007705	0.0	25.0	15.0	60.0	0.656		17.96	
16	2	175,842.0	4.04	0.006307	0.0	28.3	18.9	52.8	0.510		14.23	
17	2/3	121,839.0	2.80	0.004370	0.0	30.0	20.0	50.0	0.346	5.536	9.73	154.3
18	1	218,495.0	5.02	0.007837	0.0	25.0	15.0	60.0	0.667		18.27	
19	1	178,699.0	4.10	0.006410	0.0	26.5	17.7	55.8	0.530		14.68	
20	1	125,963.0	2.89	0.004518	0.0	31.0	20.7	48.3	0.535		9.98	
21	1	225,668.0	5.18	0.008095	0.0	26.8	17.9	55.3	0.667		18.49	
22	1	165,024.0	3.79	0.005919	0.0	25.0	15.0	60.0	0.504		13.80	
23	1	269,100.0	6.18	0.009653	0.0	28.1	18.7	53.2	0.782		21.82	
24	1	132,662.0	3.05	0.004759	0.0	27.7	18.5	53.8	0.387		10.80	107.8

Table 1											
Heritage Trails Residential											
Summary of Hydrology Parameters											
Sub Basin ID	Area	Area	Area	Land Treatment Values			Runoff Volume	Discharge value		Discharge value	
	sq.ft	acre	sq.mi.	A	B	C	D	100-yr 6-hr	100-yr 6-hr	100-yr 6-hr	Totals
								acre-ft	cfs	cfs	
31	Park(*)	84,116.0	1.93	0.003017				0.161	5.20		
32	E.Colobel	150,209.0	3.45	0.005388	0	0.0	36.0	64.0	13.35		
33	W.Colobel	67,368.0	1.55	0.002416	0	0.0	40.0	60.0	5.92		
34	Amole Mesa	229,804.4	5.28	0.008243	0	31.0	0.0	69.0	19.64		
35	118th Street	151,075.0	3.47	0.005419	0	12.0	0.0	88.0	14.22		
36	118th N sump	102,386.0	2.35	0.003673	0	0.0	100.0	0.0	7.16		
37	118th S.sump	12,735.0	0.29	0.000457	0	0.0	100.0	0.0	1.05		
(*) HYDROLOGY CALCS By Isaacson & Arfman, 1-22-18											

F:/PROJECTS/17046 Heritage Trails -Summary Table 1 Hydrology REVISED 3-14-18



CITY PROJECT NO. ZONE USE NO. N-8-2 SHEET 13	DESIGN REVIEW COMMITTEE CITY ENGINEER APPROVAL AS DESIGN UPDATE	TITLE CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT HERITAGE TRAILS SUBDIVISION SUB BASIN BOUNDARY EXHIBIT	NAME: GORDON & ASSOCIATES, P.A. CONSULTING ENGINEERS P.O. BOX 9600 ALBUQUERQUE, NEW MEXICO 87109 OFFICE (505) 628-2200, FAX (505) 797-9538	DESIGNER: DLN DRAWN BY: DER CHECKED BY: DMG	DATE: 12/17 DATE: 12/17 DATE: 12/17	REVISIONS DESIGN	NO. DATE 1 12/17	REMARKS	BY	ENGINEER'S SEAL DOREE MUELLER NEW MEXICO 17857 3-15-18	SURVEY INFORMATION FIELD NOTES NO. BY DATE	BENCH MARKS AGRS MONUMENT & BENCHMARK "1-N8" N=1470741.879, E=1488701.820 G-C=0.999878466 da=-007°27.70" CENTRAL ZONE ELEVATION=5307.250 (NAD83/NAVD88)	AS BUILT INFORMATION CONTRACTOR WORK STARTED BY INSPECTOR'S ACCEPTANCE BY FIELD VERIFICATION BY DRAWING SUBMITTED BY MICRO-FILM INFORMATION REFORMED BY NO.
--	---	---	--	--	--	---------------------	---------------------	---------	----	---	--	--	---

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) RUN DATE (MON/DAY/YR) = 02/08/2018
INPUT FILE = C:\Program Files (x86)\AHYMO-S4\HTRAILS_6S.DAT USER NO. = M-GoodwinNMSiteA90075759

- Ver. S4.01a, Rel: 01a

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1	NOTATION
---------	---------------------------	-------------	-----------	--------------	----------------------	-----------------------	-----------------	----------------------	--------------	----------	----------

START TIME= 0.00

LOCATION NEW MEXICO

*S***** FILE:HTrails_6S.DAT REV: 2-9-18 DLH

*S***** 100 YEAR 6 HOUR STORM EVENT

*S***** 100 YEAR 6 HOUR STORM EVENT

*S***** 100 YEAR 6 HOUR STORM EVENT

*S***** 100 YEAR 6 HOUR STORM EVENT

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*S***** 100 YEAR 6 HOUR STORM EVENT

RAIN6= 2.310

3.645 PER IMP= 60.00

3.367 PER IMP= 45.00

3.495 PER IMP= 51.00

3.500 PER IMP= 51.20

3.503 PER IMP= 51.40

3.405 PER IMP= 45.70

3.644 PER IMP= 60.00

COMMAND	IDENTIFICATION	NO.	NO.	FROM TO	HYDROGRAPH ID	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 2
COMPUTE NM HYD	100.80	-	1		0.00491		11.45	0.418	1.59575	1.500	3.645 PER IMP=	60.00
*S*****												
*S***** SUB BASIN 9												
*S***** (1.45 ACRES)												
COMPUTE NM HYD	100.90	-	1		0.00227		5.41	0.200	1.65118	1.500	3.730 PER IMP=	65.00
*S*****												
*S***** SUB BASIN 10												
*S***** (0.85 ACRES)												
COMPUTE NM HYD	100.10	-	1		0.00132		3.09	0.112	1.59575	1.500	3.658 PER IMP=	60.00
*S*****												
*S***** SUB BASIN 11												
*S***** (1.09 ACRES)												
COMPUTE NM HYD	100.11	-	1		0.00171		2.95	0.088	0.97157	1.500	2.704 PER IMP=	7.00
*S*****												
*S***** SUB BASIN 12												
*S***** (3.67 ACRES)												
*S*****												
*S***** FROM TO												
*S***** PEAK												
COMPUTE NM HYD	100.12	-	1		0.00573		13.36	0.487	1.59575	1.500	3.644 PER IMP=	60.00
*S*****												
*S***** SUB BASIN 13												
*S***** (2.58 ACRES)												
COMPUTE NM HYD	100.13	-	1		0.00404		9.41	0.343	1.59575	1.500	3.645 PER IMP=	60.00
*S*****												
*S***** SUB BASIN 14												
*S***** (1.87 ACRES)												
COMPUTE NM HYD	100.14	-	1		0.00292		6.30	0.221	1.41638	1.500	3.370 PER IMP=	45.00
*S*****												
*S***** SUB BASIN 15												
*S***** (4.93 ACRES)												
COMPUTE NM HYD	100.15	-	1		0.00771		17.96	0.656	1.59575	1.500	3.643 PER IMP=	60.00
*S*****												
*S***** SUB BASIN 16												
*S***** (4.04 ACRES)												
COMPUTE NM HYD	100.16	-	1		0.00631		14.23	0.510	1.51505	1.500	3.527 PER IMP=	52.80
*S*****												
*S***** SUB BASIN 17												
*S***** (2.80 ACRES)												
COMPUTE NM HYD	100.17	-	1		0.00437		9.73	0.346	1.48274	1.500	3.480 PER IMP=	50.00
*S*****												
*S***** SUB BASIN 18												
*S***** (5.02 ACRES)												
*S*****												

COMPUTE NM HYD	100.18	-	1	0.00784	18.27	0.667	1.59575	1.500	3.642 PER IMP=	60.00

*S SUB BASIN 19										
(4.10 ACRES)										

COMPUTE NM HYD	100.19	-	1	0.00641	14.68	0.530	1.54961	1.500	3.578 PER IMP=	55.80

*S SUB BASIN 20										
(2.89 ACRES)										

COMPUTE NM HYD	100.20	-	1	0.00452	9.98	0.353	1.46320	1.500	3.451 PER IMP=	48.30

*S SUB BASIN 21										
(5.18 ACRES)										

COMPUTE NM HYD	100.21	-	1	0.00810	18.49	0.667	1.54385	1.500	3.569 PER IMP=	55.30

*S SUB BASIN 22										
(3.79 ACRES)										

COMPUTE NM HYD	100.22	-	1	0.00592	13.80	0.504	1.59575	1.500	3.644 PER IMP=	60.00

*S SUB BASIN 23										
(6.18 ACRES)										

COMPUTE NM HYD	100.23	-	1	0.00965	21.82	0.782	1.51957	1.500	3.532 PER IMP=	53.20

*S SUB BASIN 24										
(3.05 ACRES)										

COMPUTE NM HYD	100.24	-	1	0.00476	10.80	0.387	1.52657	1.500	3.545 PER IMP=	53.80

*S SUB BASIN 31										
(1.93 ACRES)										

COMPUTE NM HYD	100.31	-	1	0.00302	4.56	0.133	0.82396	1.500	2.361 PER IMP=	0.00

*S SUB BASIN 32										
COLOBEL WEST										
(3.45 ACRES)										

FROM TO PEAK	ID ID	AREA	DISCHARGE							
HYDROGRAPH IDENTIFICATION NO. NO.		(SQ MI)	(CFS)							
COMMAND						RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE NOTATION	PAGE = 3
COMPUTE NM HYD	100.32	-	1	0.00539	13.35	0.488	1.69794	1.500	3.872 PER IMP=	64.00

*S SUB BASIN 33										
COLOBEL EAST										
(1.55 ACRES)										

COMPUTE NM HYD	100.33	-	1	0.00242	5.92	0.214	1.65784	1.500	3.827 PER IMP=	60.00

*S	SUB BASIN 34					
*s	AMOLE MESA FULLY DEVELOPED					
*S	(5.2755 ACRES)					
*S	*****					
COMPUTE NM HYD	100.34	-	1	0.00824	19.64	0.737
*S	*****					
*S	SUB BASIN 35					
*s	118 TH STREET FULLY DEVELOPED					
*S	(3.4682)					
*S	*****					
COMPUTE NM HYD	100.35	-	1	0.00542	14.22	0.552
*S	*****					
*S	SUB BASIN 36					
*s	118 TH STREET SUMP NORTH					
*S	(2.3504 ACRES)					
*S	*****					
COMPUTE NM HYD	100.36	-	1	0.00367	7.16	0.207
*S	*****					
*S	SUB BASIN 37					
*s	118 TH STREET SUMP SOUTH					
*S	(0.2923 ACRES)					
*S	*****					
COMPUTE NM HYD	100.37	-	1	0.00046	1.05	0.035
FINISH						

3.723 PER IMP= 69.00

4.099 PER IMP= 88.00

3.045 PER IMP= 0.00

3.578 PER IMP= 37.50

```

START                TIME=0.0 HR PUNCH CODE=0 PRINT LINES=-6
LOCATION              NEW MEXICO
*S*****
*S***** FILE:HTrails_6S.DAT REV: 2-9-18 DLH
*S*****
*S*****
*S
      100 YEAR 6 HOUR STORM EVENT
*S*****
*S*****
RAINFALL             TYPE=1 RAIN QUARTER=0.0
                     RAIN ONE=1.81 IN RAIN SIX=2.31 IN
                     RAIN DAY=2.64 IN DT=0.05 HRS
*S*****
*S      SUB BASIN 1
*S      (3.12 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.1 AREA= 0.004882 SQ MI
                     PER A=0  PER B=25  PER C=15  PER D=60
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 2
*S      (2.72 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.2 AREA= 0.004254 SQ MI
                     PER A=0  PER B=37  PER C=18  PER D=45
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 3
*S      (4.24 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.3 AREA= 0.006620 SQ MI
                     PER A=0  PER B=29.5 PER C=19.5 PER D=51
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 4
*S      (2.86 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.4 AREA= 0.004475 SQ MI
                     PER A=0  PER B=29.4 PER C=19.4 PER D=51.2
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 5
*S      (2.86 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.5 AREA= 0.004463 SQ MI
                     PER A=0  PER B=29.3 PER C=19.3 PER D=51.4
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 6
*S      (4.01 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.6 AREA= 0.006265 SQ MI
                     PER A=0  PER B=32.6 PER C=21.7 PER D=45.7
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 7
*S      (3.27 ACRES)
*S*****
COMPUTE NM HYD       ID=1  HYD NO=100.7 AREA= 0.005111 SQ MI
                     PER A=0  PER B=25  PER C=15  PER D=60
                     TP=-.1333 HR  MASS RAIN=-1
PRINT HYD            ID=1 CODE=1
*S*****
*S      SUB BASIN 8
*S      (3.14 ACRES)

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*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.8 AREA= 0.004908 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 9
*S      (1.45 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.9 AREA= 0.002266 SQ MI
                    PER A=0  PER B=23  PER C=12  PER D=65
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 10
*S      (0.85 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.10 AREA= 0.001321 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 11
*S      (1.09 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.11 AREA= 0.001705 SQ MI
                    PER A=0  PER B=63  PER C=30  PER D=7
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 12
*S      (3.67 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.12 AREA= 0.005728 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 13
*S      (2.58 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.13 AREA= 0.004036 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 14
*S      (1.87 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.14 AREA= 0.002923 SQ MI
                    PER A=0  PER B=37  PER C=18  PER D=45
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 15
*S      (4.93 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.15 AREA= 0.007705 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 16
*S      (4.04 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.16 AREA= 0.006307 SQ MI
                    PER A=0  PER B=28.3 PER C=18.9 PER D=52.8
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 17

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*S      (2.80 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.17 AREA= 0.004370 SQ MI
                    PER A=0  PER B=30  PER C=20  PER D=50
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 18
*S      (5.02 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.18 AREA= 0.007837 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 19
*S      (4.10 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.19 AREA= 0.006410 SQ MI
                    PER A=0  PER B=26.5 PER C=17.7 PER D=55.8
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 20
*S      (2.89 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.20 AREA= 0.004518 SQ MI
                    PER A=0  PER B=31  PER C=20.7 PER D=48.3
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 21
*S      (5.18 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.21 AREA= 0.008095 SQ MI
                    PER A=0  PER B=26.8 PER C=17.9 PER D=55.3
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 22
*S      (3.79 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.22 AREA= 0.005919 SQ MI
                    PER A=0  PER B=25  PER C=15  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 23
*S      (6.18 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.23 AREA= 0.009653 SQ MI
                    PER A=0  PER B=28.1 PER C=18.7 PER D=53.2
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 24
*S      (3.05 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.24 AREA= 0.004759 SQ MI
                    PER A=0  PER B=27.7 PER C=18.5 PER D=53.8
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1
*S*****
*S      SUB BASIN 31
*S      (1.93 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.31 AREA= 0.003017 SQ MI
                    PER A=0  PER B=100  PER C=0  PER D=0
                    TP=-.1333 HR  MASS RAIN=-1
PRINT HYD           ID=1 CODE=1

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*S*****
*S      SUB BASIN 32
*S      COLOBEL WEST
*S      (3.45 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.32 AREA= 0.005388 SQ MI
                    PER A=0  PER B=0  PER C=36  PER D=64
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
*S*****
*S      SUB BASIN 33
*s      COLOBEL EAST
*S      (1.55 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.33 AREA= 0.002416 SQ MI
                    PER A=0  PER B=0  PER C=40  PER D=60
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
*S*****
*S*****
*S      SUB BASIN 34
*s      AMOLE MESA FULLY DEVELOPED
*S      (5.2755 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.34 AREA= 0.008243 SQ MI
                    PER A=0  PER B=31  PER C=0  PER D=69
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
*S*****
*S      SUB BASIN 35
*s      118 TH STREET FULLY DEVELOPED
*S      (3.4682)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.35 AREA= 0.005419 SQ MI
                    PER A=0  PER B=12  PER C=0  PER D=88
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
*S*****
*S      SUB BASIN 36
*s      118 TH STREET SUMP NORTH
*S      (2.3504 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.36 AREA= 0.003673 SQ MI
                    PER A=0  PER B=0  PER C=100  PER D=0
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
*S*****
*S      SUB BASIN 37
*s      118 TH STREET SUMP SOUTH
*S      (0.2923 ACRES)
*S*****
COMPUTE NM HYD      ID=1  HYD NO=100.37 AREA= 0.000457 SQ MI
                    PER A=0  PER B=0  PER C=100  PER D=0
                    TP=-.1333 HR  MASS RAIN=-1

PRINT HYD          ID=1 CODE=1
FINISH

```



NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico,
USA*

Latitude: 35.0353°, Longitude: -106.751°

Elevation: 5225.6 ft**

* source: ESRI Maps

** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.175 (0.150–0.203)	0.226 (0.194–0.263)	0.303 (0.259–0.352)	0.363 (0.309–0.420)	0.445 (0.377–0.514)	0.508 (0.430–0.588)	0.576 (0.483–0.665)	0.646 (0.538–0.746)	0.741 (0.612–0.858)	0.817 (0.670–0.946)
10-min	0.265 (0.228–0.309)	0.344 (0.295–0.400)	0.461 (0.395–0.537)	0.553 (0.471–0.640)	0.677 (0.575–0.783)	0.774 (0.654–0.895)	0.876 (0.735–1.01)	0.983 (0.819–1.14)	1.13 (0.931–1.31)	1.24 (1.02–1.44)
15-min	0.329 (0.283–0.383)	0.426 (0.366–0.496)	0.572 (0.489–0.665)	0.685 (0.585–0.793)	0.840 (0.713–0.971)	0.959 (0.811–1.11)	1.09 (0.912–1.25)	1.22 (1.02–1.41)	1.40 (1.16–1.62)	1.54 (1.26–1.78)
30-min	0.443 (0.381–0.516)	0.574 (0.493–0.668)	0.770 (0.659–0.896)	0.923 (0.787–1.07)	1.13 (0.960–1.31)	1.29 (1.09–1.49)	1.46 (1.23–1.69)	1.64 (1.37–1.90)	1.88 (1.56–2.18)	2.08 (1.70–2.40)
60-min	0.549 (0.471–0.638)	0.711 (0.610–0.827)	0.953 (0.815–1.11)	1.14 (0.974–1.32)	1.40 (1.19–1.62)	1.60 (1.35–1.85)	1.81 (1.52–2.09)	2.03 (1.69–2.35)	2.33 (1.92–2.70)	2.57 (2.11–2.97)
2-hr	0.637 (0.546–0.755)	0.817 (0.698–0.968)	1.08 (0.922–1.28)	1.29 (1.10–1.52)	1.59 (1.34–1.86)	1.82 (1.53–2.13)	2.07 (1.72–2.42)	2.33 (1.93–2.72)	2.70 (2.20–3.15)	3.00 (2.42–3.50)
3-hr	0.683 (0.590–0.804)	0.867 (0.748–1.02)	1.14 (0.980–1.34)	1.35 (1.16–1.58)	1.65 (1.40–1.93)	1.89 (1.60–2.20)	2.14 (1.80–2.49)	2.41 (2.01–2.81)	2.78 (2.29–3.24)	3.09 (2.52–3.60)
6-hr	0.787 (0.686–0.918)	0.992 (0.867–1.16)	1.28 (1.12–1.49)	1.50 (1.31–1.75)	1.81 (1.57–2.10)	2.05 (1.77–2.38)	2.31 (1.97–2.67)	2.57 (2.18–2.97)	2.93 (2.47–3.39)	3.23 (2.69–3.74)
12-hr	0.873 (0.767–0.998)	1.10 (0.969–1.26)	1.40 (1.22–1.59)	1.63 (1.42–1.85)	1.94 (1.69–2.20)	2.18 (1.89–2.48)	2.43 (2.10–2.76)	2.69 (2.30–3.06)	3.04 (2.58–3.46)	3.33 (2.80–3.79)
24-hr	0.980 (0.868–1.12)	1.23 (1.09–1.40)	1.54 (1.36–1.75)	1.78 (1.58–2.02)	2.12 (1.86–2.39)	2.37 (2.08–2.68)	2.64 (2.30–2.97)	2.90 (2.53–3.27)	3.26 (2.82–3.68)	3.55 (3.05–4.00)
2-day	1.03 (0.921–1.16)	1.30 (1.15–1.46)	1.62 (1.44–1.81)	1.87 (1.66–2.09)	2.21 (1.96–2.47)	2.47 (2.18–2.76)	2.74 (2.42–3.06)	3.01 (2.64–3.37)	3.38 (2.95–3.78)	3.66 (3.17–4.10)
3-day	1.14 (1.03–1.26)	1.42 (1.29–1.58)	1.76 (1.59–1.95)	2.03 (1.83–2.24)	2.38 (2.15–2.63)	2.65 (2.38–2.93)	2.93 (2.62–3.23)	3.21 (2.86–3.54)	3.58 (3.18–3.95)	3.86 (3.41–4.27)
4-day	1.25 (1.15–1.37)	1.55 (1.42–1.70)	1.91 (1.74–2.08)	2.18 (2.00–2.38)	2.56 (2.33–2.79)	2.84 (2.58–3.09)	3.12 (2.83–3.40)	3.41 (3.08–3.71)	3.78 (3.41–4.13)	4.06 (3.65–4.44)
7-day	1.44 (1.32–1.57)	1.79 (1.63–1.95)	2.17 (1.99–2.37)	2.47 (2.27–2.69)	2.87 (2.63–3.11)	3.17 (2.89–3.43)	3.46 (3.15–3.75)	3.74 (3.41–4.06)	4.11 (3.73–4.46)	4.38 (3.96–4.76)
10-day	1.59 (1.46–1.73)	1.97 (1.81–2.15)	2.42 (2.22–2.63)	2.76 (2.54–3.00)	3.22 (2.95–3.49)	3.56 (3.25–3.86)	3.91 (3.56–4.23)	4.24 (3.86–4.59)	4.68 (4.24–5.07)	5.00 (4.52–5.43)
20-day	2.00 (1.84–2.19)	2.49 (2.29–2.71)	3.02 (2.78–3.29)	3.42 (3.14–3.72)	3.93 (3.61–4.27)	4.30 (3.94–4.67)	4.66 (4.26–5.05)	5.00 (4.57–5.41)	5.42 (4.94–5.87)	5.72 (5.21–6.20)
30-day	2.40 (2.21–2.60)	2.98 (2.74–3.23)	3.59 (3.30–3.88)	4.04 (3.71–4.36)	4.60 (4.22–4.95)	5.00 (4.58–5.38)	5.37 (4.92–5.79)	5.73 (5.24–6.17)	6.15 (5.62–6.63)	6.45 (5.88–6.95)
45-day	2.92 (2.70–3.16)	3.62 (3.34–3.91)	4.31 (3.98–4.65)	4.80 (4.43–5.17)	5.40 (4.99–5.81)	5.81 (5.37–6.25)	6.18 (5.71–6.64)	6.50 (6.01–6.99)	6.87 (6.35–7.38)	7.09 (6.56–7.61)
60-day	3.38 (3.12–3.65)	4.18 (3.86–4.52)	4.98 (4.60–5.38)	5.55 (5.13–5.99)	6.25 (5.77–6.73)	6.71 (6.20–7.24)	7.14 (6.60–7.71)	7.53 (6.95–8.12)	7.96 (7.36–8.60)	8.23 (7.63–8.89)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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APPENDIX B - HYDRAULICS

Table 2 Summary of Street Capacity Calculations
Sump Calculations
Street Capacity Exhibit
Hydraflow Street Capacity Reports

TABLE 2

2.1

Heritage Trails Subdivision

Summary of Street Capacity Calculations												
LOCATION	WIDTH	CROWN	Std or Mtb	SLOPE %	Q cfs	DEPTH ft.	EG (ft)	INLET Q cfs	TYPE INLET	INLET ID	INLET BYPASS	ADD Q cfs
Bord Peak	26	Y	Mtb	2.40	8.16	0.32	0.45					
Banner Peak	26	Y	Mtb	2.70	11.39	0.34	0.52					9.17
Banner/Bord		Y	Std	SUMP	20.56			20.56	(2)DBL A	A1	0	
Cirque Park	26	Y	Mtb	4.00	5.42	0.26	0.44					
Bord Peak	26	Y	Mtb	1.00	6.65	0.34	0.40					
Costilla Peak	26	Y	Mtb	2.55	11.45	0.34	0.52					
Barrow Rd	42	Y	Mtb	4.51	5.41	0.26	0.44					
Diamond Peak	26	Y	Std	2.70	32.25	0.45	0.87	8.7(2)	DBL A	B1	14.85	+1.09
Diamond Peak	26	Y	Std	2.70	15.94	0.37	0.60	5.7(2)	SGL C	B2	4.54	+13.36+1.48
Crag Peak	26	Y	Std	4.90	19.38	0.36	0.75	6.8(2)	SGL A	B3	5.78	
Emerald Peak	26	Y	Std	2.34	9.41	0.33	0.48					
Crag Peak	26	Y	Std	3.20	26.69	0.41	0.83	6.2(2)	SGL A	B4	14.29	
Emerald P Entrance	15	H	Std	3.32	8.35	0.37	0.63					
Tyler Peak	26	Y	Std	0.80	26.47	0.51	0.69	5.8(2)	SGL C	B5	14.87	
Pine Town Way	26	Y	Std	3.40	20.65	0.38	0.73	5.8(2)	SGL C	B6	9.05	+14.23
Alta Peak Trail(1)	26	Y	Std	0.71	23.28	0.50	0.65	5.8(2)	SGL C	B7	11.68	+9.73
Alta Peak Trail(2)	26	Y	Std	0.71	21.41	0.49	0.63	5.0(2)	SGL C	B8	11.41	+8.76
Alta Peak Trail(3)	26	Y	Std	0.71	20.17	0.48	0.61	4.9(2)	SGL C	B9	10.37	+4.89
Alta Peak Trail	26	Y	Std	SUMP	15.26							
Crest Trail	28	Y	Std	5.00	6.64	0.27	0.48					
Basin Peak	26	Y	Std	5.00	14.81	0.33	0.69					
Basin Peak(2)	26	Y	Std	5.00	24.50	0.38	0.87	8.0(2)	DBL A	B26	8.5	+10.01+0.33
Basin Peak	26	Y	Std	5.00	18.84	0.36	0.73	6.6(2)	SGL C	B25	5.64	SUMP
Alta PK/Basin Pk	26	Y	Std	SUMP	20.90			20.90	(2)DBL C	B12		

TABLE 2

2.2

Heritage Trails Subdivision

Summary of Street Capacity Calculations													
LOCATION	WIDTH	CROWN	Std or Mtb	SLOPE %	Q cfs	DEPTH ft.	EG (ft)	INLET Q cfs	TYPE INLET	INLET ID	INLET BYPASS	ADD Q cfs	
Deer Horn	26	Y	Mtb	4.00	9.50	0.31	0.52	Transition to Std C&G					
Deer Horn	26	Y	Std	4.00	9.50	0.30	0.54						
Three Rivers Rd	26	Y	Std	2.00	5.00	0.28	0.38						
South Peak Rd	26	Y	Std	2.77	18.27	0.38	0.65						
South Peak Rd	26	Y	Std	2.77	20.37	0.39	0.69	6.6(2)	DBL A	C1	7.17	+6.94	
Winsor Street	26	Y	Std	0.6	14.11	0.44	0.53	4.0(2)	SGL C	C2	6.11	+0.94	
Winsor Street				SUMP	7.05								
Horseshoe lake	26	Y	Std	4.07	14.68	0.34	0.64	5.2(2)	SGL A	C3	4.28	SUMP	
Horseshoe/Winsor	26	No	Std	SUMP	11.33			11.33	(1)DBL C	C4			
Crest Trail	26	Y	Std	4.57	12.32	0.32	0.61	4.6(2)	SGL A	C5	3.12		
Gold Hill Rd	26	Y	Std	3.69	13.8	0.34	0.61	5.0(2)	SGL A	C6	3.8		
Grass Mtn Rd	26	Y	Std	0.6	16.03	0.46	0.56	4.2(2)	SGL A	C7	7.63		
West Fork Rd	26	Y	Std	3.15	21.82	0.39	0.73	5.8(2)	SGL A	C8	10.22		
Grass Mtn Rd	26	Y	Std	0.6	19.12	0.48	0.60	4.9(2)	SGL C	C9	9.32	+6.59	
Grass Mtn Culdesac				SUMP	15.91			15.91	(2)SGL C	C10			
Colobel Avenue	48	Y	Std	3.00	13.35	0.34	0.59	4.9(2)	SGL A	D1	3.55		
Colobel Avenue	48	Y	Std	2.65	12.26	0.34	0.55	4.4(2)	SGL C	D2	3.46		
Colobel Avenue	48	Y	Std	2.65	3.46	0.24	0.35	1.73(2)	SGL C	D3	0		
Note: Sump inlets are designed for 2 times the 100 year discharge value.													

CALCULATIONS FOR SUMP INLETS
for
Heritage Trails Subdivision

Capacity is measured by the weir equation at the lip of the gutter assuming an allowable ponding elevation equal to the lowest adjacent right of way elevation. The length of the double grate facing the street is 6.5' and the maximum depth is 0.725' at the lip of the gutter. The sides are each 2' long and the average depth is 0.892'. These depths assume an 8" curb with right of way 9' behind the curb for an additional depth of 0.18' above the top of curb. From the weir equation:

FOR SINGLE 'C' INLET

Front $Q \text{ cap} = (3.0) \times (3.0') \times (0.725) **1.5 = 5.56 \text{ cfs}$

Sides $Q \text{ cap} = (3.0) \times (4.0') \times (0.892) **1.5 = 10.11 \text{ cfs}$

Total $Q \text{ cap} = 5.56 \text{ cfs} + 10.11 \text{ cfs} = 15.67 \text{ cfs}$

FOR DOUBLE 'C' INLET

Front $Q \text{ cap} = (3.0) \times (6.5') \times (0.725) **1.5 = 12.04 \text{ cfs}$

Sides $Q \text{ cap} = (3.0) \times (4.0') \times (0.892) **1.5 = 10.11 \text{ cfs}$

Total $Q \text{ cap} = 12.04 \text{ cfs} + 10.11 \text{ cfs} = 22.15 \text{ cfs}$

FOR TRIPLE 'C' INLET

Front $Q \text{ cap} = (3.0) \times (9.75') \times (0.725) **1.5 = 18.06 \text{ cfs}$

Sides $Q \text{ cap} = (3.0) \times (4.0') \times (0.892) **1.5 = 10.11 \text{ cfs}$

Total $Q \text{ cap} = 12.04 \text{ cfs} + 10.11 \text{ cfs} = 28.17 \text{ cfs}$

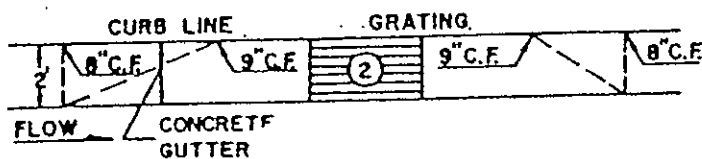
**The 100 year flow to the sump inlet at Banner-Bord Peak (Unit 3) is 20.56 cfs.
Design for 41.12 cfs ---- Use (2) Double "C" inlets (minimum)**

**The 100 year flow to the sump inlet at Basin Peak-Alta Peak (Unit 2) is 20.90 cfs.
Design for 41.80 cfs ---- Use (2) Double "C" inlets (minimum)**

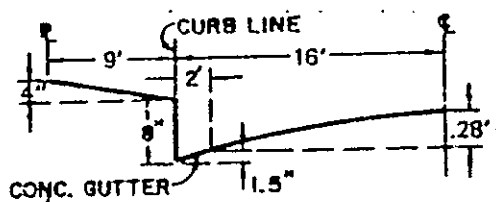
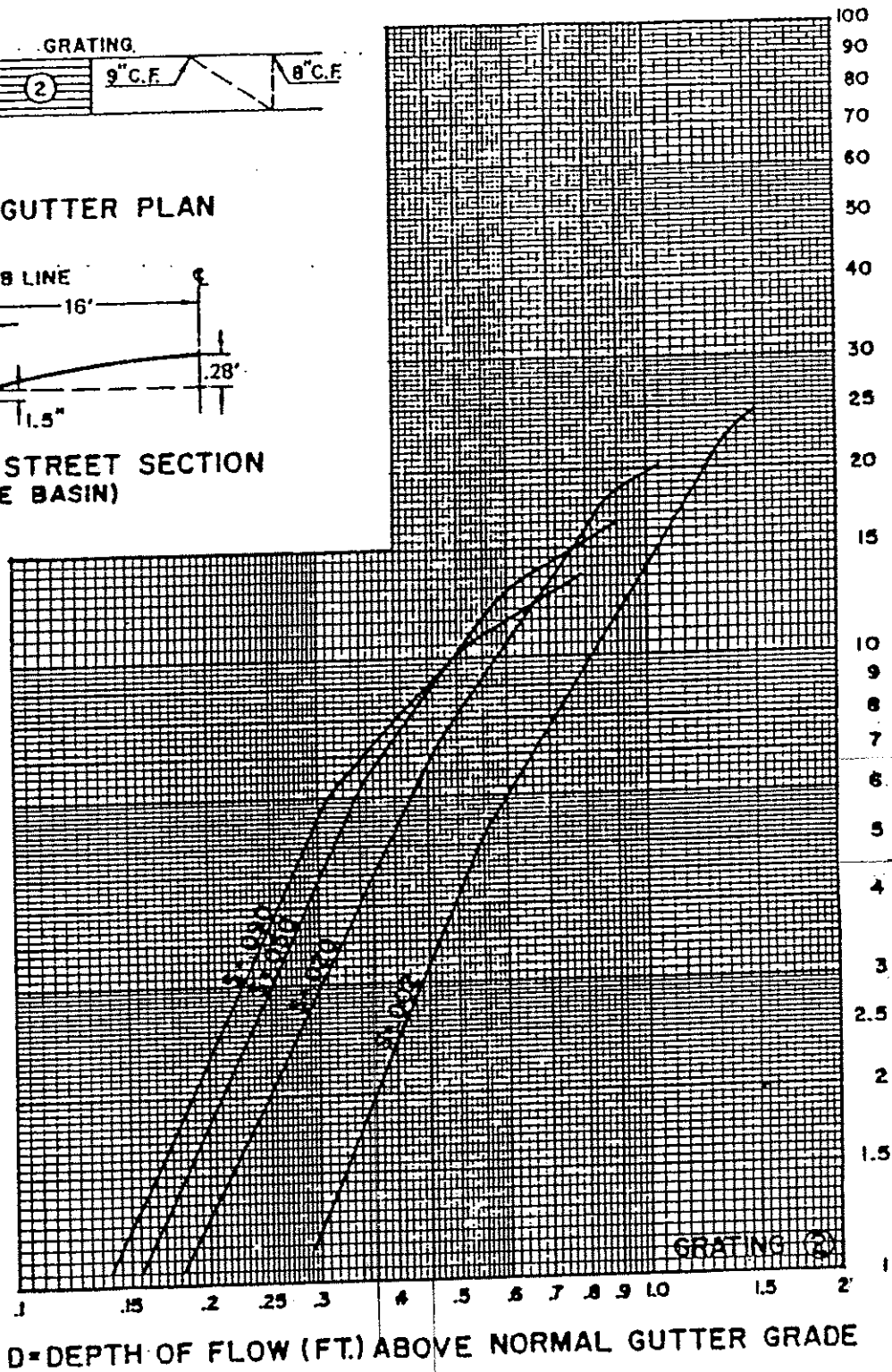
**The 100 year flow to the sump inlet at Horseshoe-Winsor (Unit 1) is 11.3 cfs.
Design for 22.60 cfs ---- Use (1) Double "C" inlet (minimum)**

**The 100 year flow to the sump inlet at Grass Mountain (Unit 1) is 15.91 cfs.
Design for 31.82 cfs ---- Use (2) Single "C" inlets (minimum)**

GRATING CAPACITIES FOR TYPE "A", "C" and "D"



GRATING & GUTTER PLAN

TYPICAL HALF STREET SECTION
(ABOVE BASIN)

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Thursday, Mar 15 2018

Amole Mesa-36-Std-0.5%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 1.00
N-Value = 0.017

Highlighted

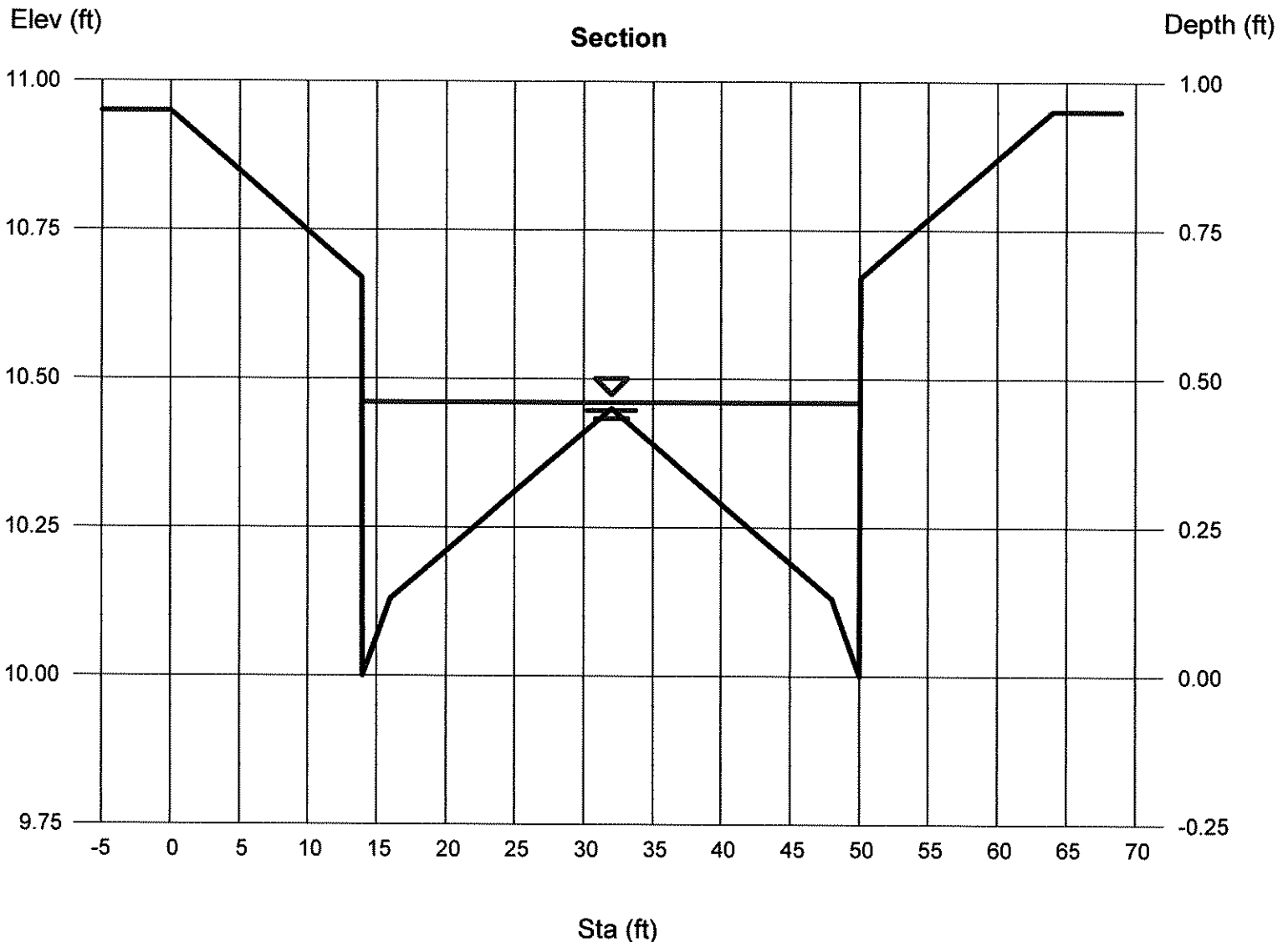
Depth (ft) = 0.46
Q (cfs) = 19.64
Area (sqft) = 7.05
Velocity (ft/s) = 2.79
Wetted Perim (ft) = 36.94
Crit Depth, Yc (ft) = 0.48
Top Width (ft) = 36.11
EGL (ft) = 0.58

Calculations

Compute by: Known Q
Known Q (cfs) = 19.64

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.95)-(13.92, 10.67, 0.017)-(14.00, 10.00, 0.017)-(16.00, 10.13, 0.017)-(32.00, 10.45, 0.017)-(48.00, 10.13, 0.017)-(50.00, 10.00, 0.017)
-(50.08, 10.67, 0.017)-(64.00, 10.95, 0.017)



Channel Report

Amole Mesa-36-Std-1.0%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 1.00
N-Value = 0.017

Calculations

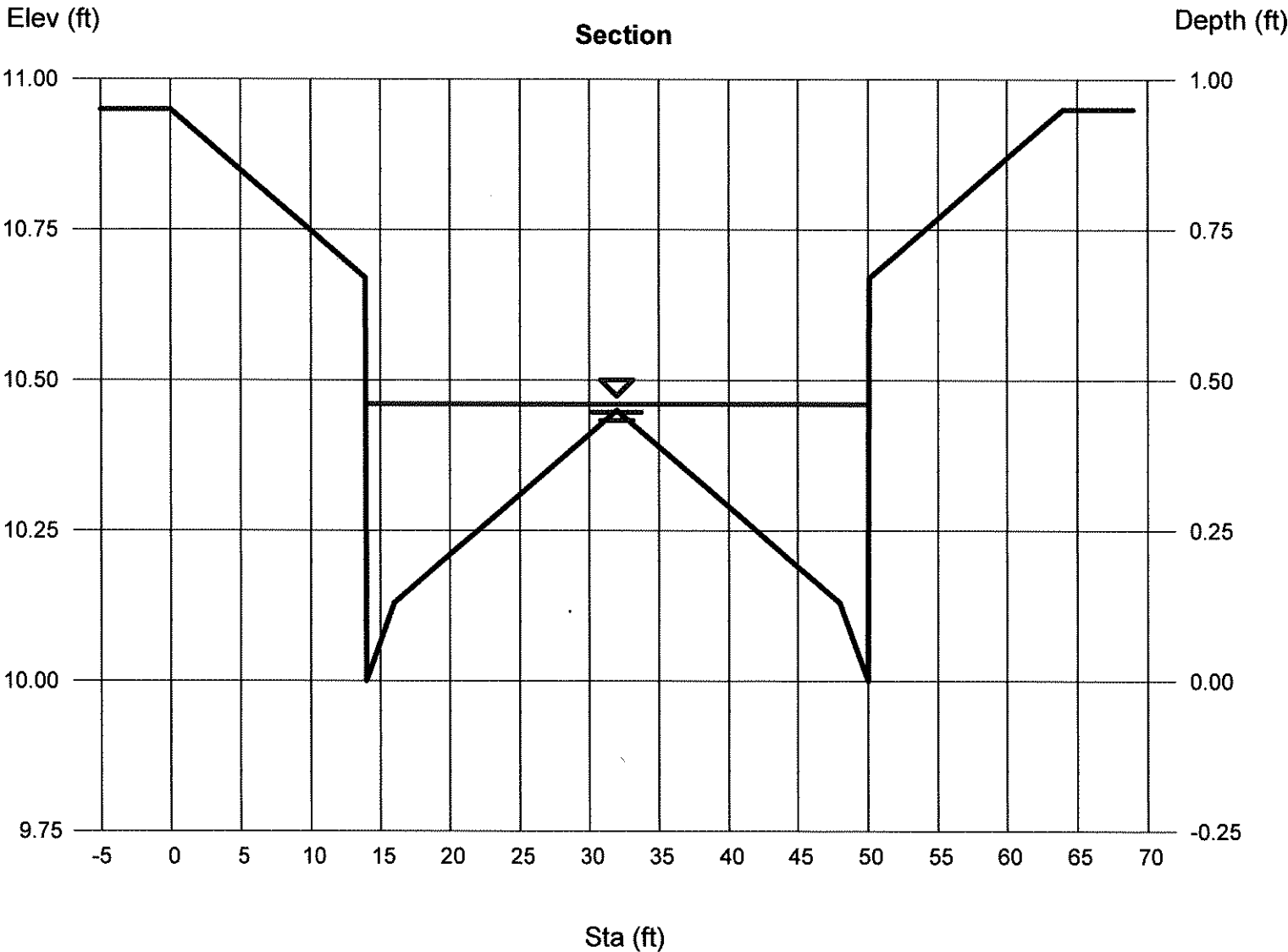
Compute by: Known Q
Known Q (cfs) = 19.64

Highlighted

Depth (ft) = 0.46
Q (cfs) = 19.64
Area (sqft) = 7.05
Velocity (ft/s) = 2.79
Wetted Perim (ft) = 36.94
Crit Depth, Yc (ft) = 0.48
Top Width (ft) = 36.11
EGL (ft) = 0.58

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.95)-(13.92, 10.67, 0.017)-(14.00, 10.00, 0.017)-(16.00, 10.13, 0.017)-(32.00, 10.45, 0.017)-(48.00, 10.13, 0.017)-(50.00, 10.00, 0.017)
-(50.08, 10.67, 0.017)-(64.00, 10.95, 0.017)



Channel Report

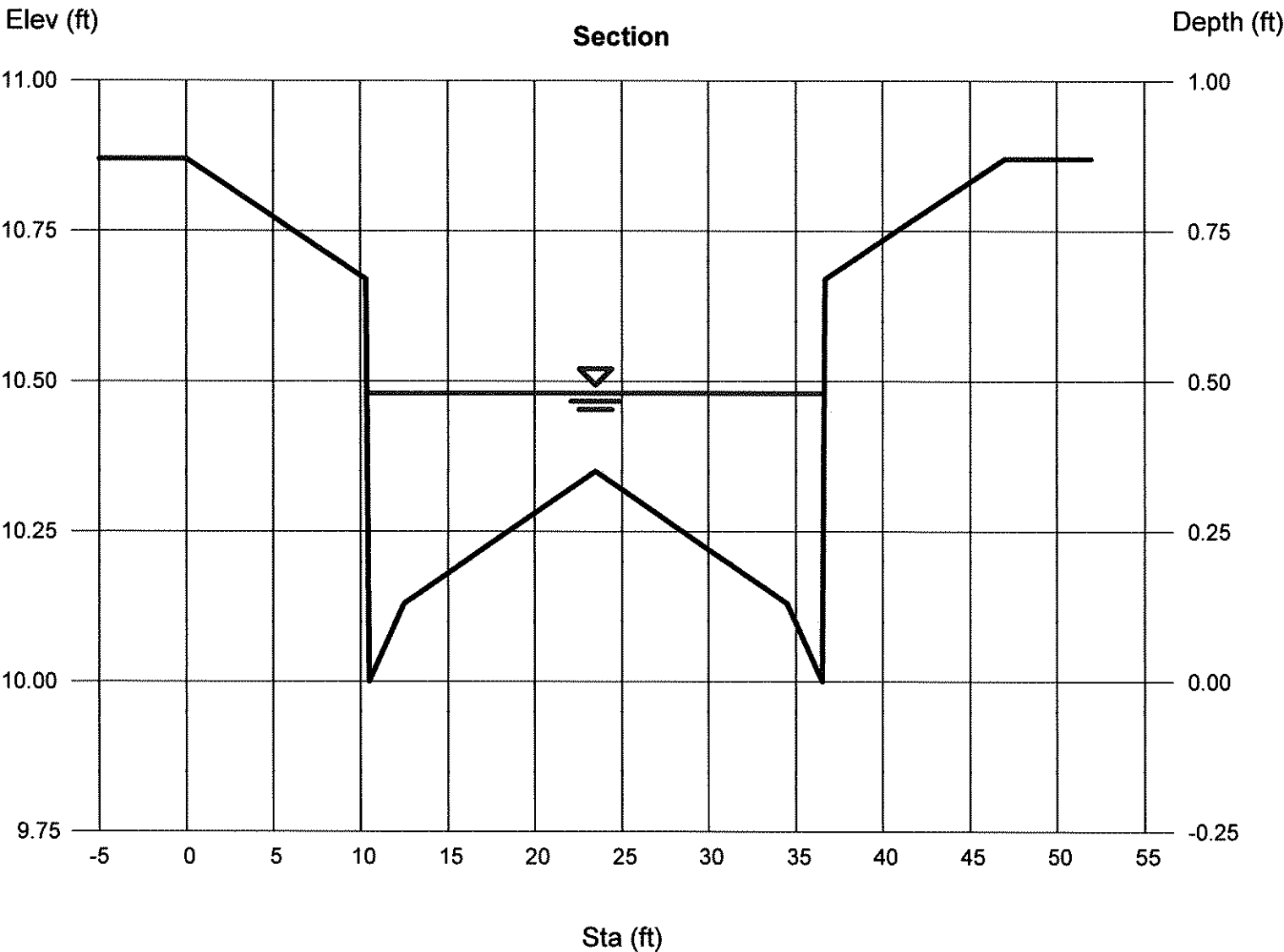
Grass Mountain Road-26-Std-0.6%(2)

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.48
Slope (%)	= 0.60	Q (cfs)	= 19.12
N-Value	= 0.017	Area (sqft)	= 7.00
		Velocity (ft/s)	= 2.73
		Wetted Perim (ft)	= 27.00
		Crit Depth, Yc (ft)	= 0.47
		Top Width (ft)	= 26.24
		EGL (ft)	= 0.60

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



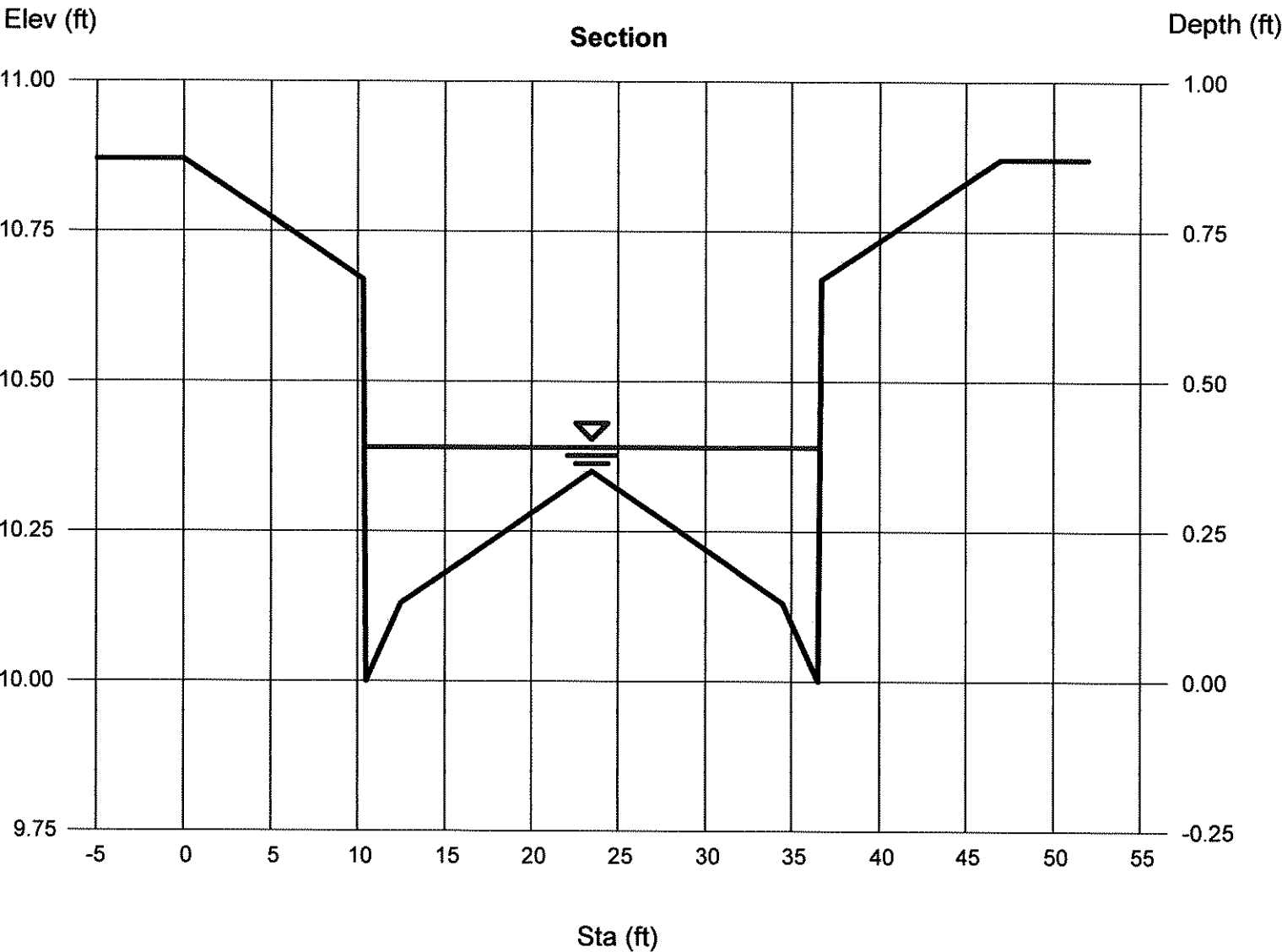
Channel Report

West Fork-26-Std-3.15%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.39
Slope (%)	= 3.15	Q (cfs)	= 21.82
N-Value	= 0.017	Area (sqft)	= 4.64
		Velocity (ft/s)	= 4.70
		Wetted Perim (ft)	= 26.82
		Crit Depth, Yc (ft)	= 0.50
		Top Width (ft)	= 26.20
		EGL (ft)	= 0.73

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)-
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Grass Mountain Road-26-Std-0.6%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 0.60
N-Value = 0.017

Highlighted

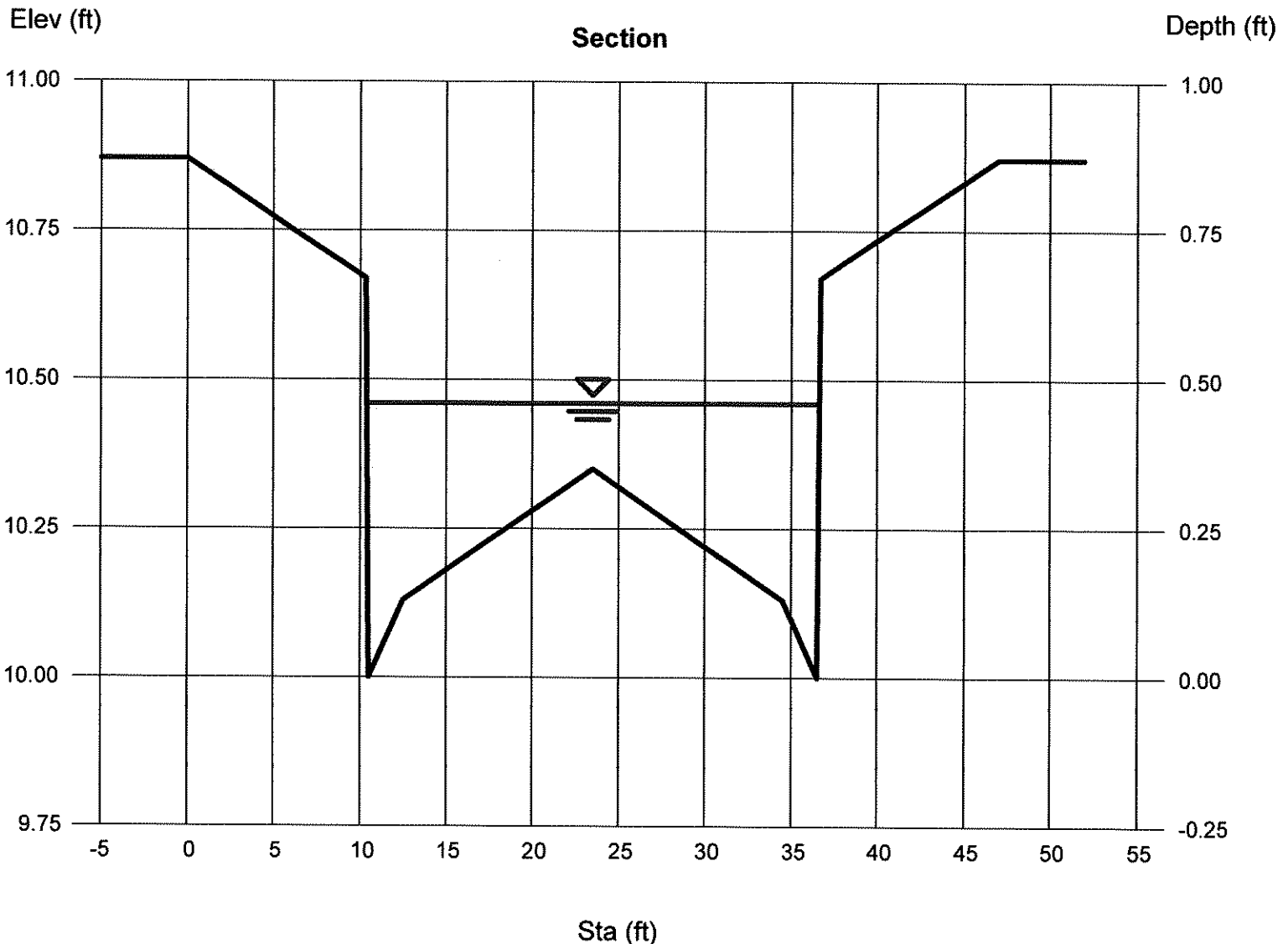
Depth (ft) = 0.46
Q (cfs) = 16.03
Area (sqft) = 6.47
Velocity (ft/s) = 2.48
Wetted Perim (ft) = 26.96
Crit Depth, Yc (ft) = 0.44
Top Width (ft) = 26.23
EGL (ft) = 0.56

Calculations

Compute by: Known Q
Known Q (cfs) = 16.03

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Gold Hill-26-Std-3.69%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 3.69
N-Value = 0.017

Highlighted

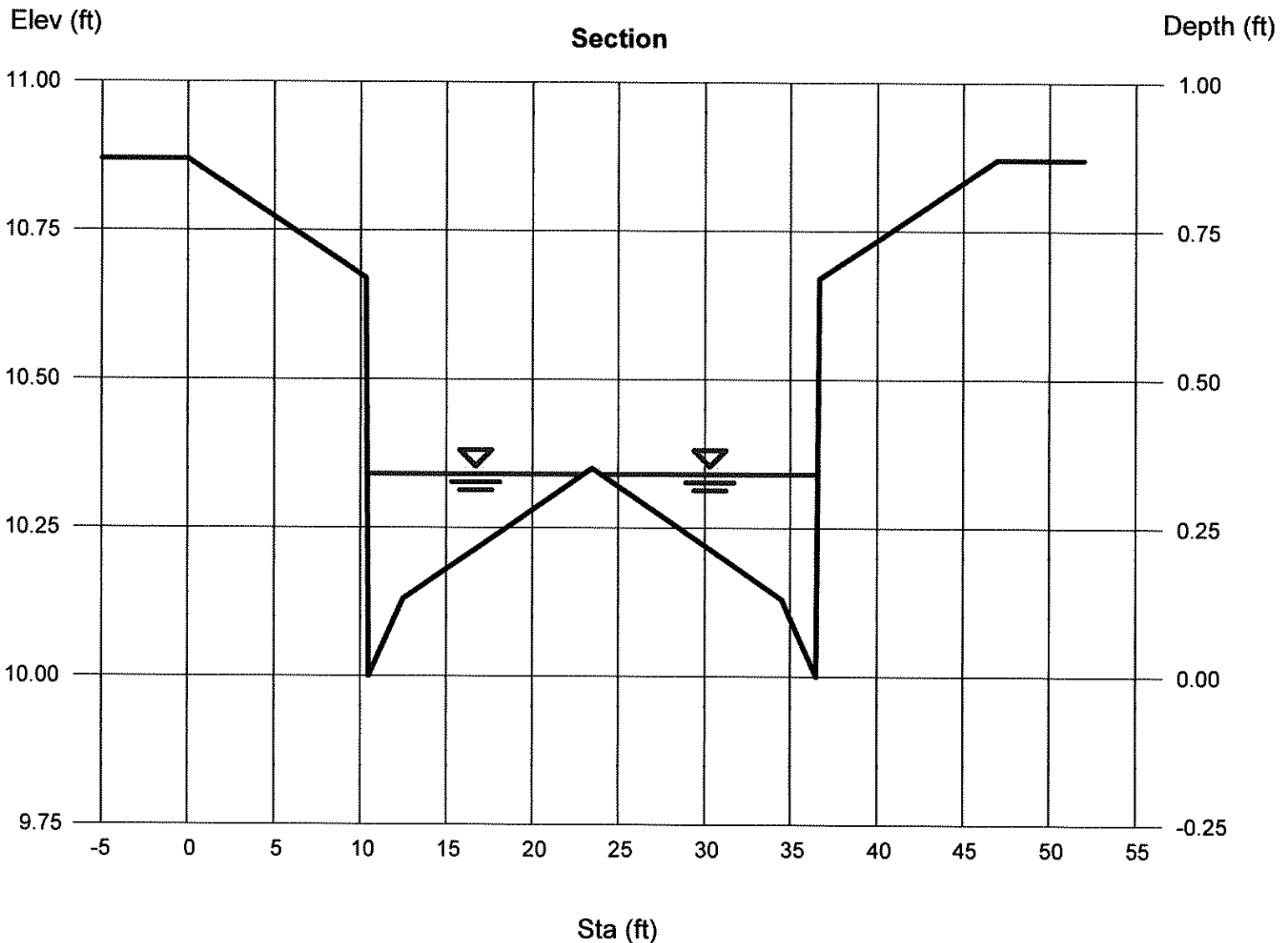
Depth (ft) = 0.34
Q (cfs) = 13.80
Area (sqft) = 3.33
Velocity (ft/s) = 4.14
Wetted Perim (ft) = 25.71
Crit Depth, Yc (ft) = 0.42
Top Width (ft) = 25.17
EGL (ft) = 0.61

Calculations

Compute by: Known Q
Known Q (cfs) = 13.80

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



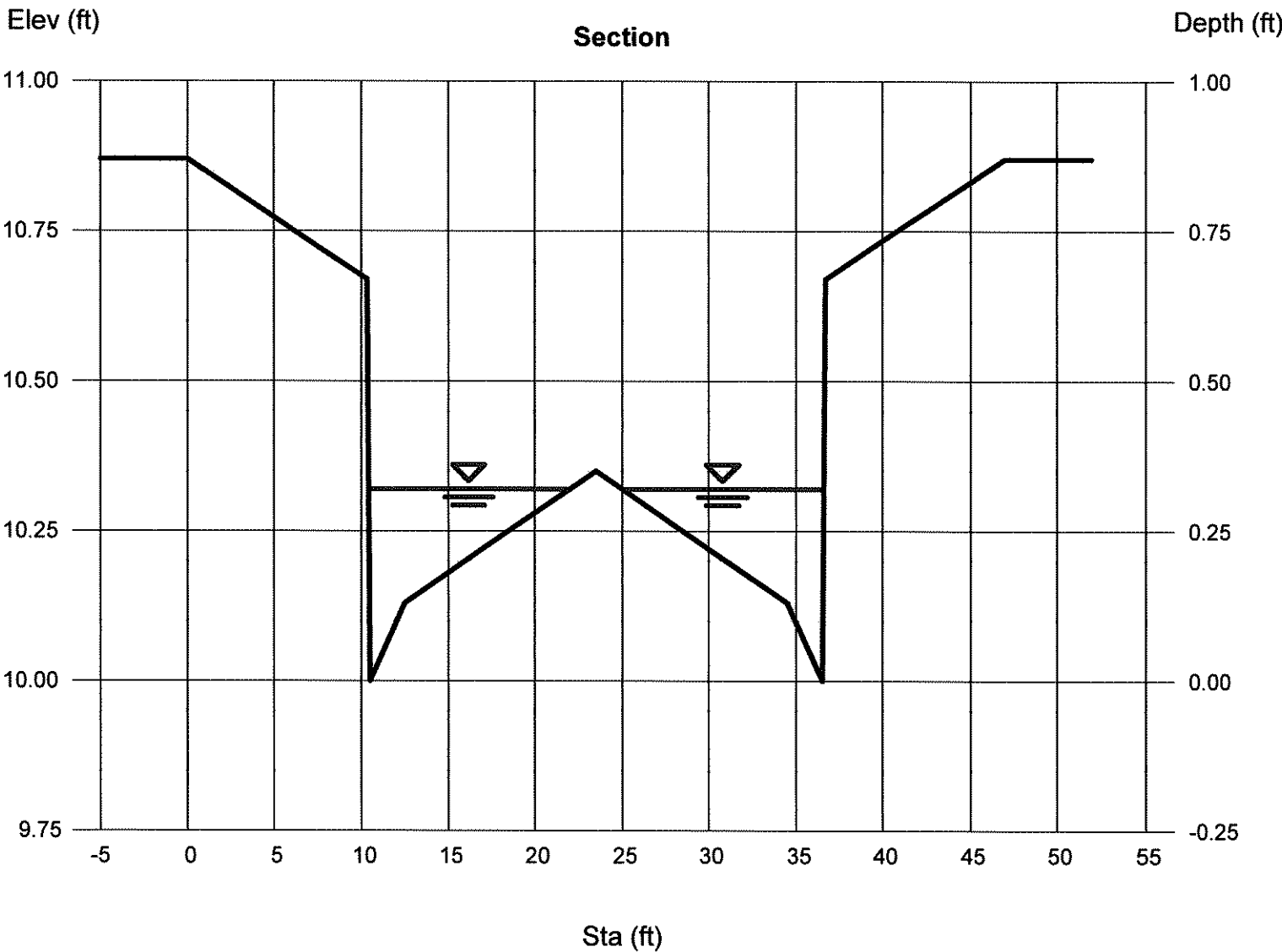
Channel Report

Crest Trail-26-Std-4.57%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.32
Slope (%)	= 4.57	Q (cfs)	= 12.32
N-Value	= 0.017	Area (sqft)	= 2.85
		Velocity (ft/s)	= 4.32
		Wetted Perim (ft)	= 23.67
		Crit Depth, Yc (ft)	= 0.41
		Top Width (ft)	= 23.16
		EGL (ft)	= 0.61

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



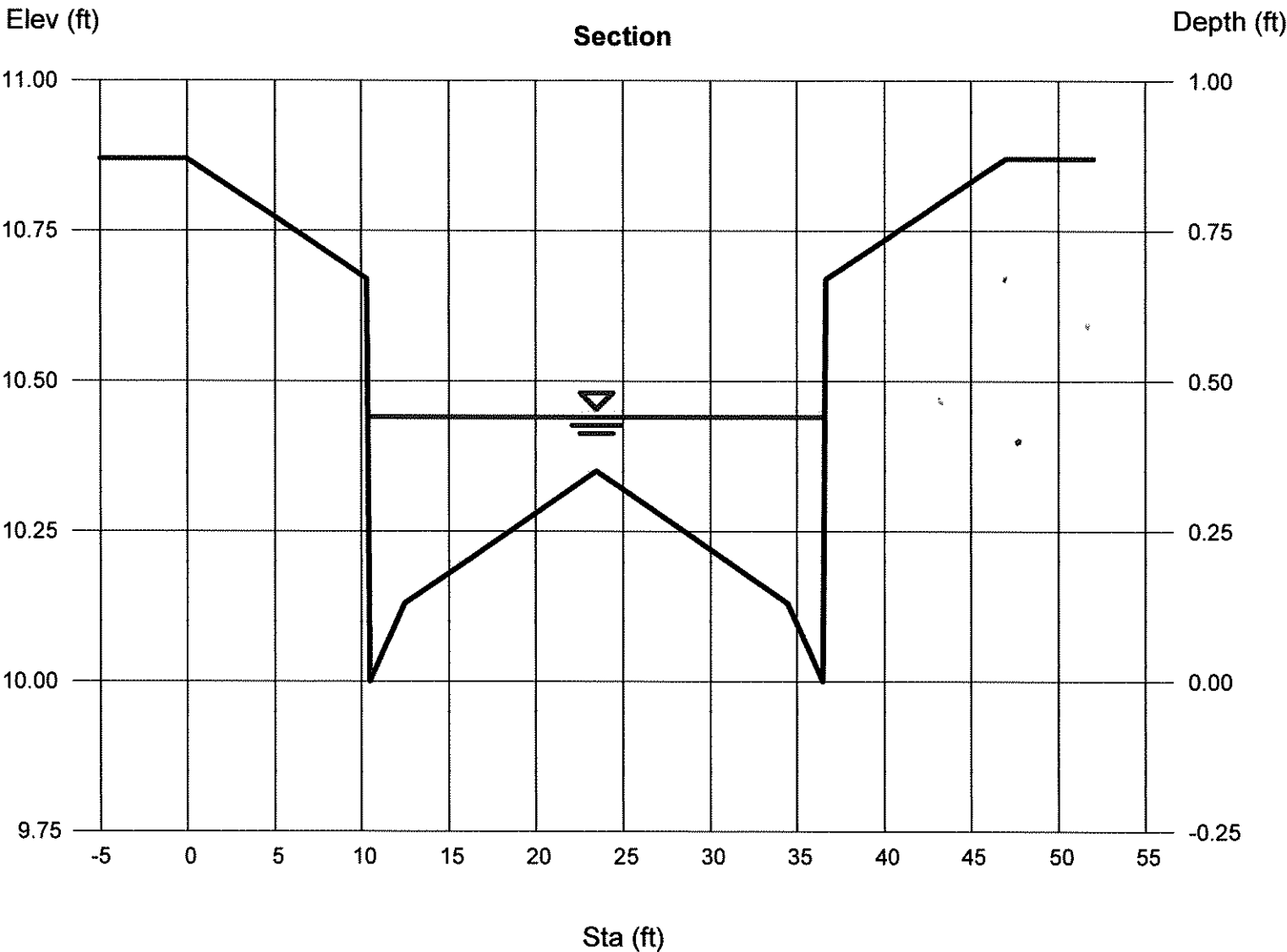
Channel Report

Winsor Street-26-Std-0.6%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.44
Slope (%)	= 0.60	Q (cfs)	= 14.11
N-Value	= 0.017	Area (sqft)	= 5.95
		Velocity (ft/s)	= 2.37
		Wetted Perim (ft)	= 26.92
		Crit Depth, Yc (ft)	= 0.43
		Top Width (ft)	= 26.22
		EGL (ft)	= 0.53

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Three Rivers-26-Std-2.0%

User-defined

Invert Elev (ft)	= 10.00
Slope (%)	= 2.00
N-Value	= 0.017

Highlighted

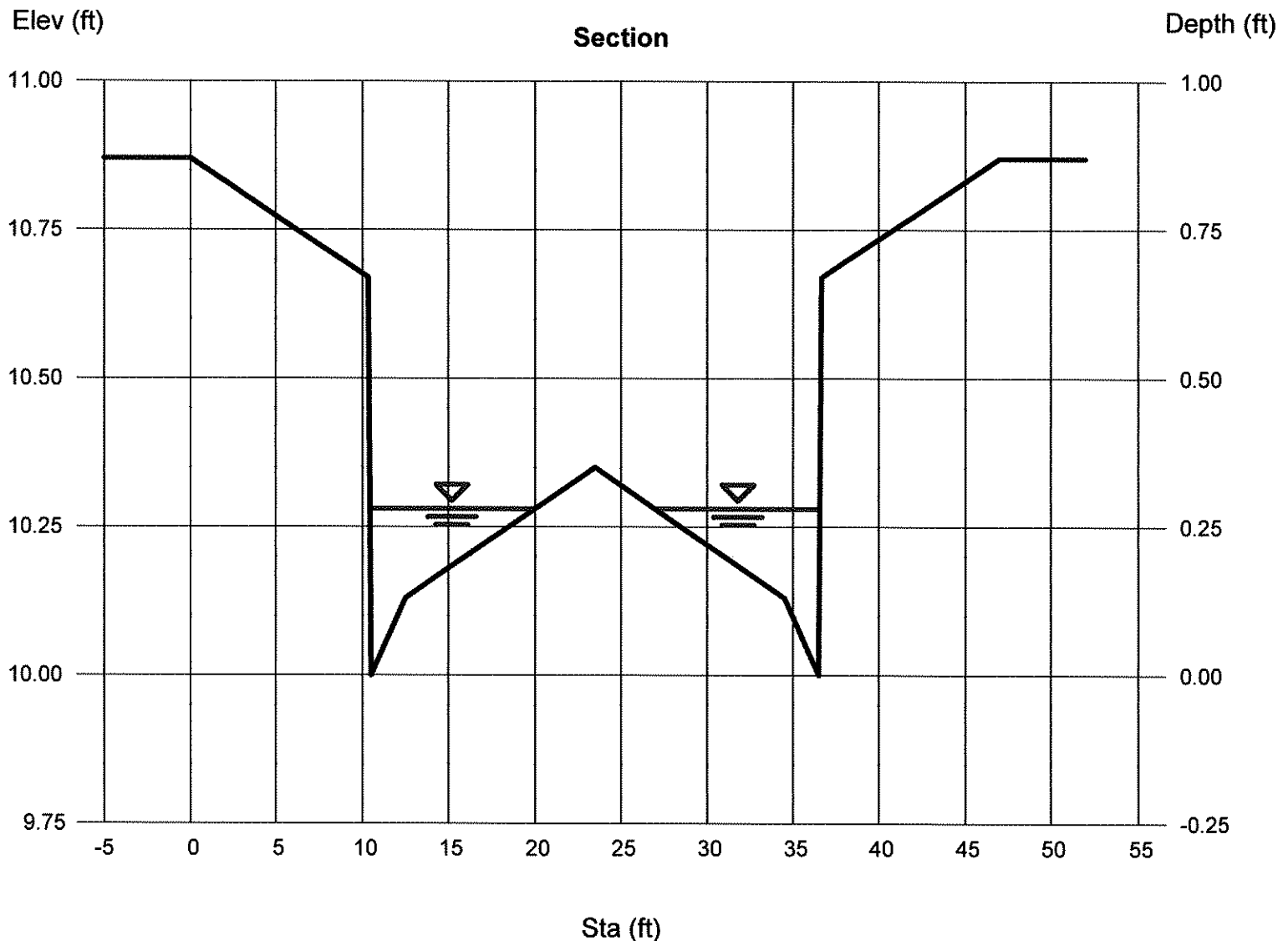
Depth (ft)	= 0.28
Q (cfs)	= 5.000
Area (sqft)	= 2.00
Velocity (ft/s)	= 2.49
Wetted Perim (ft)	= 19.59
Crit Depth, Yc (ft)	= 0.31
Top Width (ft)	= 19.14
EGL (ft)	= 0.38

Calculations

Compute by: Known Q
Known Q (cfs) = 5.00

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
 -(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

South Peak-26-Std-2.77%(2)

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.77
N-Value = 0.017

Calculations

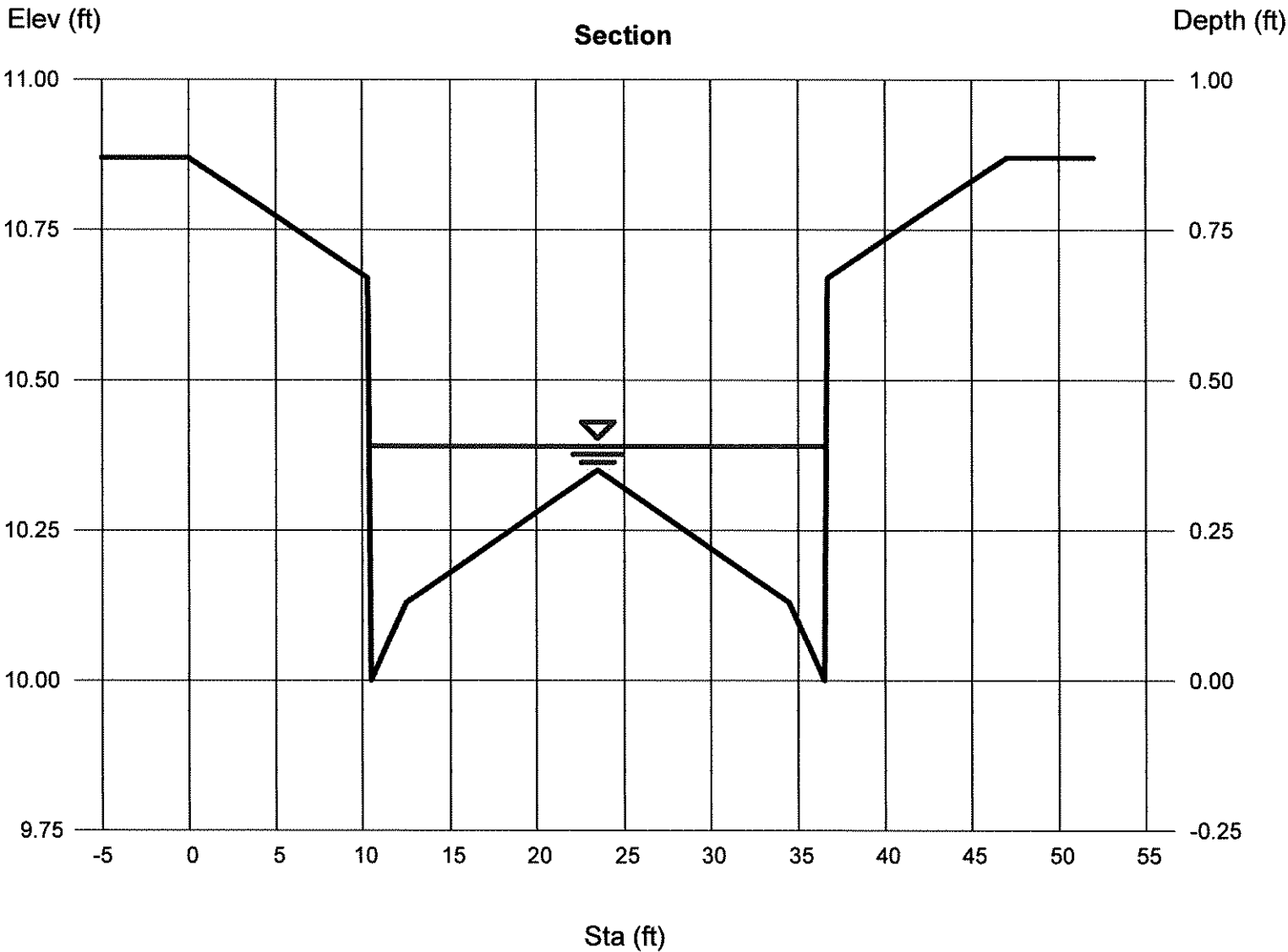
Compute by: Known Q
Known Q (cfs) = 20.37

Highlighted

Depth (ft) = 0.39
Q (cfs) = 20.37
Area (sqft) = 4.64
Velocity (ft/s) = 4.39
Wetted Perim (ft) = 26.82
Crit Depth, Yc (ft) = 0.48
Top Width (ft) = 26.20
EGL (ft) = 0.69

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

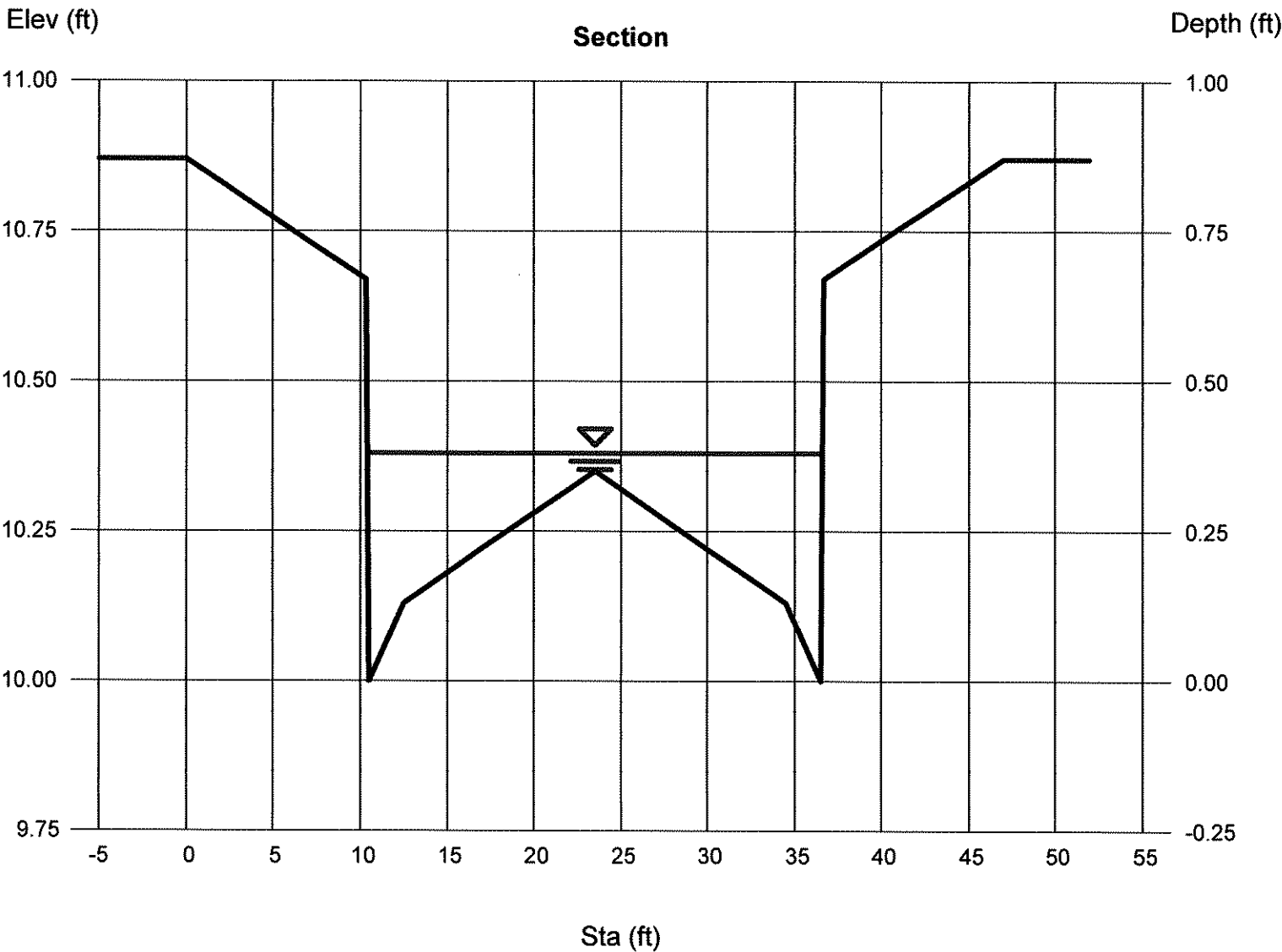
South Peak-26-Std-2.77%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.38
Slope (%)	= 2.77	Q (cfs)	= 18.27
N-Value	= 0.017	Area (sqft)	= 4.38
		Velocity (ft/s)	= 4.17
		Wetted Perim (ft)	= 26.80
		Crit Depth, Yc (ft)	= 0.47
		Top Width (ft)	= 26.19
		EGL (ft)	= 0.65

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

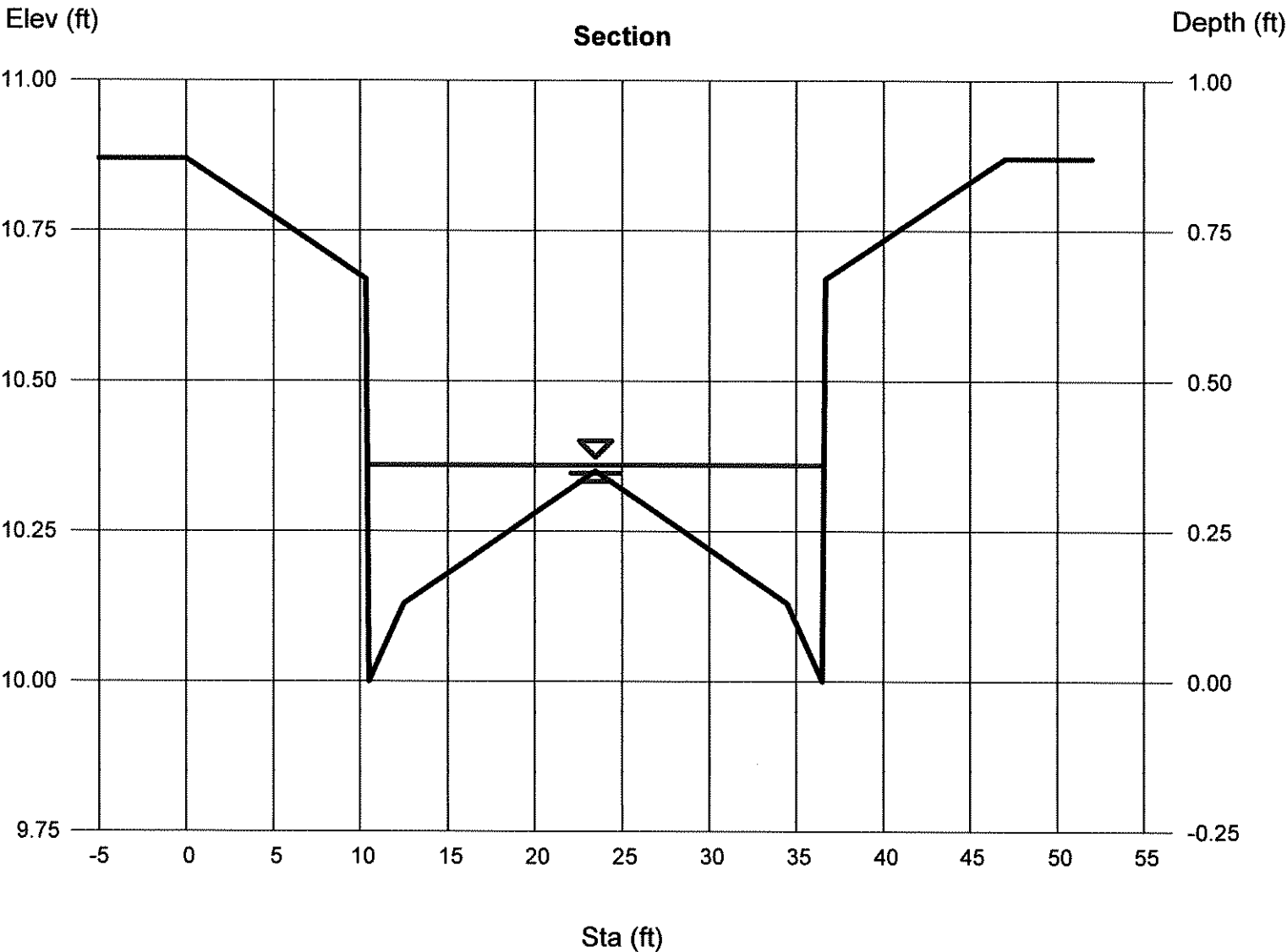
Basin Peak-26-Std-5.0%(3)

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.36
Slope (%)	= 5.00	Q (cfs)	= 18.84
N-Value	= 0.017	Area (sqft)	= 3.85
		Velocity (ft/s)	= 4.89
		Wetted Perim (ft)	= 26.76
		Crit Depth, Yc (ft)	= 0.47
		Top Width (ft)	= 26.18
		EGL (ft)	= 0.73

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Deer Horn-26-MTB-4.0%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 4.00
N-Value = 0.017

Calculations

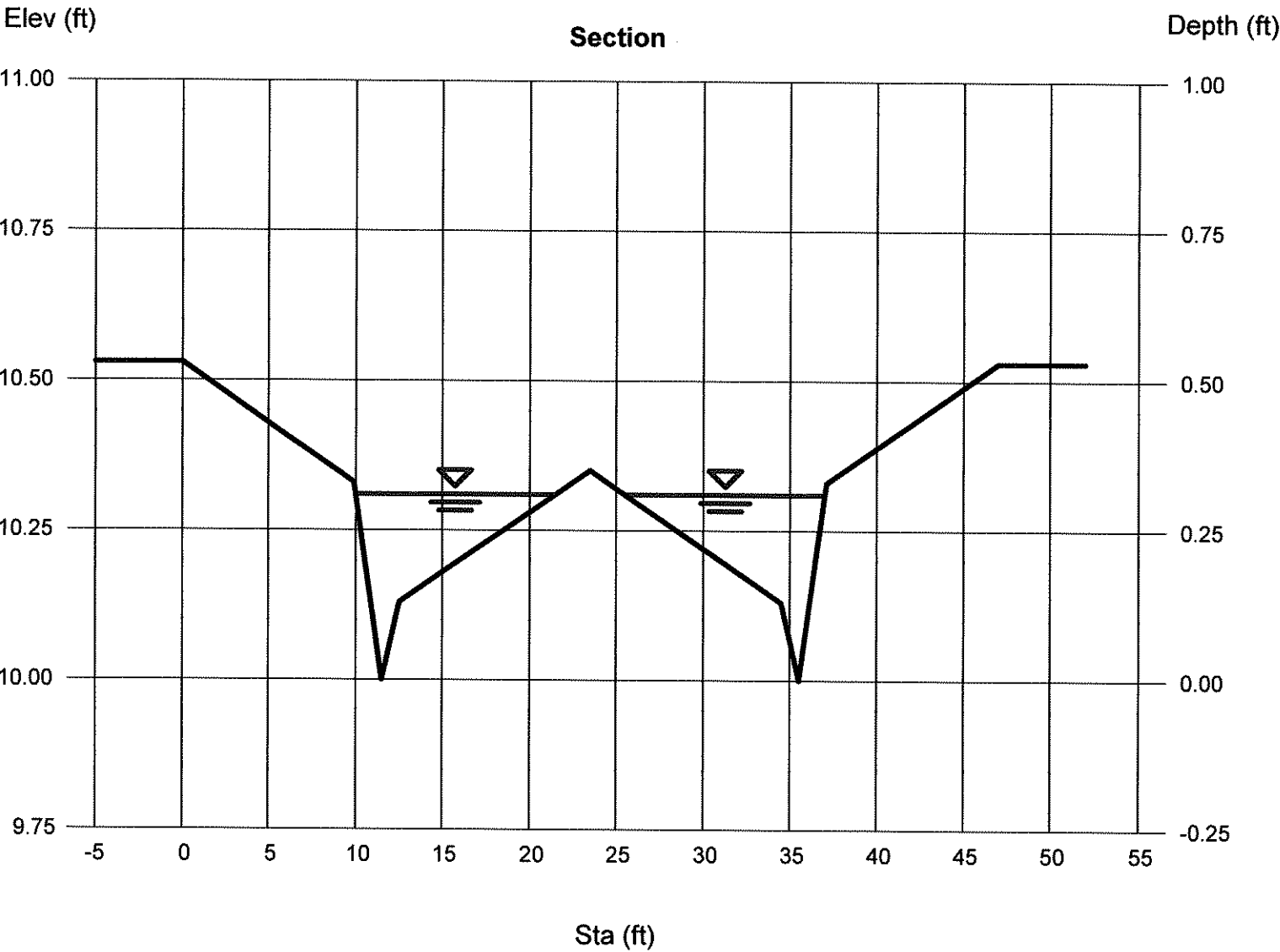
Compute by: Known Q
Known Q (cfs) = 9.50

Highlighted

Depth (ft) = 0.31
Q (cfs) = 9.500
Area (sqft) = 2.59
Velocity (ft/s) = 3.67
Wetted Perim (ft) = 23.15
Crit Depth, Yc (ft) = 0.38
Top Width (ft) = 23.07
EGL (ft) = 0.52

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)
-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Deer Horn-26-Std-4.0%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 4.00
N-Value = 0.017

Highlighted

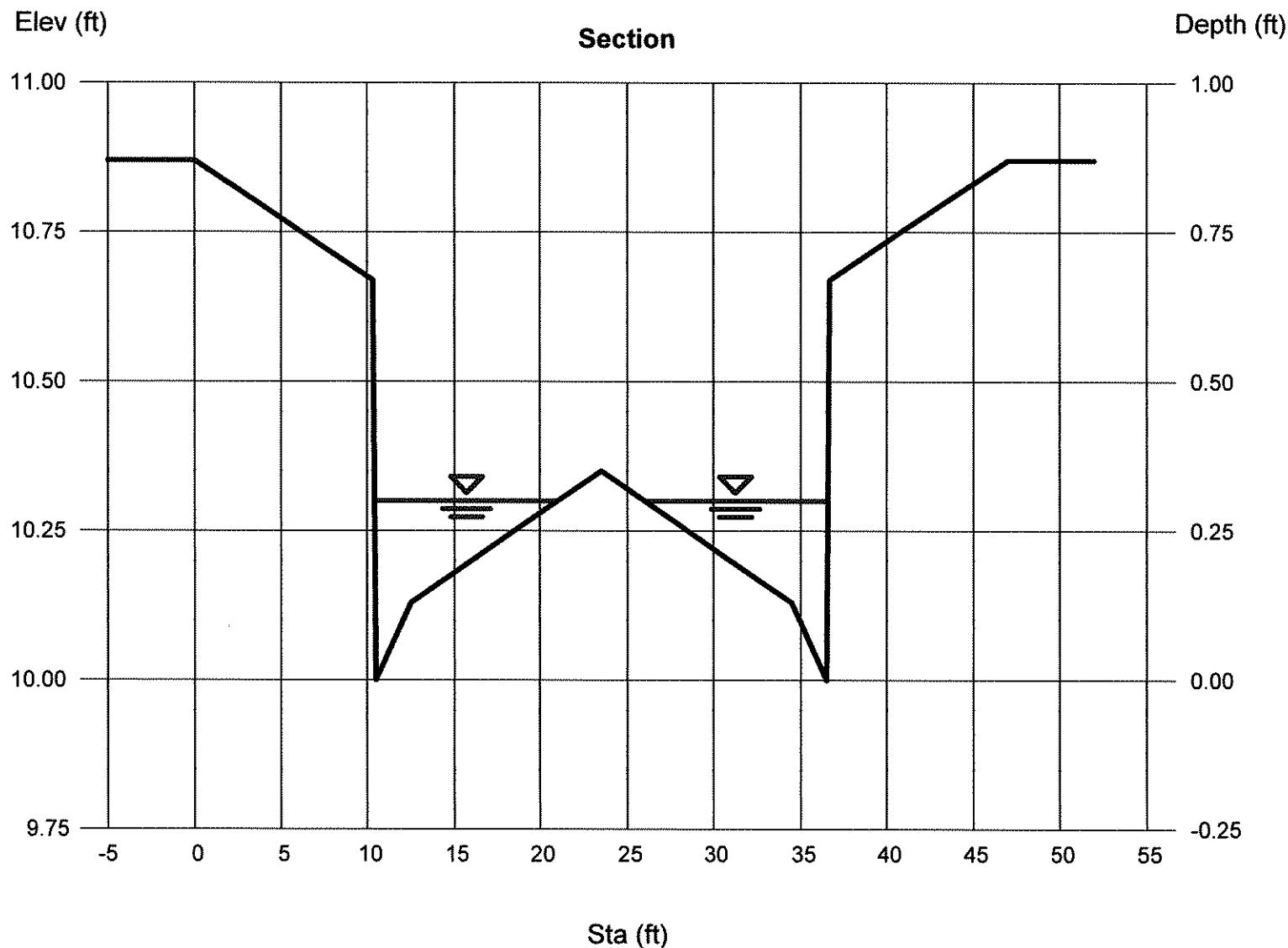
Depth (ft) = 0.30
Q (cfs) = 9.500
Area (sqft) = 2.41
Velocity (ft/s) = 3.95
Wetted Perim (ft) = 21.63
Crit Depth, Yc (ft) = 0.38
Top Width (ft) = 21.15
EGL (ft) = 0.54

Calculations

Compute by: Known Q
Known Q (cfs) = 9.50

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Basin Peak-26-Std-5.0%(2)

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 5.00
N-Value = 0.017

Calculations

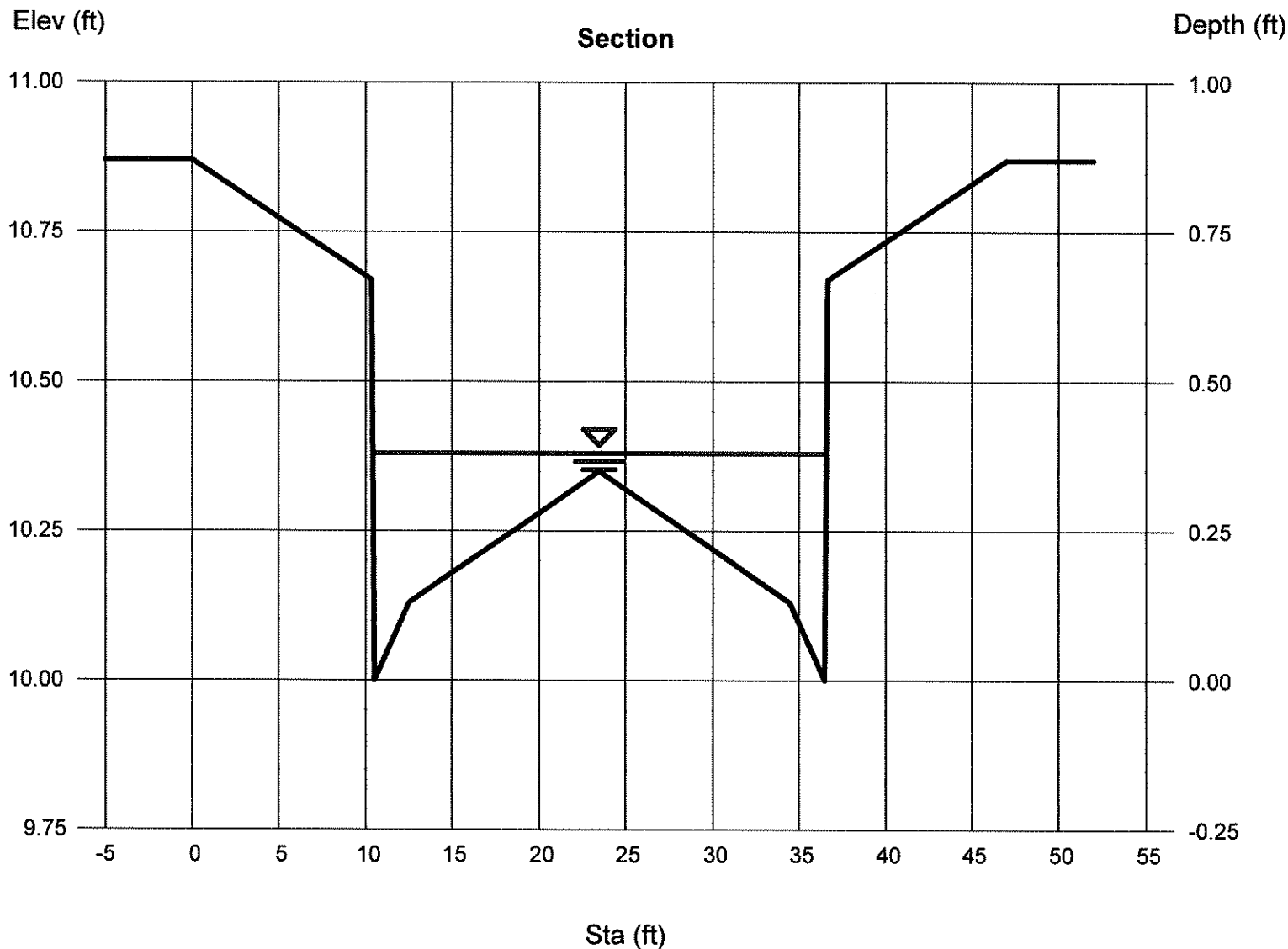
Compute by: Known Q
Known Q (cfs) = 24.50

Highlighted

Depth (ft) = 0.38
Q (cfs) = 24.50
Area (sqft) = 4.38
Velocity (ft/s) = 5.60
Wetted Perim (ft) = 26.80
Crit Depth, Yc (ft) = 0.52
Top Width (ft) = 26.19
EGL (ft) = 0.87

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



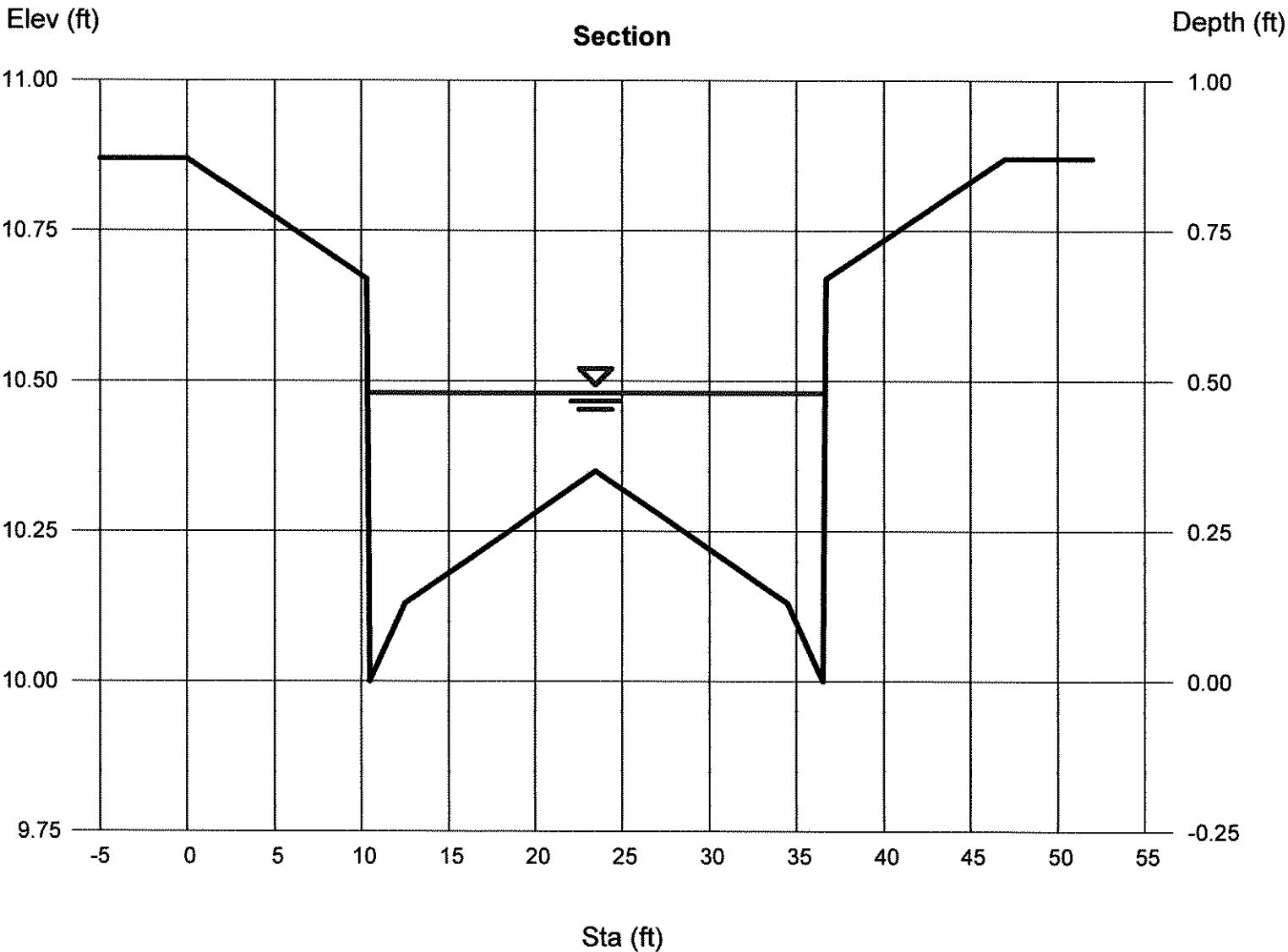
Channel Report

Alta Peak Trail-26-Std-0.711%(3)

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.48
Slope (%)	= 0.71	Q (cfs)	= 20.17
N-Value	= 0.017	Area (sqft)	= 7.00
		Velocity (ft/s)	= 2.88
		Wetted Perim (ft)	= 27.00
		Crit Depth, Yc (ft)	= 0.48
		Top Width (ft)	= 26.24
		EGL (ft)	= 0.61

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Crest Trail-28-Std-5.00%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 5.00
N-Value = 0.017

Calculations

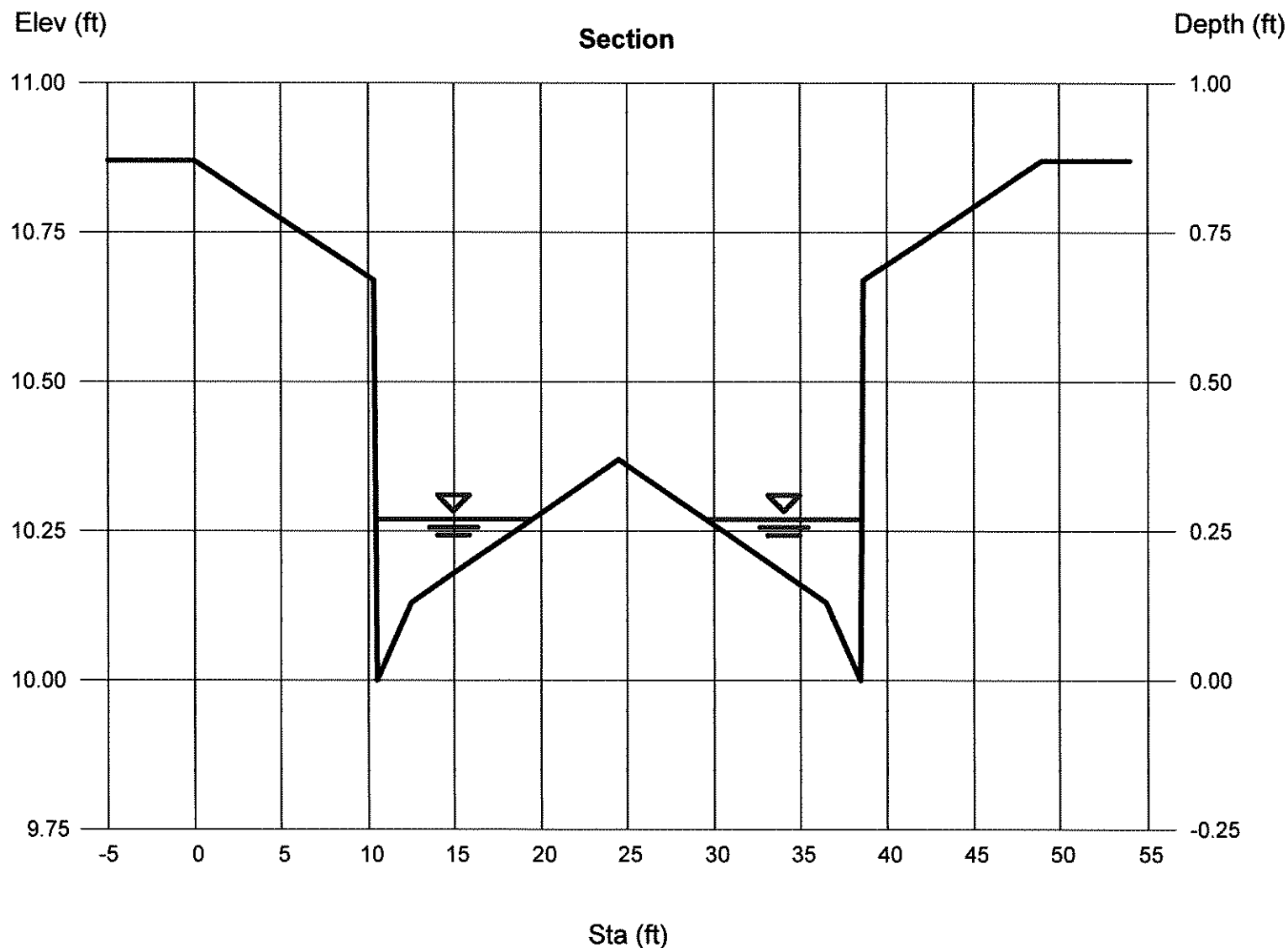
Compute by: Known Q
Known Q (cfs) = 6.64

Highlighted

Depth (ft) = 0.27
Q (cfs) = 6.640
Area (sqft) = 1.82
Velocity (ft/s) = 3.65
Wetted Perim (ft) = 18.57
Crit Depth, Yc (ft) = 0.34
Top Width (ft) = 18.14
EGL (ft) = 0.48

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(24.50, 10.37, 0.017)-(36.50, 10.13, 0.017)-(38.50, 10.00, 0.017)
-(38.67, 10.67, 0.017)-(49.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Emerald Peak-15-STD-3.32%-Entrance

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 3.32
N-Value = 0.017

Highlighted

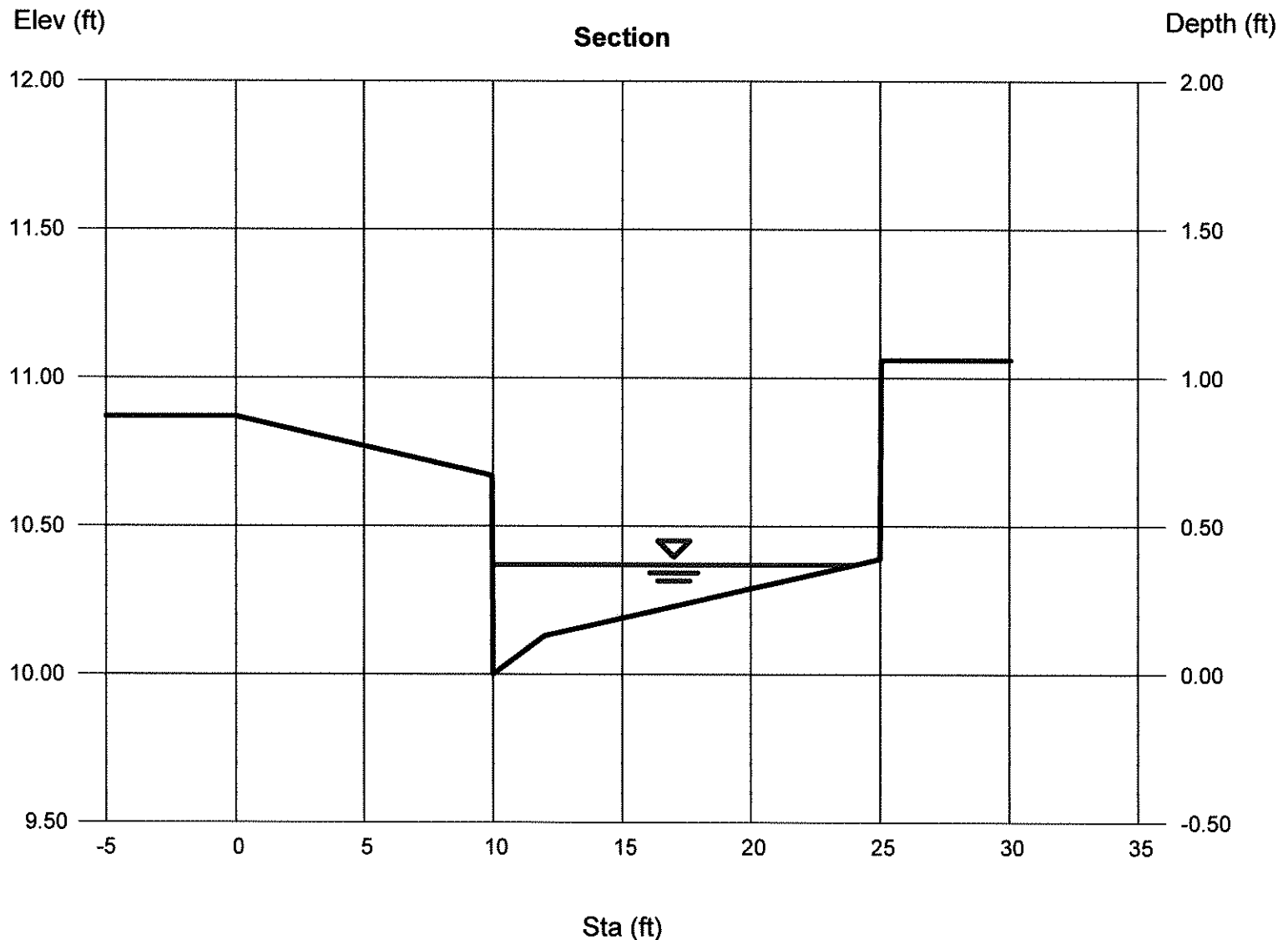
Depth (ft) = 0.37
Q (cfs) = 8.350
Area (sqft) = 2.06
Velocity (ft/s) = 4.06
Wetted Perim (ft) = 14.38
Crit Depth, Yc (ft) = 0.45
Top Width (ft) = 14.03
EGL (ft) = 0.63

Calculations

Compute by: Known Q
Known Q (cfs) = 8.35

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(9.95, 10.67, 0.017)-(10.00, 10.00, 0.017)-(12.00, 10.13, 0.017)-(25.00, 10.39, 0.017)-(25.05, 11.06, 0.017)



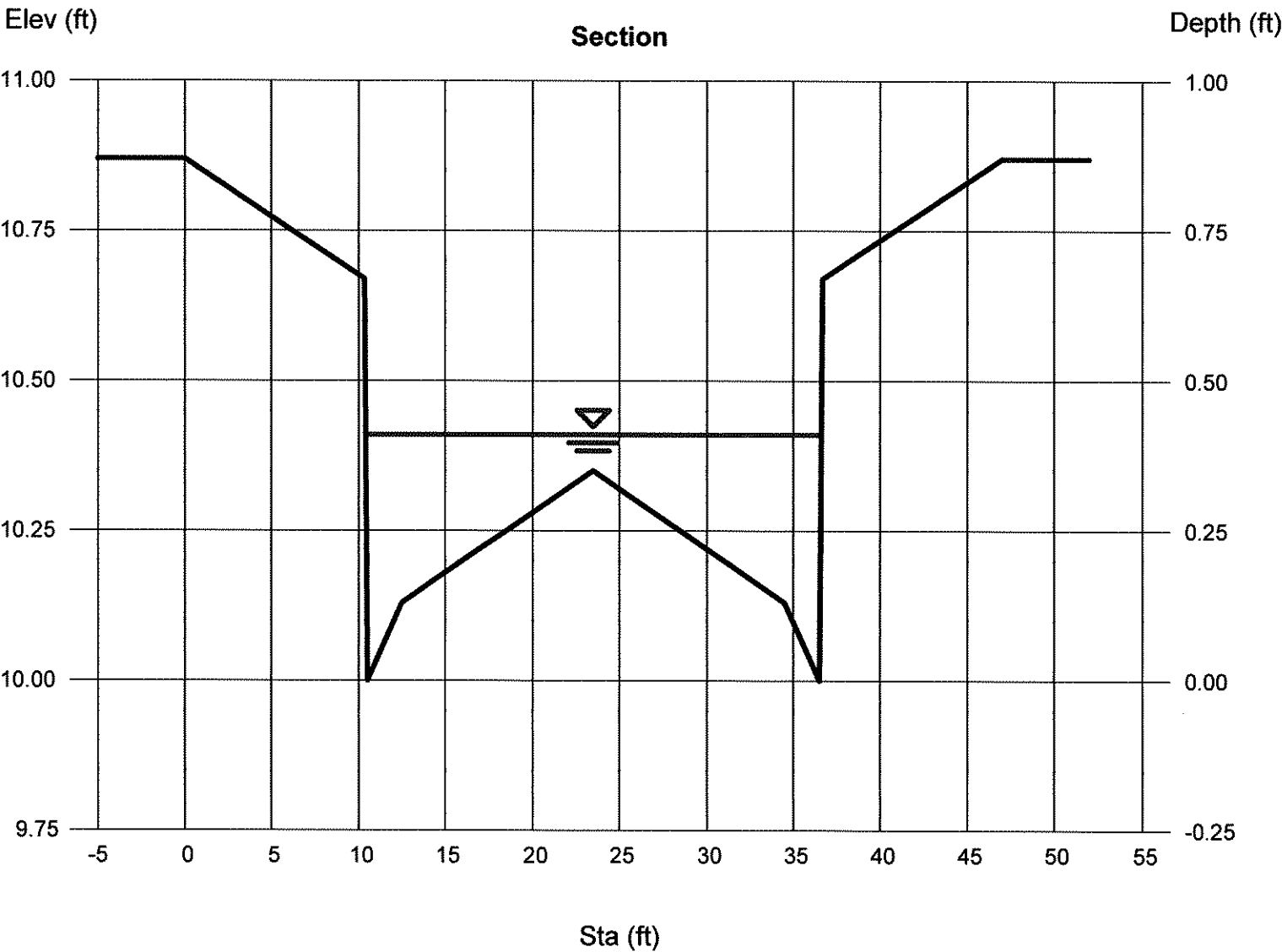
Channel Report

Crag Peak-26-Std-3.2%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.41
Slope (%)	= 3.20	Q (cfs)	= 26.69
N-Value	= 0.017	Area (sqft)	= 5.16
		Velocity (ft/s)	= 5.17
		Wetted Perim (ft)	= 26.86
		Crit Depth, Yc (ft)	= 0.54
		Top Width (ft)	= 26.21
		EGL (ft)	= 0.83

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

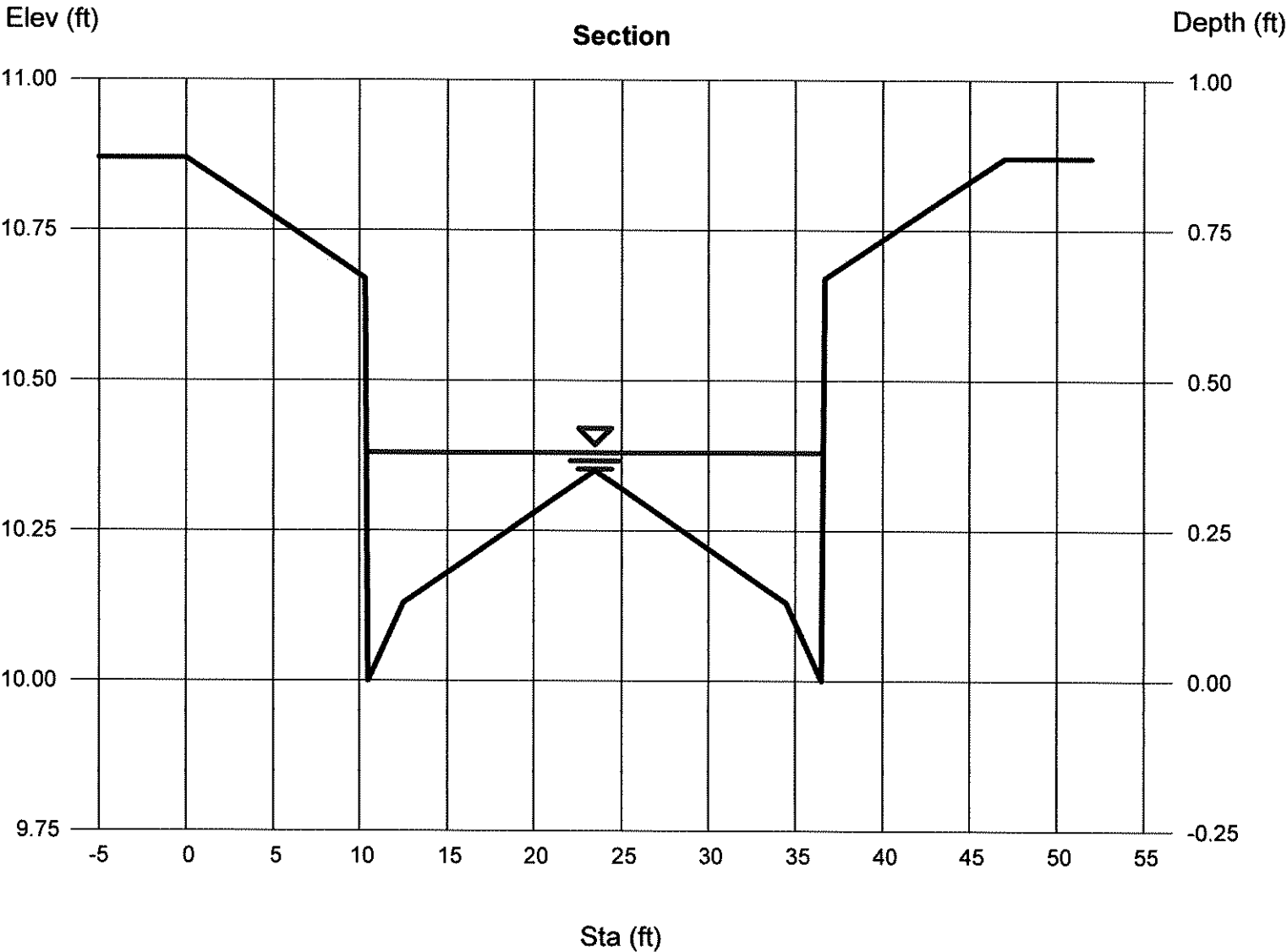
Pine Town Way-26-Std-3.4%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.38
Slope (%)	= 3.40	Q (cfs)	= 20.65
N-Value	= 0.017	Area (sqft)	= 4.38
		Velocity (ft/s)	= 4.72
		Wetted Perim (ft)	= 26.80
		Crit Depth, Yc (ft)	= 0.49
		Top Width (ft)	= 26.19
		EGL (ft)	= 0.73

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Alta Peak Trail-26-Std-0.711%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 0.71
N-Value = 0.017

Highlighted

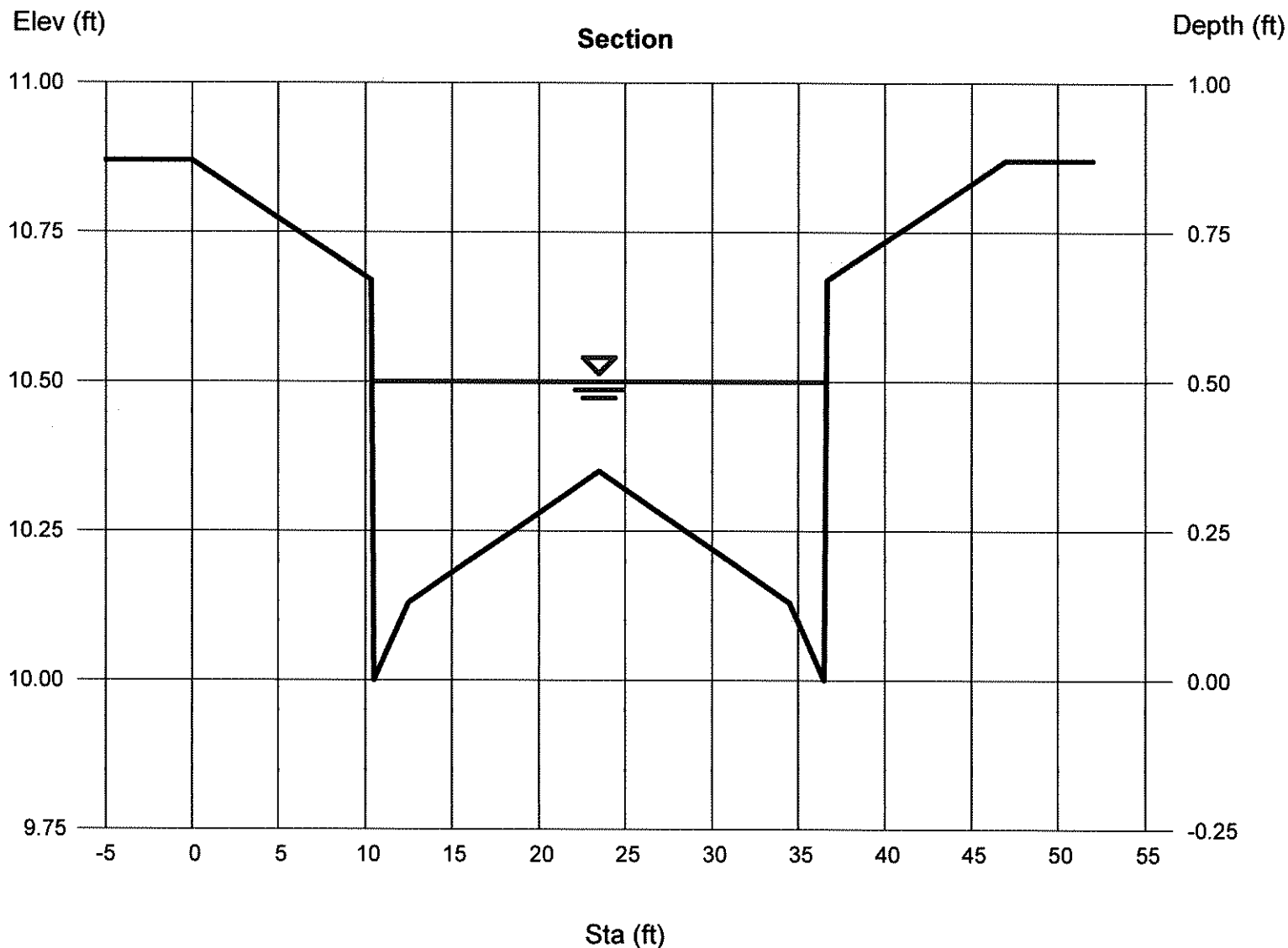
Depth (ft) = 0.50
Q (cfs) = 23.28
Area (sqft) = 7.52
Velocity (ft/s) = 3.09
Wetted Perim (ft) = 27.04
Crit Depth, Yc (ft) = 0.51
Top Width (ft) = 26.25
EGL (ft) = 0.65

Calculations

Compute by: Known Q
Known Q (cfs) = 23.28

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

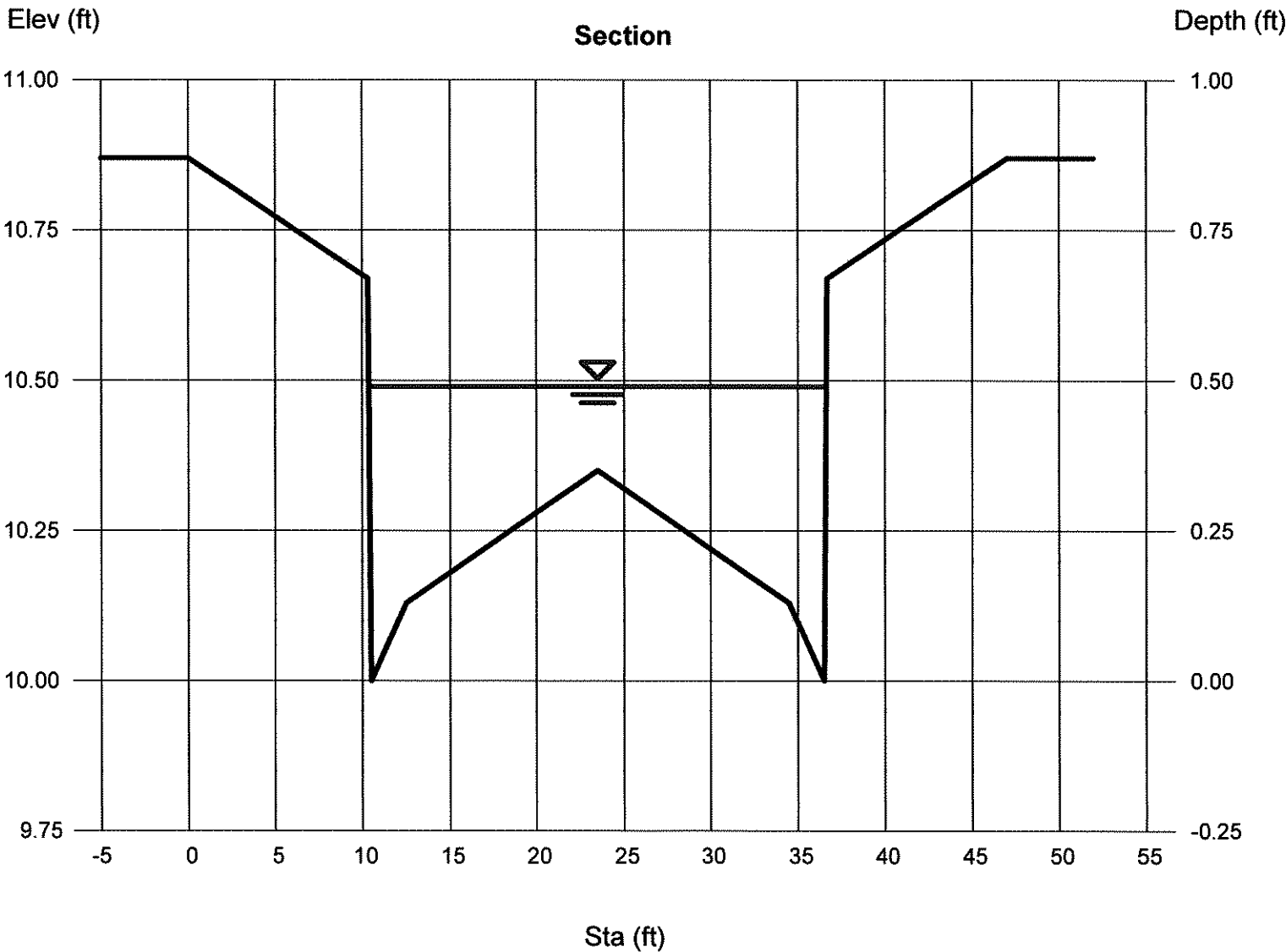
Alta Peak Trail-26-Std-0.711%(2)

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.49
Slope (%)	= 0.71	Q (cfs)	= 21.41
N-Value	= 0.017	Area (sqft)	= 7.26
		Velocity (ft/s)	= 2.95
Calculations		Wetted Perim (ft)	= 27.02
Compute by:	Known Q	Crit Depth, Yc (ft)	= 0.49
Known Q (cfs)	= 21.41	Top Width (ft)	= 26.25
		EGL (ft)	= 0.63

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Monday, Feb 12 2018

Crag Peak-26-Std-4.9% (2)

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 4.90
N-Value = 0.017

Calculations

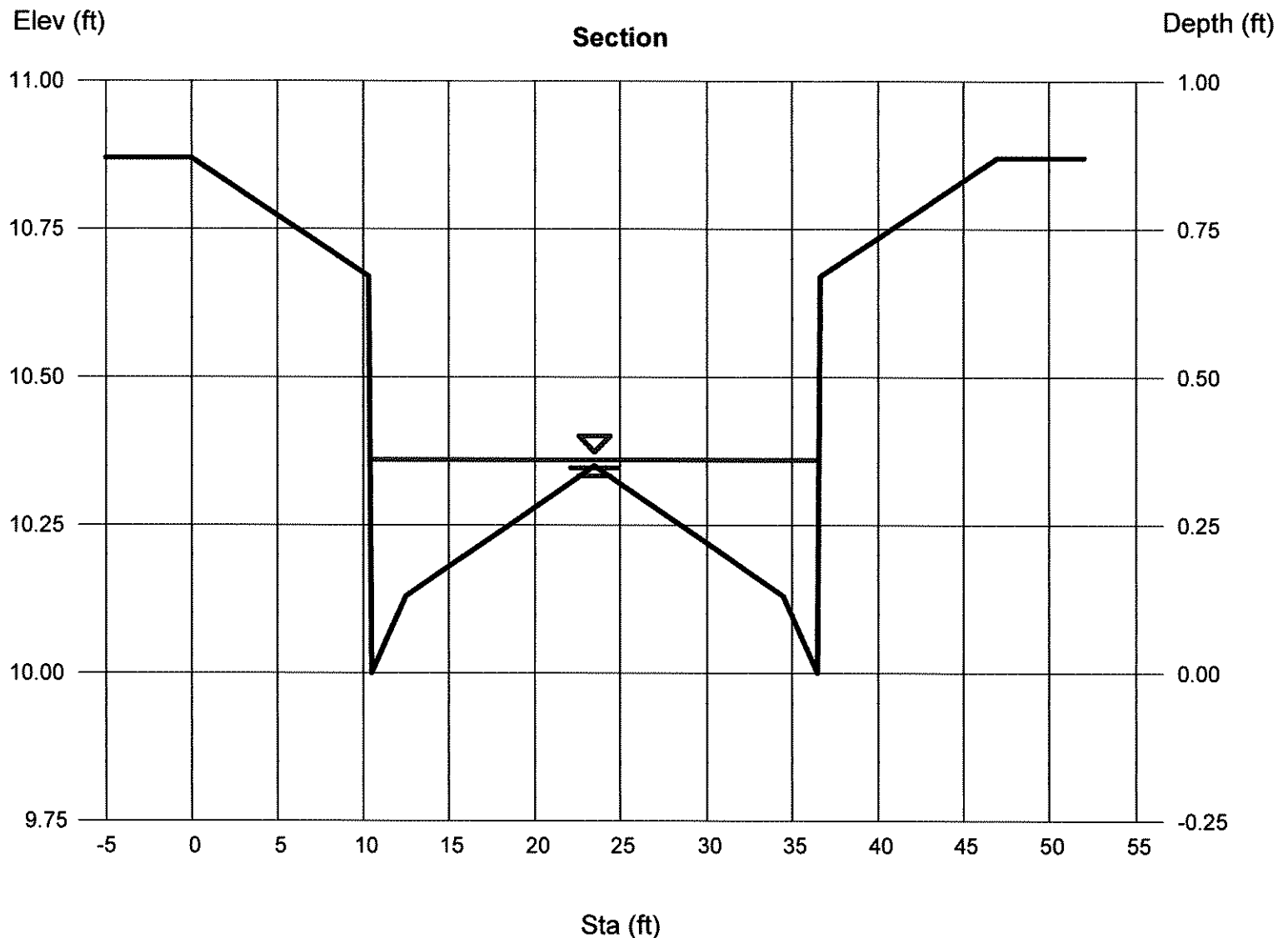
Compute by: Known Q
Known Q (cfs) = 19.38

Highlighted

Depth (ft) = 0.36
Q (cfs) = 19.38
Area (sqft) = 3.85
Velocity (ft/s) = 5.03
Wetted Perim (ft) = 26.76
Crit Depth, Yc (ft) = 0.48
Top Width (ft) = 26.18
EGL (ft) = 0.75

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

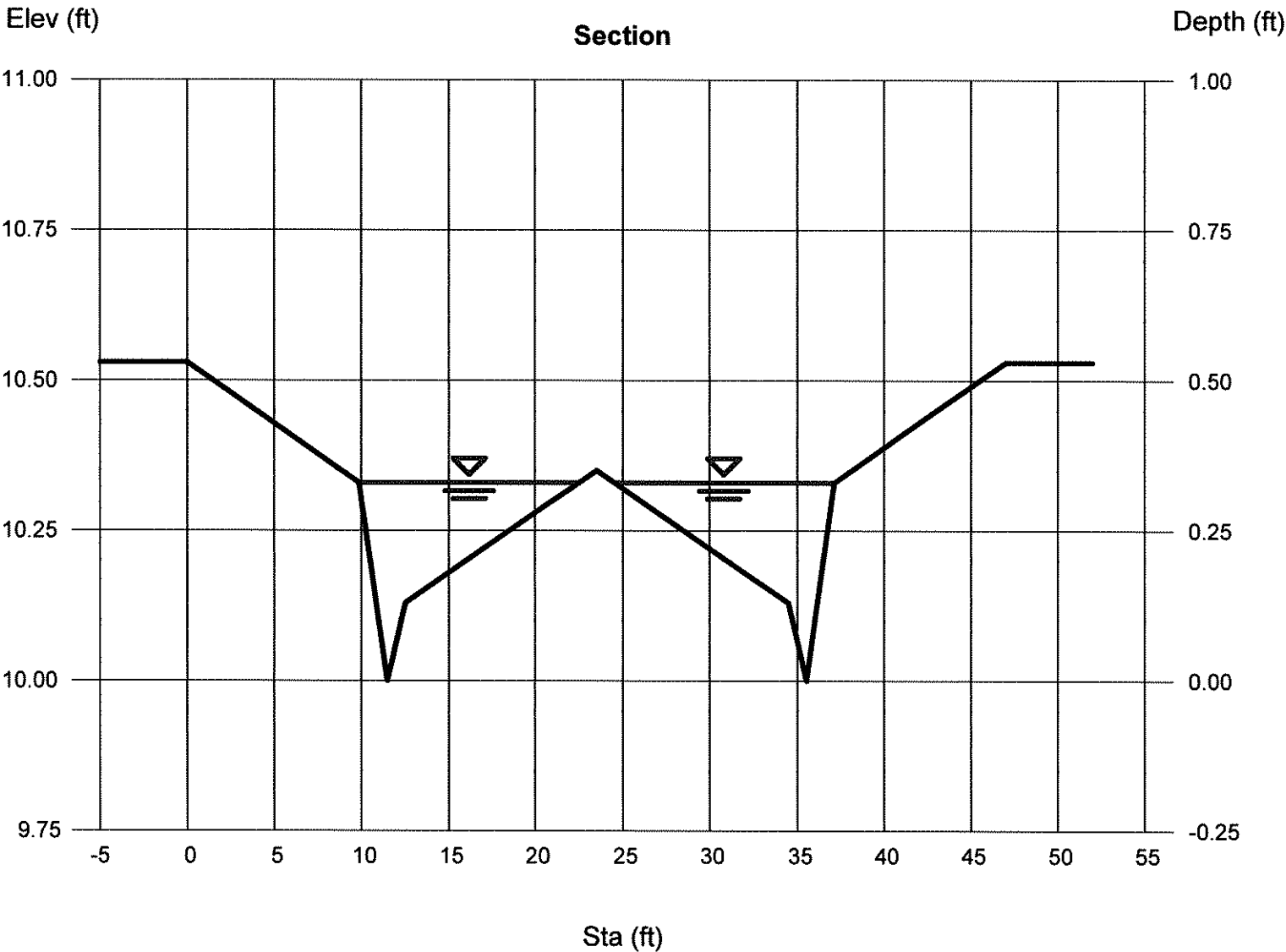
Emerald Peak-26-MTB-2.34%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.33
Slope (%)	= 2.34	Q (cfs)	= 9.410
N-Value	= 0.017	Area (sqft)	= 3.07
		Velocity (ft/s)	= 3.06
		Wetted Perim (ft)	= 25.35
Calculations		Crit Depth, Yc (ft)	= 0.38
Compute by:	Known Q	Top Width (ft)	= 25.26
Known Q (cfs)	= 9.41	EGL (ft)	= 0.48

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)

-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

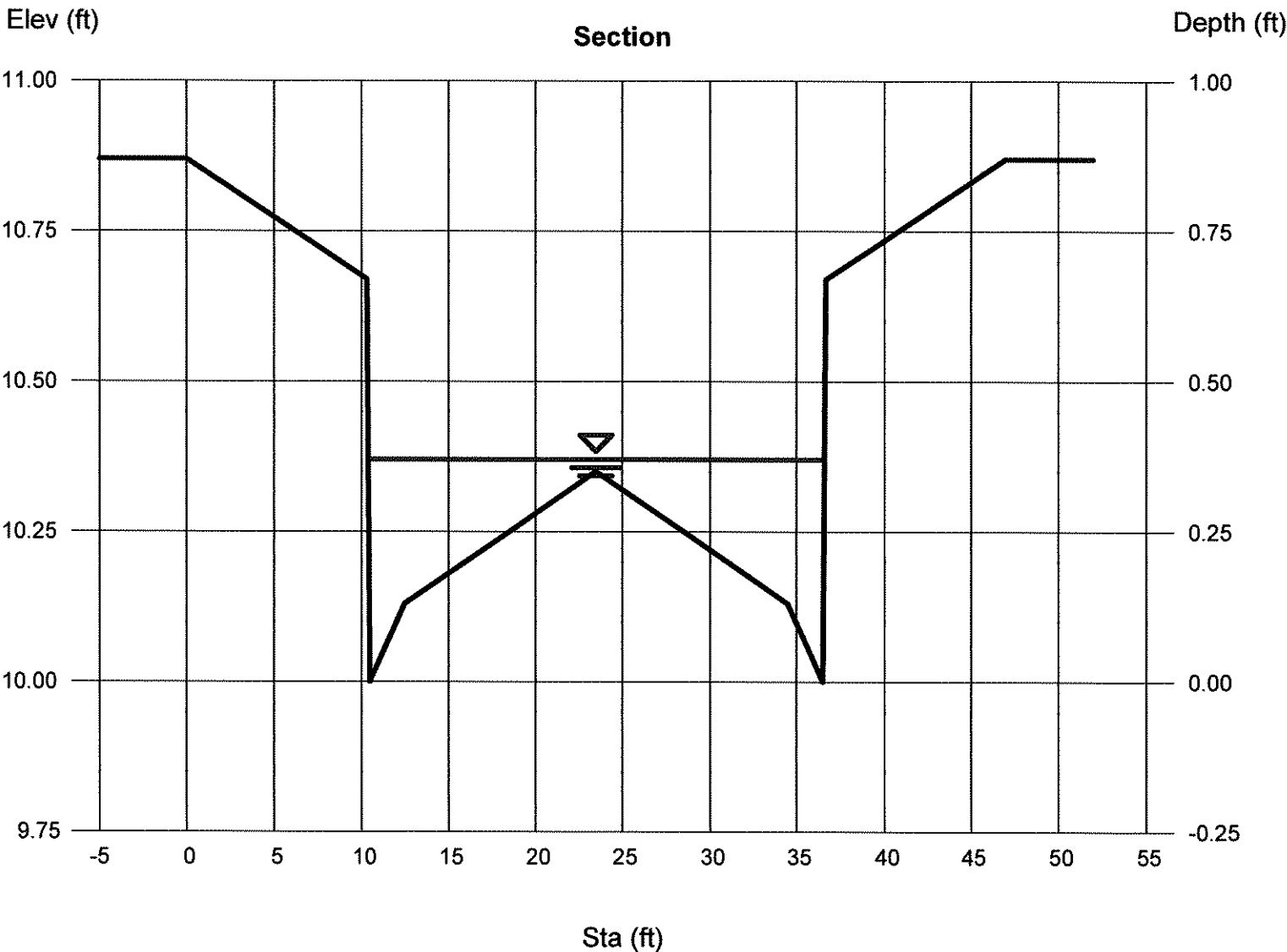
Diamond Peak-26-Std-2.7% (2)

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.37
Slope (%)	= 2.70	Q (cfs)	= 15.94
N-Value	= 0.017	Area (sqft)	= 4.11
		Velocity (ft/s)	= 3.87
		Wetted Perim (ft)	= 26.78
		Crit Depth, Yc (ft)	= 0.44
		Top Width (ft)	= 26.19
		EGL (ft)	= 0.60

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)

-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Sunday, Feb 11 2018

Diamond Peak-26-Std-2.7%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.70
N-Value = 0.017

Highlighted

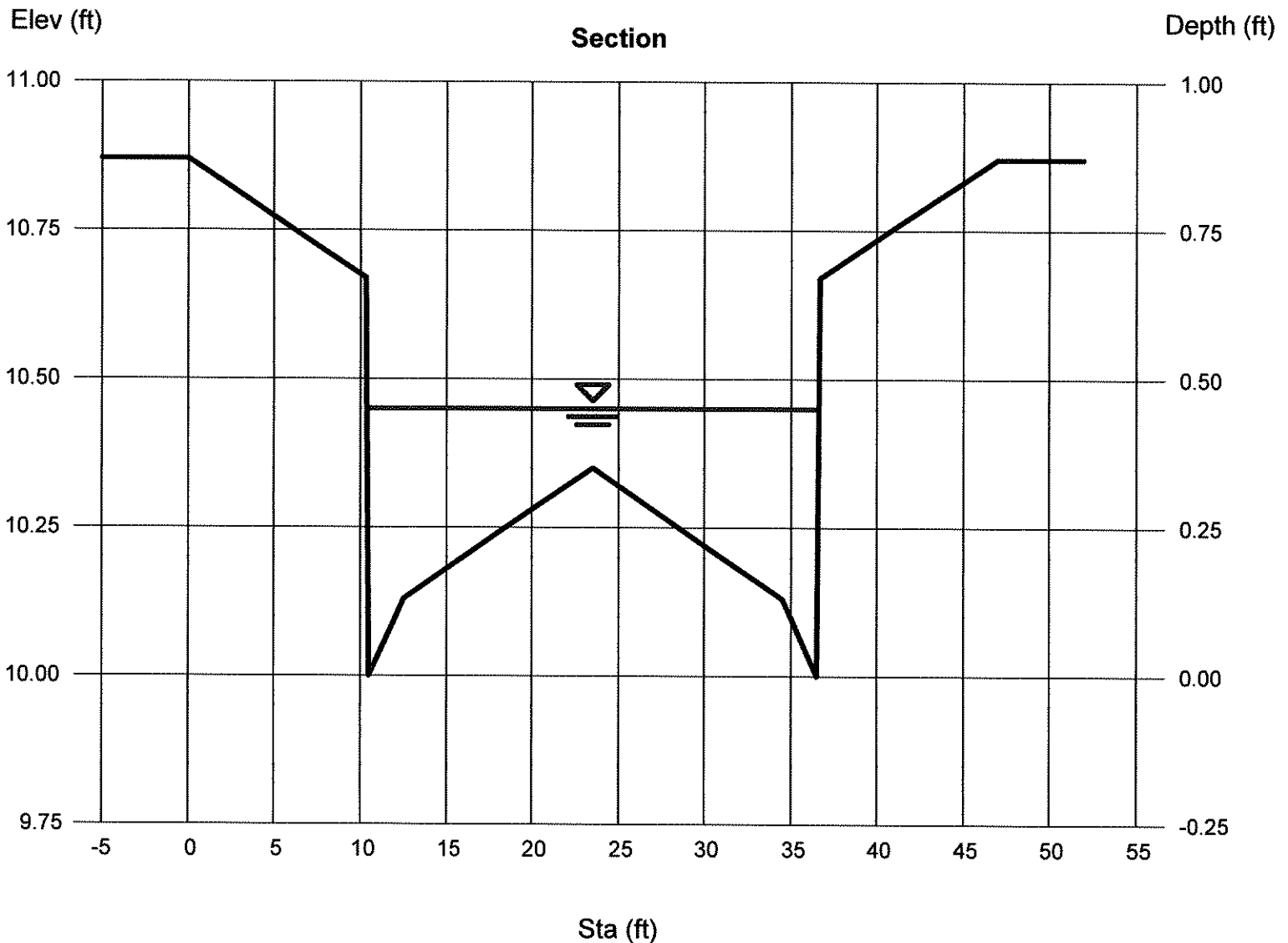
Depth (ft) = 0.45
Q (cfs) = 32.25
Area (sqft) = 6.21
Velocity (ft/s) = 5.19
Wetted Perim (ft) = 26.94
Crit Depth, Yc (ft) = 0.58
Top Width (ft) = 26.23
EGL (ft) = 0.87

Calculations

Compute by: Known Q
Known Q (cfs) = 32.25

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.87)-(10.33, 10.67, 0.017)-(10.50, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(36.50, 10.00, 0.017)
-(36.67, 10.67, 0.017)-(47.00, 10.87, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Sunday, Feb 11 2018

Barrow Road-42-MTB-4.51%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 4.51
N-Value = 0.017

Highlighted

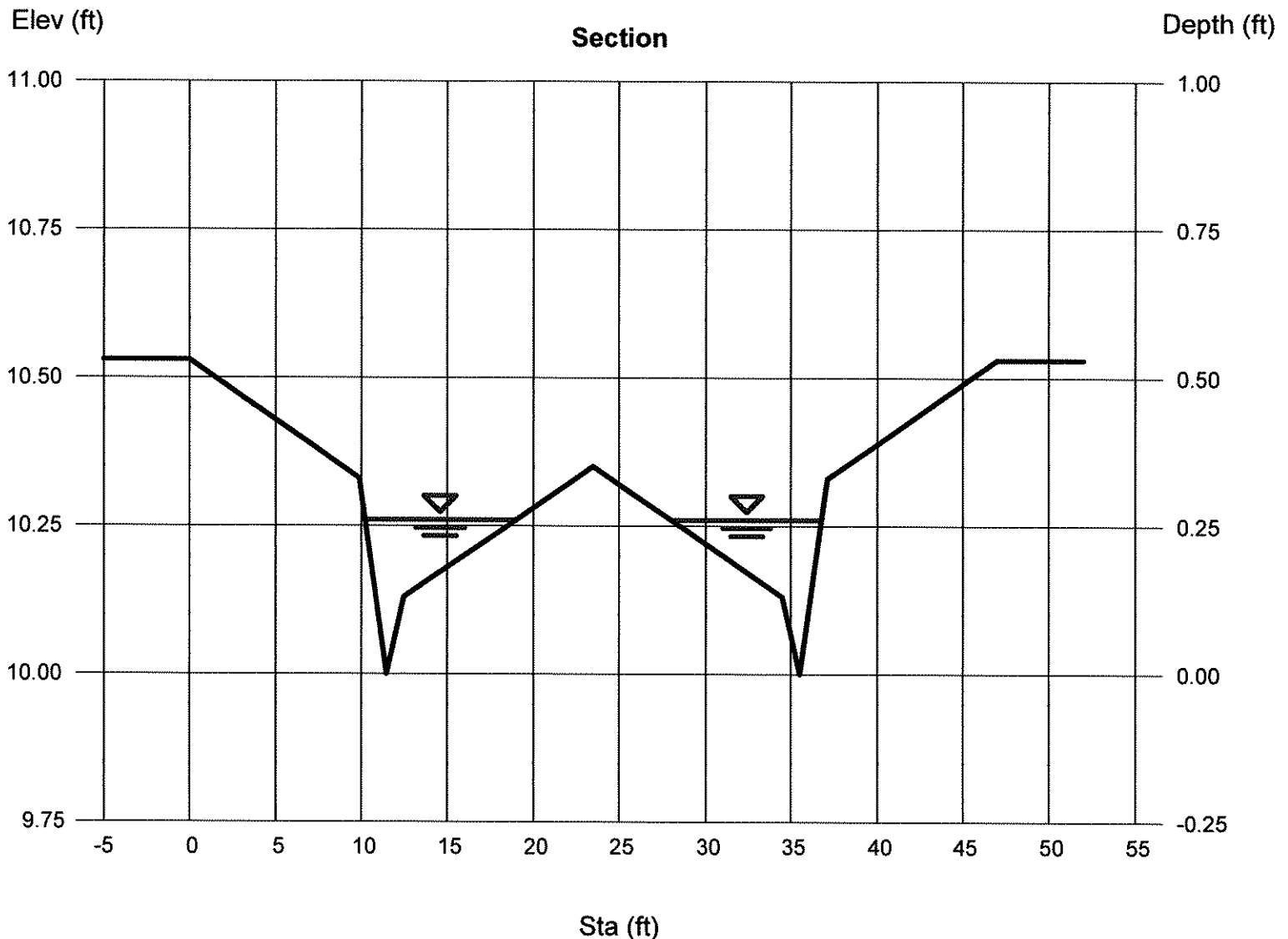
Depth (ft) = 0.26
Q (cfs) = 5.410
Area (sqft) = 1.57
Velocity (ft/s) = 3.44
Wetted Perim (ft) = 17.65
Crit Depth, Yc (ft) = 0.32
Top Width (ft) = 17.58
EGL (ft) = 0.44

Calculations

Compute by: Known Q
Known Q (cfs) = 5.41

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)
-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Sunday, Feb 11 2018

Costilla Peak-26-MTB-2.55%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.55
N-Value = 0.017

Highlighted

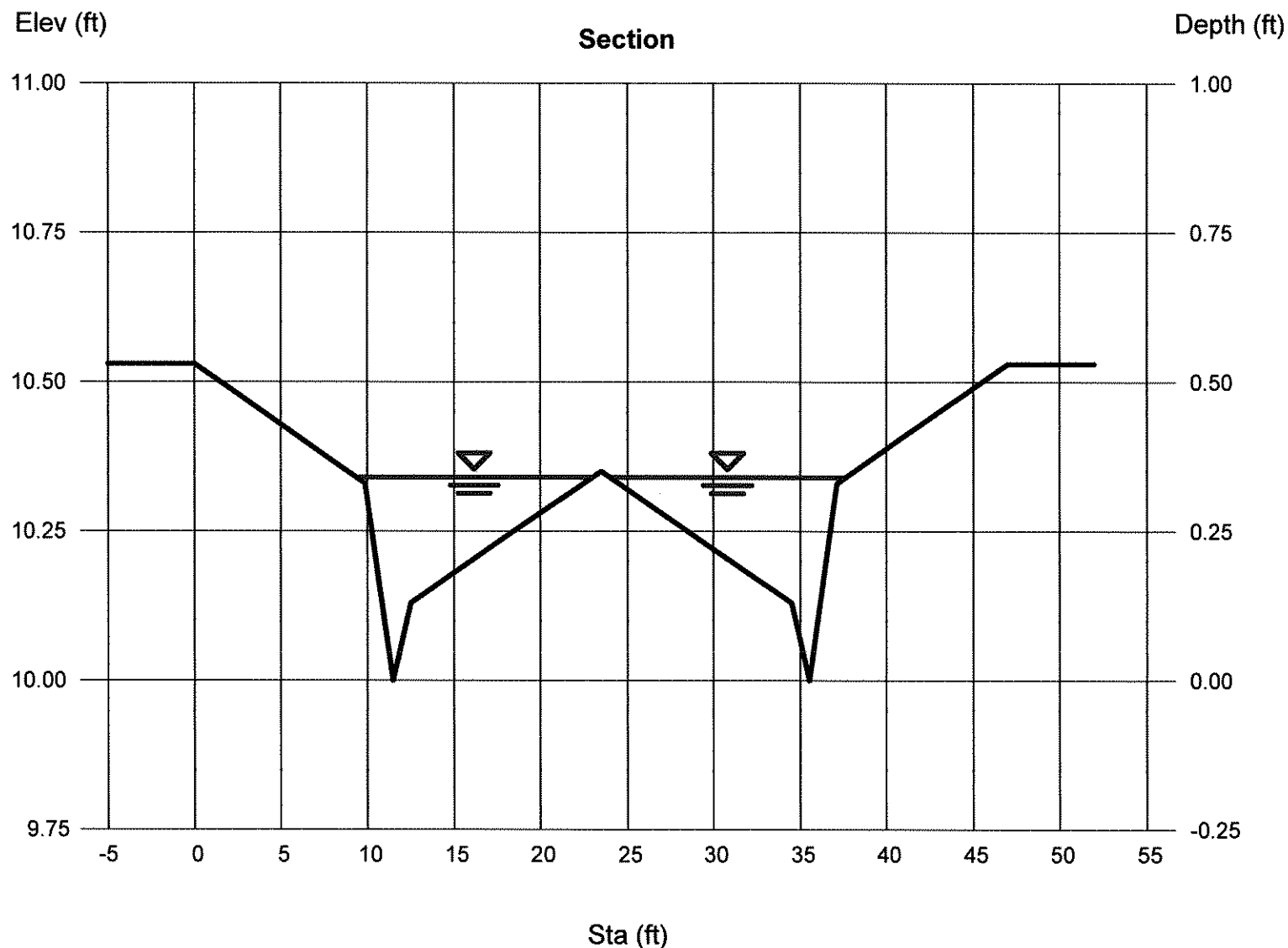
Depth (ft) = 0.34
Q (cfs) = 11.45
Area (sqft) = 3.34
Velocity (ft/s) = 3.43
Wetted Perim (ft) = 27.34
Crit Depth, Yc (ft) = 0.40
Top Width (ft) = 27.25
EGL (ft) = 0.52

Calculations

Compute by: Known Q
Known Q (cfs) = 11.45

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)
-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

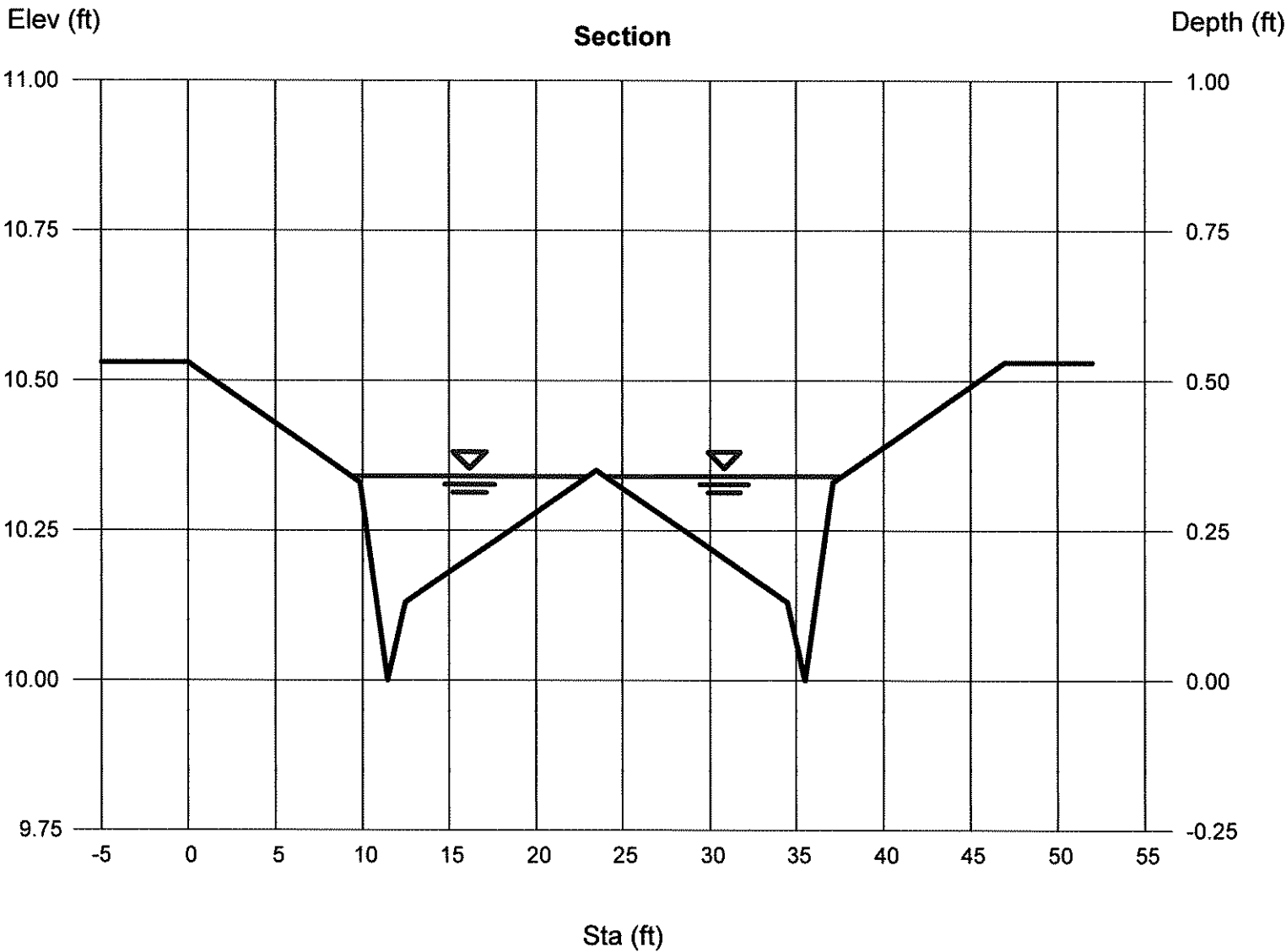
Bord Peak-26-MTB-1.0%

User-defined		Highlighted	
Invert Elev (ft)	= 10.00	Depth (ft)	= 0.34
Slope (%)	= 1.00	Q (cfs)	= 6.650
N-Value	= 0.017	Area (sqft)	= 3.34
		Velocity (ft/s)	= 1.99
		Wetted Perim (ft)	= 27.34
Calculations		Crit Depth, Yc (ft)	= 0.35
Compute by:	Known Q	Top Width (ft)	= 27.25
Known Q (cfs)	= 6.65	EGL (ft)	= 0.40

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)

-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Sunday, Feb 11 2018

Cirque Park-26-MTB-4.0%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 4.00
N-Value = 0.017

Highlighted

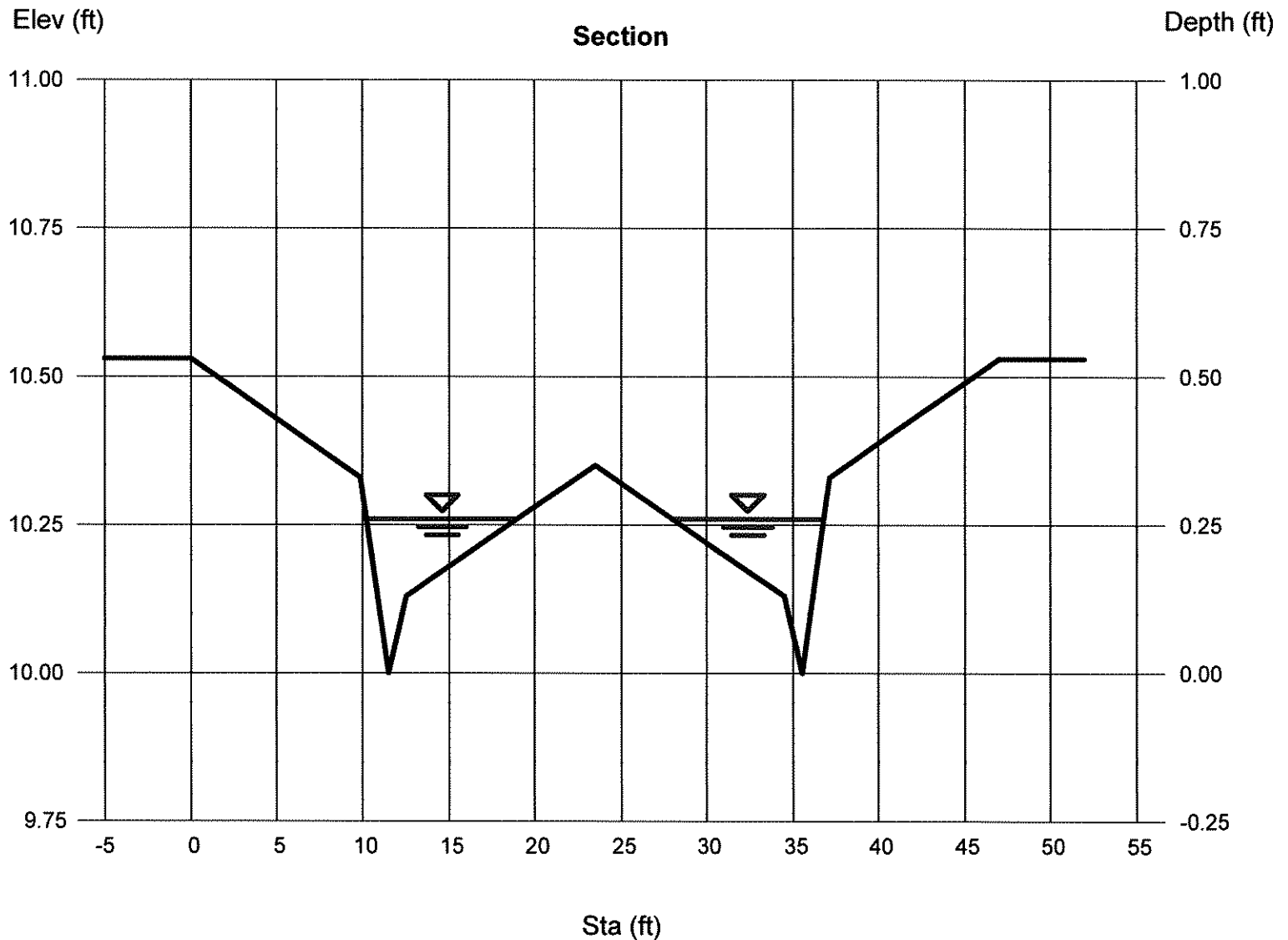
Depth (ft) = 0.26
Q (cfs) = 5.420
Area (sqft) = 1.57
Velocity (ft/s) = 3.44
Wetted Perim (ft) = 17.65
Crit Depth, Yc (ft) = 0.32
Top Width (ft) = 17.58
EGL (ft) = 0.44

Calculations

Compute by: Known Q
Known Q (cfs) = 5.42

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)
-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Sunday, Feb 11 2018

Banner Peak-26-MTB-2.70%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.70
N-Value = 0.017

Highlighted

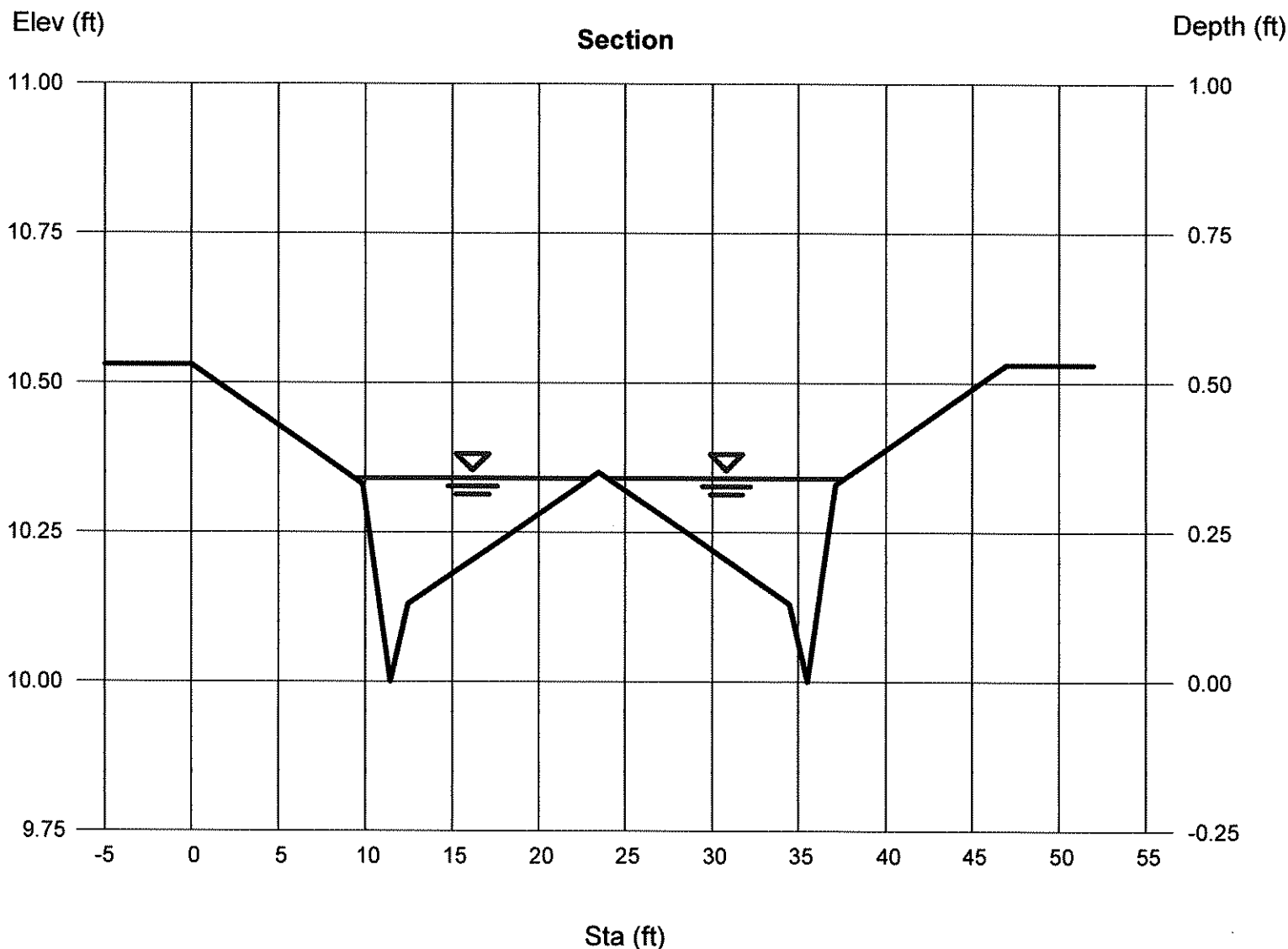
Depth (ft) = 0.34
Q (cfs) = 11.39
Area (sqft) = 3.34
Velocity (ft/s) = 3.41
Wetted Perim (ft) = 27.34
Crit Depth, Yc (ft) = 0.40
Top Width (ft) = 27.25
EGL (ft) = 0.52

Calculations

Compute by: Known Q
Known Q (cfs) = 11.39

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)
-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

Bord Peak-26-MTB-2.40%

User-defined

Invert Elev (ft)

= 10.00

Slope (%)

= 2.40

N-Value

= 0.017

Highlighted

Depth (ft)

= 0.32

Q (cfs)

= 8.160

Area (sqft)

= 2.83

Velocity (ft/s)

= 2.89

Wetted Perim (ft)

= 24.25

Crit Depth, Yc (ft)

= 0.37

Top Width (ft)

= 24.16

EGL (ft)

= 0.45

Calculations

Compute by:

Known Q

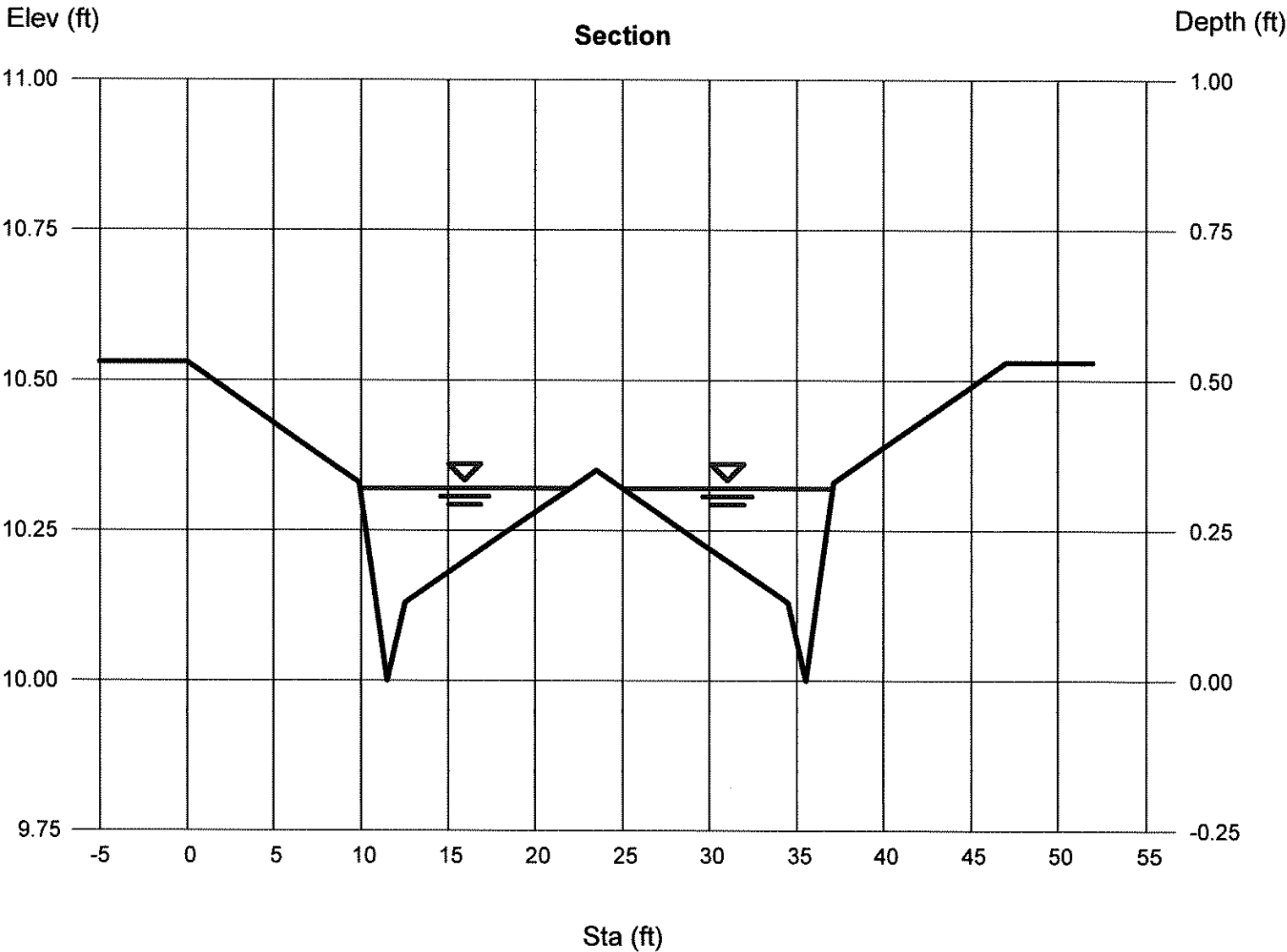
Known Q (cfs)

= 8.16

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.53)-(9.87, 10.33, 0.017)-(11.47, 10.00, 0.017)-(12.50, 10.13, 0.017)-(23.50, 10.35, 0.017)-(34.50, 10.13, 0.017)-(35.53, 10.00, 0.017)

-(37.13, 10.33, 0.017)-(47.00, 10.53, 0.017)



Channel Report

118th Street Road side Swale - 2.33%

Triangular

Side Slopes (z:1) = 10.00, 10.00
Total Depth (ft) = 2.50

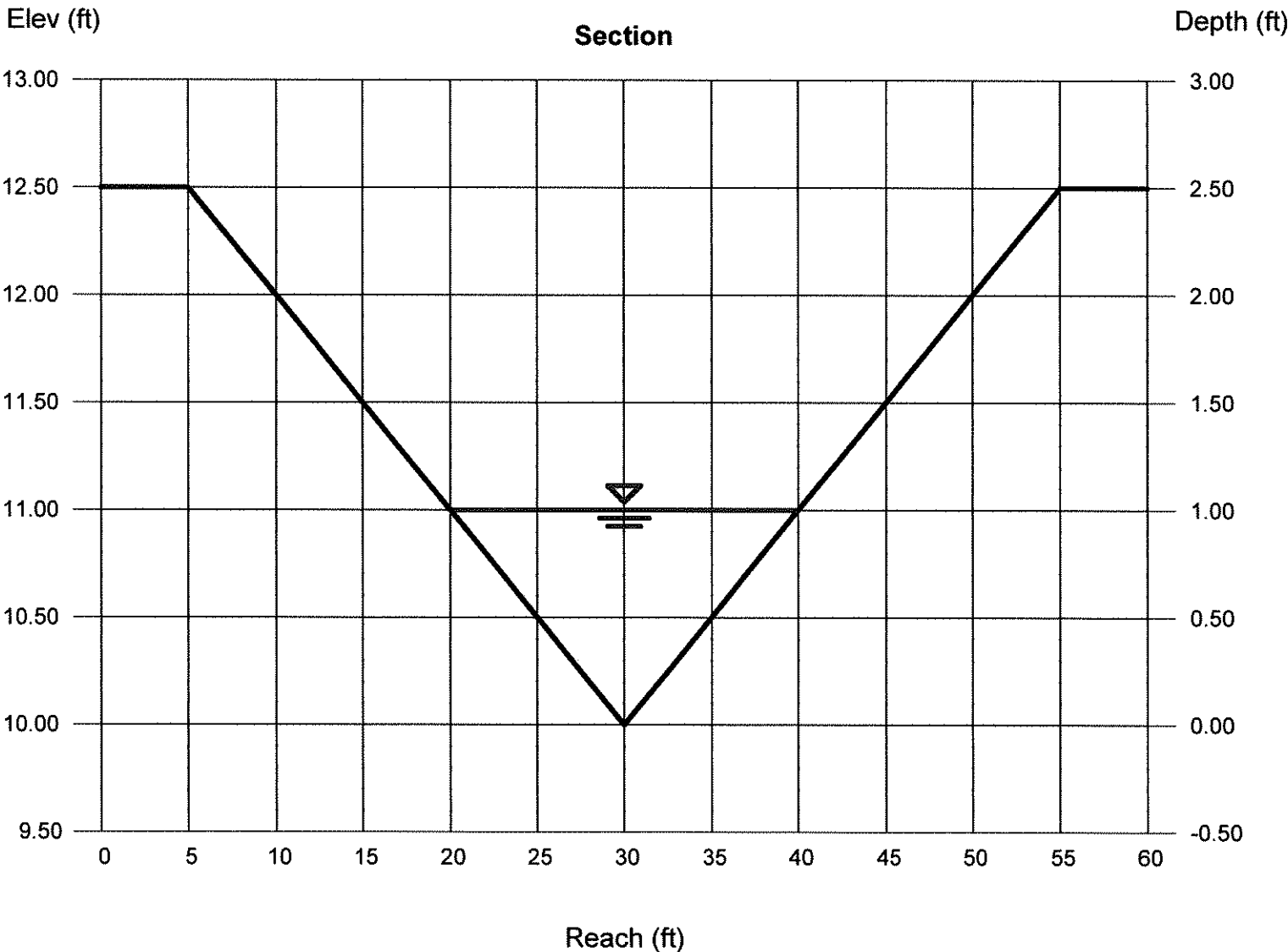
Invert Elev (ft) = 10.00
Slope (%) = 2.33
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 47.00

Highlighted

Depth (ft) = 1.00
Q (cfs) = 47.00
Area (sqft) = 10.00
Velocity (ft/s) = 4.70
Wetted Perim (ft) = 20.10
Crit Depth, Yc (ft) = 1.07
Top Width (ft) = 20.00
EGL (ft) = 1.34



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Tuesday, Mar 13 2018

Colobel Avenue Upstream-48-Std-2.65% (2)

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.65
N-Value = 0.017

Highlighted

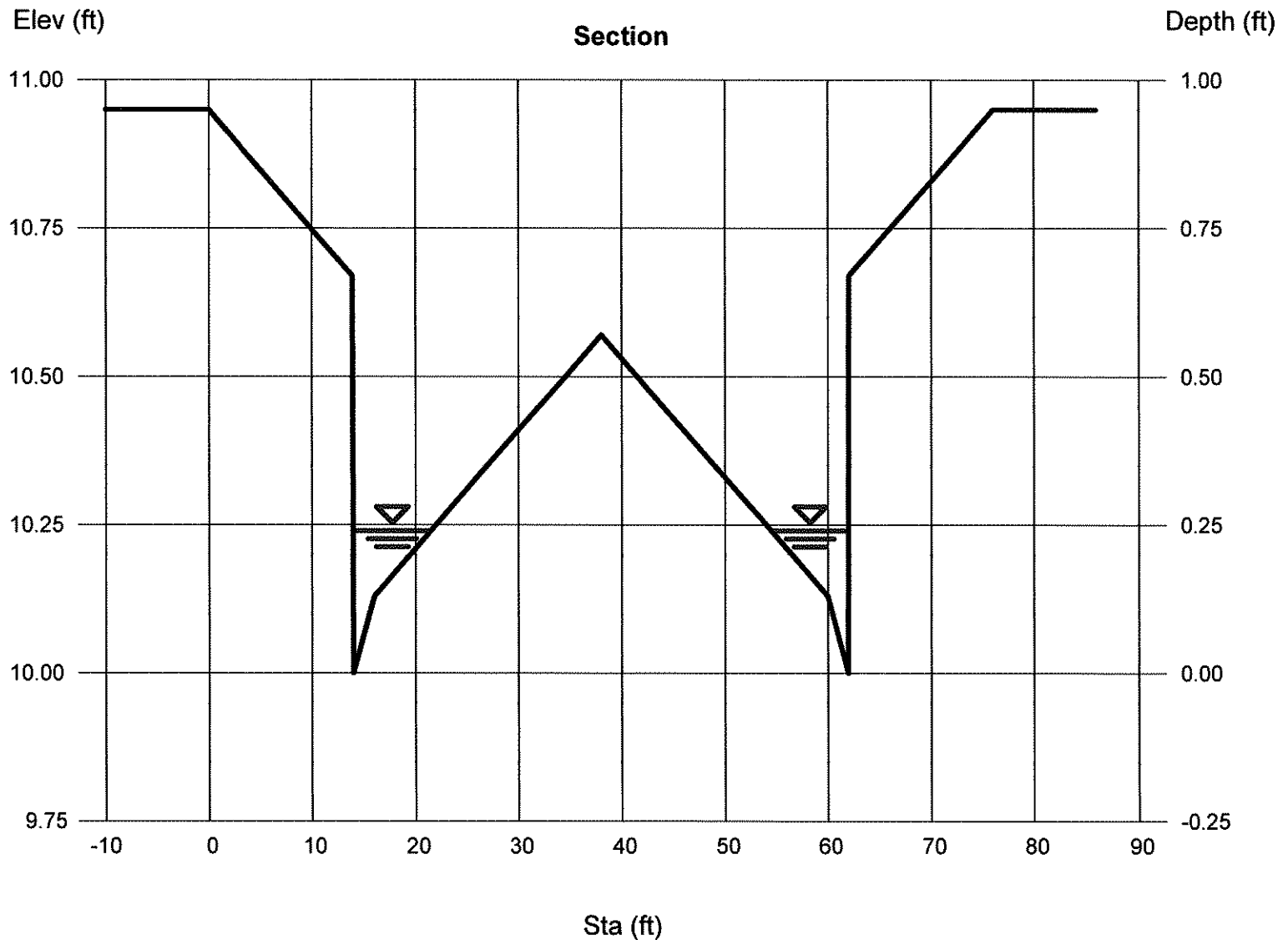
Depth (ft) = 0.24
Q (cfs) = 3.460
Area (sqft) = 1.31
Velocity (ft/s) = 2.64
Wetted Perim (ft) = 15.49
Crit Depth, Yc (ft) = 0.28
Top Width (ft) = 15.06
EGL (ft) = 0.35

Calculations

Compute by: Known Q
Known Q (cfs) = 3.46

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.95)-(13.92, 10.67, 0.017)-(14.00, 10.00, 0.017)-(16.00, 10.13, 0.017)-(38.00, 10.57, 0.017)-(60.00, 10.13, 0.017)-(62.00, 10.00, 0.017)
-(62.08, 10.67, 0.017)-(76.00, 10.95, 0.017)



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc.

Tuesday, Mar 13 2018

Colobel Avenue Upstream-48-Std-3.0%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 3.00
N-Value = 0.017

Calculations

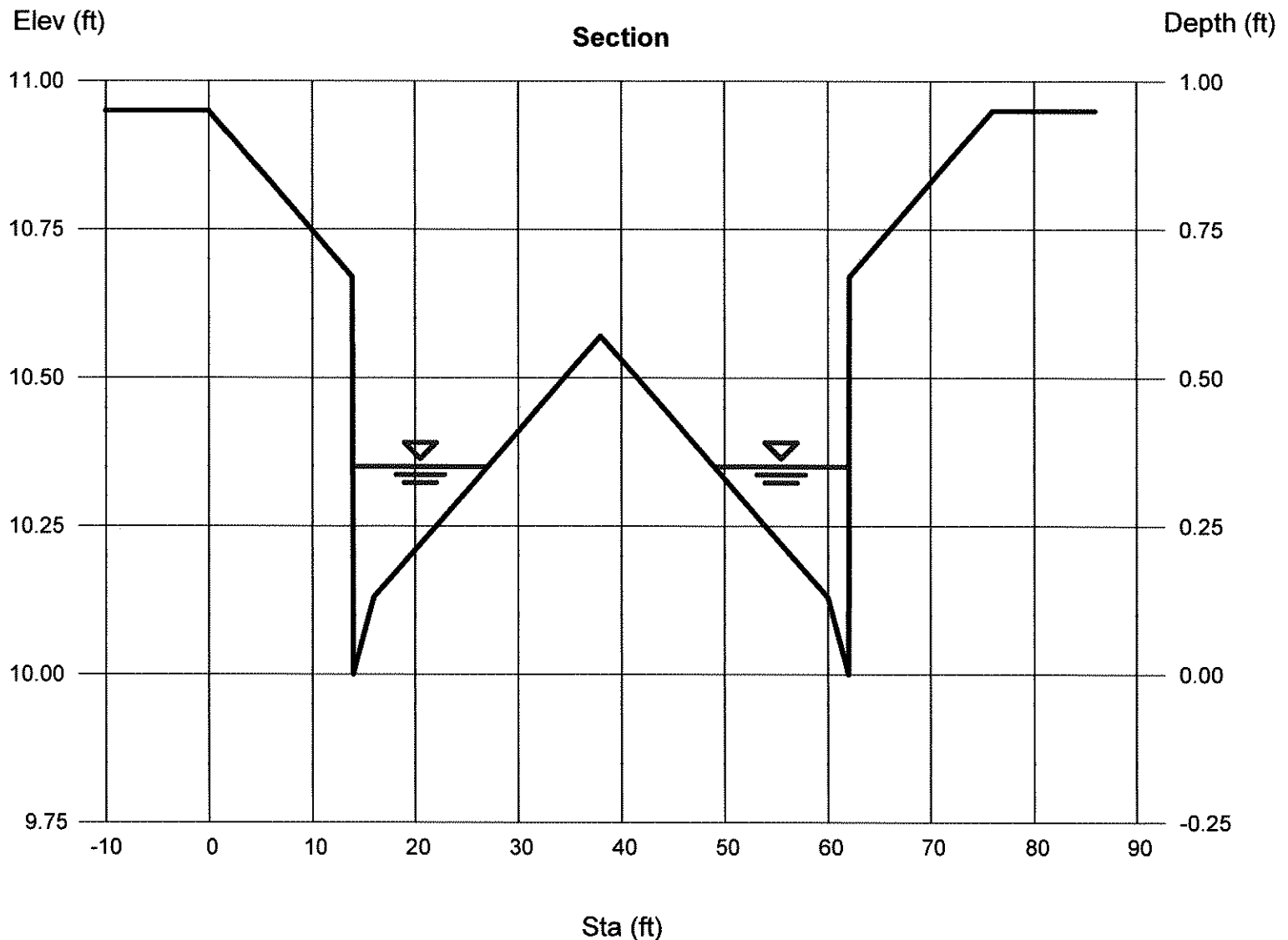
Compute by: Known Q
Known Q (cfs) = 13.35

Highlighted

Depth (ft) = 0.35
Q (cfs) = 13.35
Area (sqft) = 3.57
Velocity (ft/s) = 3.73
Wetted Perim (ft) = 26.72
Crit Depth, Yc (ft) = 0.43
Top Width (ft) = 26.08
EGL (ft) = 0.57

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.95)-(13.92, 10.67, 0.017)-(14.00, 10.00, 0.017)-(16.00, 10.13, 0.017)-(38.00, 10.57, 0.017)-(60.00, 10.13, 0.017)-(62.00, 10.00, 0.017)
-(62.08, 10.67, 0.017)-(76.00, 10.95, 0.017)



Channel Report

Colobel Avenue Upstream-48-Std-2.65%

User-defined

Invert Elev (ft) = 10.00
Slope (%) = 2.65
N-Value = 0.017

Calculations

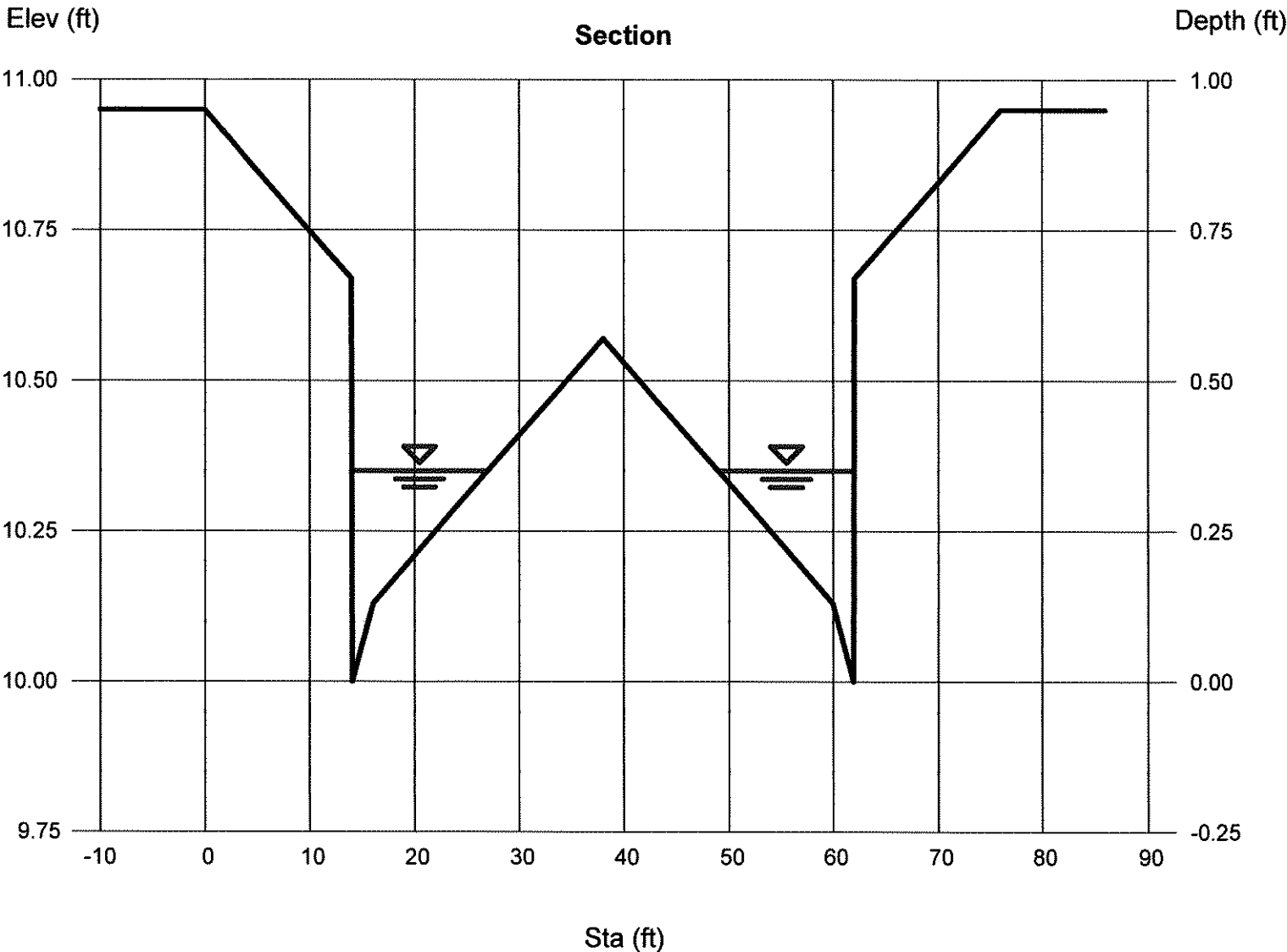
Compute by: Known Q
Known Q (cfs) = 12.26

Highlighted

Depth (ft) = 0.35
Q (cfs) = 12.26
Area (sqft) = 3.57
Velocity (ft/s) = 3.43
Wetted Perim (ft) = 26.72
Crit Depth, Yc (ft) = 0.41
Top Width (ft) = 26.08
EGL (ft) = 0.53

(Sta, El, n)-(Sta, El, n)...

(0.00, 10.95)-(13.92, 10.67, 0.017)-(14.00, 10.00, 0.017)-(16.00, 10.13, 0.017)-(38.00, 10.57, 0.017)-(60.00, 10.13, 0.017)-(62.00, 10.00, 0.017)
-(62.08, 10.67, 0.017)-(76.00, 10.95, 0.017)



APPENDIX C – FIRST FLUSH PONDS

Table 4 First Flush Volume Calculations - Required

Table 5 First Flush Volume Calculations- Provided

First Flush Pond Unit 1 Details

First Flush Pond Unit 2 Details

First Flush Unit 3 Details

Table 4

Heritage Trails Residential First Flush Volume Calculations-Required					
Sub Basin	Location Descrip	Area	Land Treatm	First Flush Volume	Required Volume
ID		sq.ft	D	acre-ft	Totals
1	Unit 3	136,116.0	60.0	2,313.97	
2	Unit 3	118,581.0	45.0	1,511.91	3,825.88
3	Unit 2/3	184,551.0	51.0	2,666.76	
4	Unit 2	124,767.0	51.2	1,809.95	
5	Unit 2	124,416.0	51.4	1,811.91	
6	Unit 2	174,647.0	45.7	2,261.39	
7	Unit 3	142,490.0	60.0	2,422.33	
8	Unit 3	136,839.0	60.0	2,326.26	
9	Unit 3	63,185.0	65.0	1,163.66	
10	Unit 3	36,818.0	60.0	625.91	
11	Unit 3	47,544.0	7.0	94.30	
12	Unit 2/3	159,689.0	60.0	2,714.71	
13	Unit 2	112,524.0	60.0	1,912.91	
14	Unit 2	81,491.0	45.0	1,039.01	
15	Unit 2	214,811.0	60.0	3,651.79	
16	Unit 2	175,842.0	52.8	2,630.60	
17	Unit 2/3	121,839.0	50.0	1,726.05	28,857.53
18	Unit 1	218,495.0	60.0	3,714.42	
19	Unit 1	178,699.0	55.8	2,825.23	
20	Unit 1	125,963.0	48.3	1,723.80	
21	Unit 1	225,668.0	55.3	3,535.84	
22	Unit 1	165,024.0	60.0	2,805.41	
23	Unit 1	269,100.0	53.2	4,056.23	
24	Unit 1	132,662.0	53.8	2,022.21	20,683.14

Revised 3-15-18

Table 5

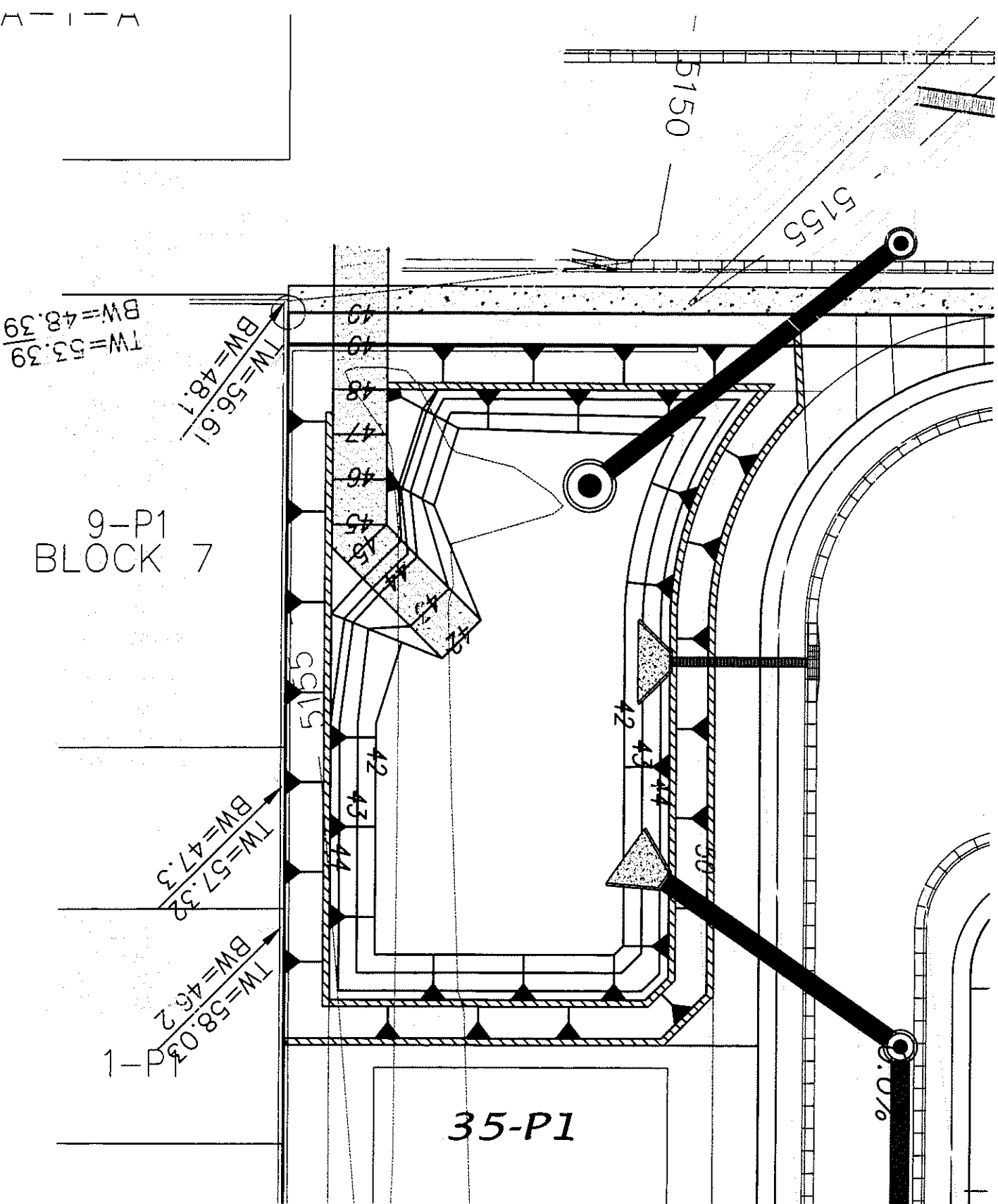
Heritage Trails Unit 1 First Flush Pond				
Volume Calculations-Design Provided				
ELEV ft.	AREA sq.ft.	VOLUME cu.ft.	SUM-VOL cu.ft.	SUM-VOL ac.ft.
41.5	5,086.00			
42.0	5,664.60	2,686	2,686	
43.0	7,202.20	6,418	9,104	0.209
44.0	8,818.70	7,997	17,101	0.393
44.5	9,787.90	4,650	21,751	0.499

Table 5

Heritage Trails Unit 2 First Flush Pond				
Volume Calculations-Design Provided				
ELEV ft.	AREA sq.ft.	VOLUME cu.ft.	SUM-VOL cu.ft.	SUM-VOL ac.ft.
72.6	12,021.40	-	0	
73.0	12,121.40	4,587	4,587	0.105
74.0	12,221.40	12,171	16,758	0.385
75.0	12,356.50	12,289	29,047	0.667

Table 5

Heritage Trails Unit 3 First Flush Pond				
Volume Calculations-Design Provided				
ELEV ft.	AREA sq.ft.	VOLUME cu.ft.	SUM-VOL cu.ft.	SUM-VOL ac.ft.
32.88	2,372.50	-	0	
34.5	2,372.50	3,843	3,843	0.088
35.0	2,372.50	1,186	5,030	0.115



Unit 1 First Flush Pond Details:

Req'd Volume = 20,683 Cu.Ft.

Volume Provided = 21,751 Cu.Ft.

Pond Bottom = 5141.5

Top Pond = 5144.5

Spillway Elev. = 5144.39

Max WSEL = 5145.4

12' wide Maintenance Road 10:1 slope Max

Maximum Q at Outfall = 107.81 cfs

$Q = C \times L \times (H \sqrt{3/2})$

$107.81 = 3 \times L \times (1)$

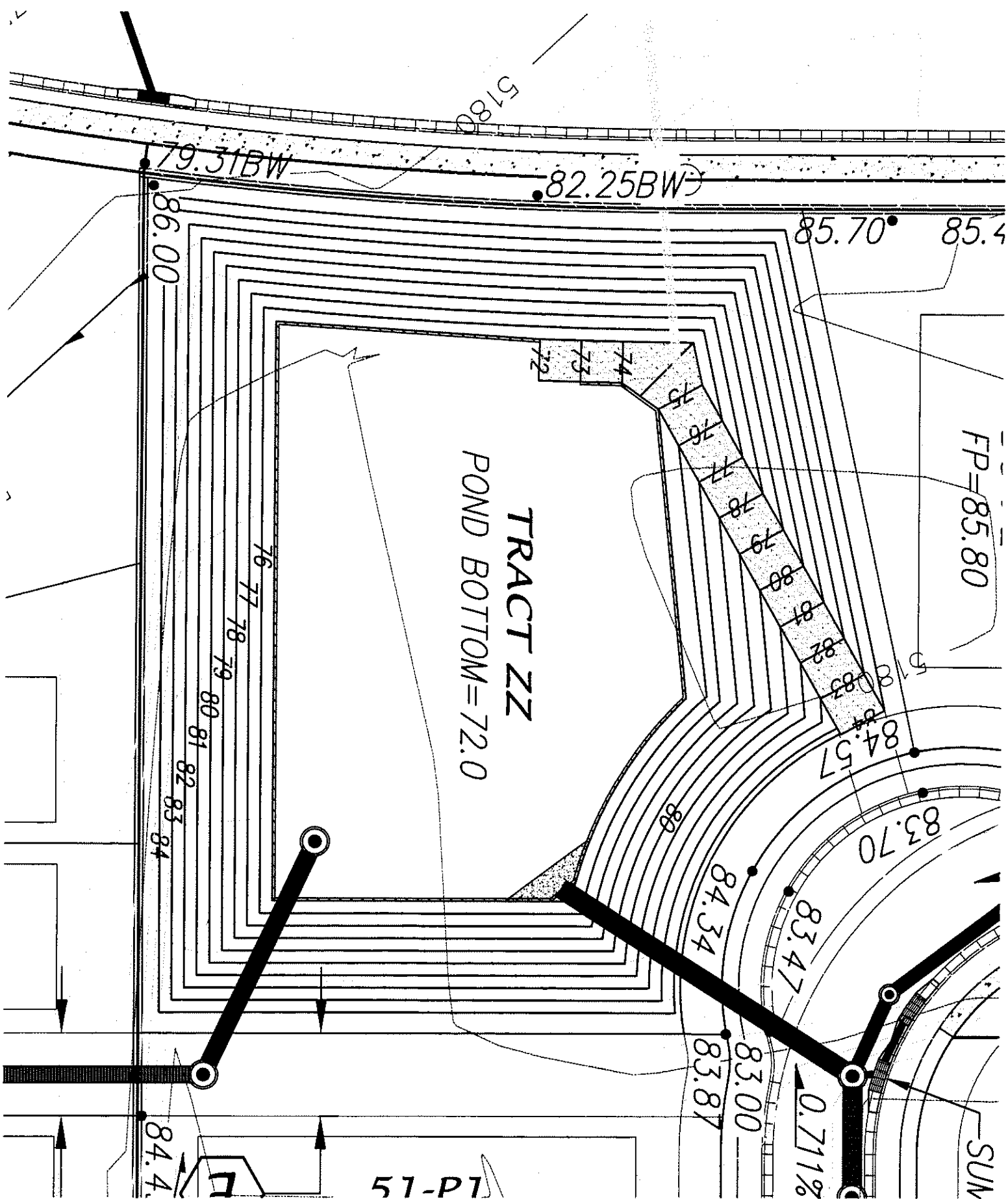
$L = 35 \text{ ft.}$

Possible Radius = 5.6 ft

Diameter Outfall = 12 feet

Exact Outfall configuration to be design at DRC

Inside Retaining Wall 3.5 Feet (44.0 to 47.5)



Unit 2 First Flush Pond Details:

Req'd Volume = 28,857 Cu.Ft.

Volume Provided = 29,047 Cu.Ft.

Pond Bottom = 5172.0

Top Pond = 5184.0

Spillway Elev. = 5175.0

Max WSEL = 5176.0

12' wide Maintenance Road 10:1 slope Max

Maximum Q at Outfall = 159.5 cfs

$Q=CxLx(H^{3/2})$

$159.5 = 3 \times L \times (1)$

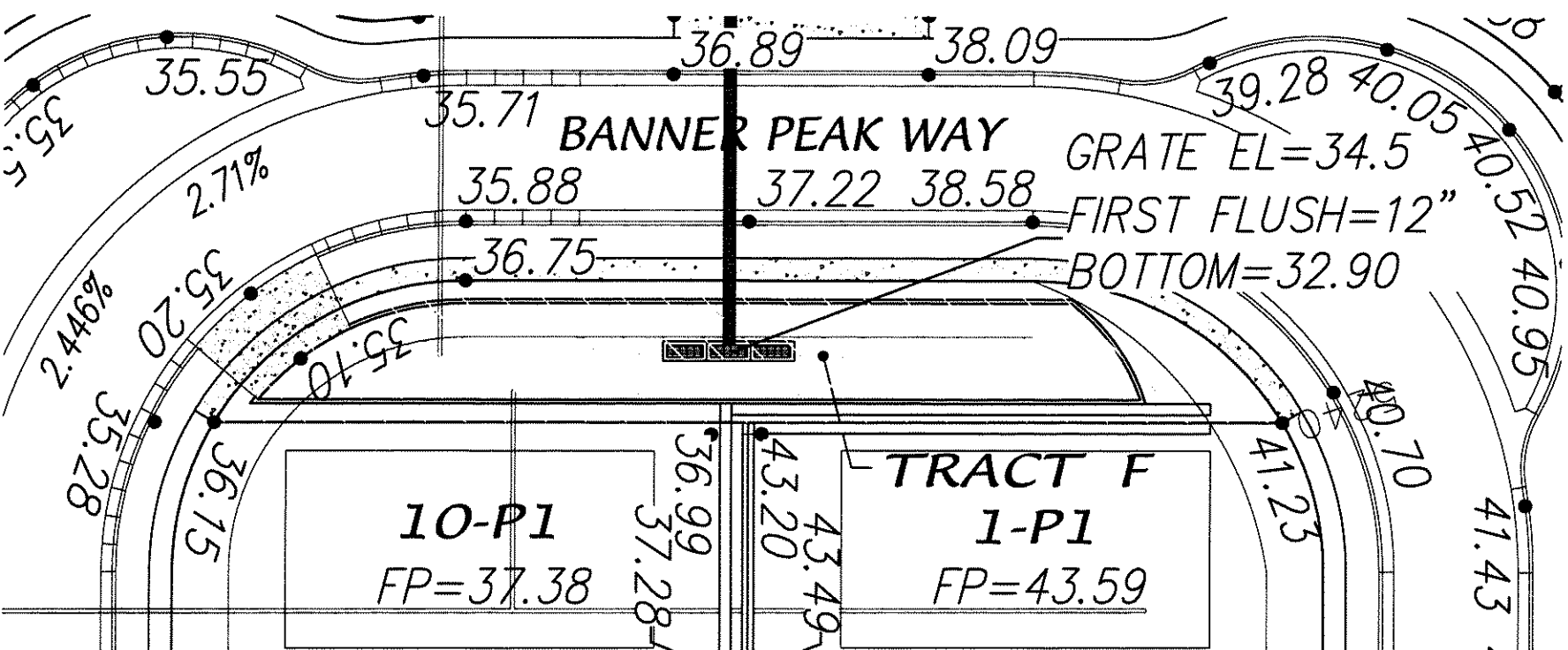
$L=53.2 \text{ ft.}$

Possible Radius = 8.5 ft

Diameter Outfall = 17 feet

Exact Outfall configuration to be design at DRC

Inside Retaining Wall 3. Feet (72.0 to 75.0)



Unit 3 First Flush Pond Details:

Req'd Volume = 3,826 Cu.Ft.

Volume Provided = 5,030 Cu.Ft.

Pond Bottom = 5132.88

Top Pond = 5135.0

Spillway Elev. = 5134.5

Max WSEL = 5135.5

Maximum Q at Outfall = 20.56 cfs

$Q = C \times L \times (H \sqrt{3/2})$

20.56 cfs = $3 \times L \times ((0.5) \sqrt{3/2})$

L = 19.4 ft.

Use (3) Double D Inlets

L = 40.0 feet

$Q = 3 \times (40) \times (0.5) \sqrt{3/2} = 42.4$ cfs

(twice the required capacity,

for 50% assumed clogging factor)

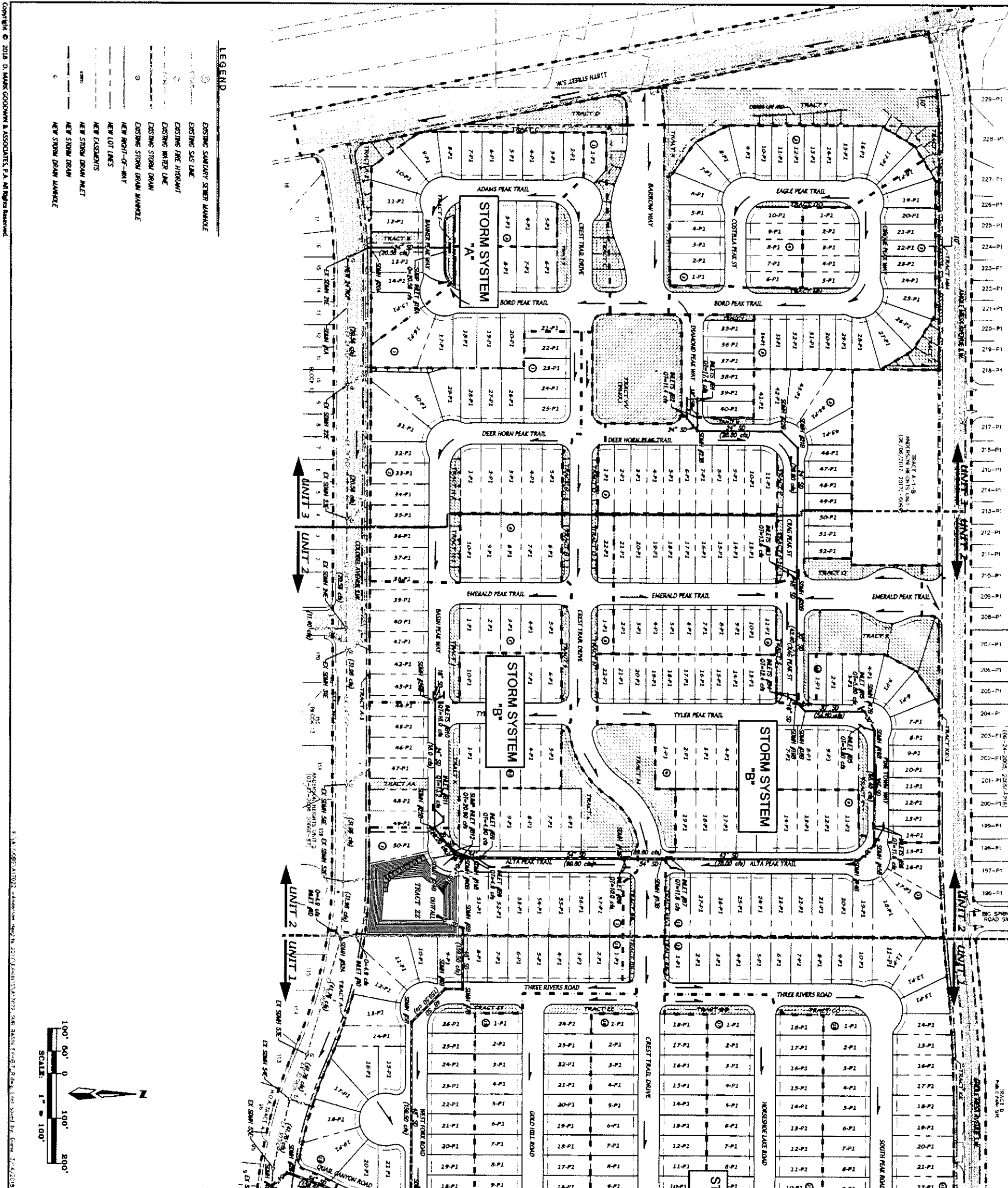
Note: Because this pond is so shallow, a rundown must be used.

No maintenance road provided because it is shallow.

APPENDIX D – STORM DRAIN DESIGN

*Preliminary Storm Drain Layout Exhibit
Table 3 Storm Drain Analysis Summary
WSPGW Civil design storm analysis printouts
Existing Downstream Storm Drain P&P*

CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT		CITY ENGINEER APPROVAL		CITY PROJECT NO.		ZONING MAP NO.		SHEET		OF	
TITLE: HERITAGE TRAILS SUBDIVISION PRELIMINARY STORM DRAIN LAYOUT		DESIGN BY: W. W. COMPTON		CITY ENGINEER APPROVAL		LAST DESIGN UPDATE		SHEET		OF	
MARK GOODWIN & ASSOCIATES, P.A. CONSULTING ENGINEERS P.O. BOX 8000 ALBUQUERQUE, NEW MEXICO 87109 OFFICE (505) 838-2000 FAX (505) 838-2000		NO. DATE		REMARKS		DESIGN		BY		DATE	
DESIGNED BY: DLH		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
DRAWN BY: DER		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
CHECKED BY: DMG		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
ENGINEER'S SEAL		SURVEY INFORMATION		BENCH MARKS		AS BUILT INFORMATION		CONTRACTOR		DATE	
D. MARK GOODWIN REGISTERED PROFESSIONAL ENGINEER NO. 11002		FIELD NOTES		AGRS MONUMENT & BENCHMARK "1-NB"		CONTRACTOR		DATE		DATE	
		NO. BY DATE		N=1470741.870, E=1468701.820		WORK		DATE		DATE	
				G-C=0.999878488		INSPECTOR'S		DATE		DATE	
				Δ=0.00172770"		ACCEPTANCE BY		DATE		DATE	
				CENTRAL ZONE		FIELD		DATE		DATE	
				ELEVATION=5307.250		VERIFICATION BY		DATE		DATE	
				(NAD83/NAVD88)		CORRECTED BY		DATE		DATE	
						MICRO-FILM INFORMATION		RECORDED BY		DATE	
						NO.		DATE		DATE	



CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT		CITY ENGINEER APPROVAL		CITY PROJECT NO.		ZONING MAP NO.		SHEET		OF	
TITLE: HERITAGE TRAILS SUBDIVISION PRELIMINARY STORM DRAIN LAYOUT		DESIGN BY: W. W. COMPTON		CITY ENGINEER APPROVAL		LAST DESIGN UPDATE		SHEET		OF	
MARK GOODWIN & ASSOCIATES, P.A. CONSULTING ENGINEERS P.O. BOX 8000 ALBUQUERQUE, NEW MEXICO 87109 OFFICE (505) 838-2000 FAX (505) 838-2000		NO. DATE		REMARKS		DESIGN		BY		DATE	
DESIGNED BY: DLH		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
DRAWN BY: DER		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
CHECKED BY: DMG		DATE: 12/17		REVISIONS		DESIGN		BY		DATE	
ENGINEER'S SEAL		SURVEY INFORMATION		BENCH MARKS		AS BUILT INFORMATION		CONTRACTOR		DATE	
D. MARK GOODWIN REGISTERED PROFESSIONAL ENGINEER NO. 11002		FIELD NOTES		AGRS MONUMENT & BENCHMARK "1-NB"		CONTRACTOR		DATE		DATE	
		NO. BY DATE		N=1470741.870, E=1468701.820		WORK		DATE		DATE	
				G-C=0.999878488		INSPECTOR'S		DATE		DATE	
				Δ=0.00172770"		ACCEPTANCE BY		DATE		DATE	
				CENTRAL ZONE		FIELD		DATE		DATE	
				ELEVATION=5307.250		VERIFICATION BY		DATE		DATE	
				(NAD83/NAVD88)		CORRECTED BY		DATE		DATE	
						MICRO-FILM INFORMATION		RECORDED BY		DATE	
						NO.		DATE		DATE	

Table 3

Heritage Trails Subdivision							
WSPGW - Storm Drain Analysis							
Outfall Pond 10 to Colobel Storm Drain to Storm Drain "A"							
Manhole # - WSPGW Station ID							
Manhole ID	WSPGW Station	Rim Estimate	WSEL	Manhole ID	WSPGW Station	Rim Estimate	WSEL
OUTFALL	1008.1	137.31	139.81	52A	2592.5 2596.5	172.5	170.91
SD Size	78"			SD Size	30"		
1E	1207.1 1217.1	145.9	142.71	52E	2721.67	176.6	169.5
SD Size	78"			SD Size	30"		
2E	1407.4 1417.4	147.2	146.28	51E	2936.7 2940.7	187.22	181.18
SD Size	78"			SD Size	24"		
3E	1594.4	148.7	147.1	31E	3236.4	198.77	193.24
SD Size	78"			SD Size	24"		
57E	1778.9 1786.9	151.52	146.5	24E	3284.6 3288.6	200.72	197.24
SD Size	48"			SD Size	24"		
58E	1809 1815	152.22	148.44	23E	3530.1	209.63	203.76
SD Size	48"			SD Size	24"		
56E	1913	154.61	148.89	22E	3828.4	223.1	216.53
SD Size	48"			SD Size	24"		
55E	2059.3 2065.3	158.67	157.56	21E	4110.6	240.13	229.19
SD Size	36"			SD Size	24"		
54E	2216.4 2222.4	163.21	157.01	20A	4162.3	242.6	229.72
SD Size	30"			SD Size	24"		
53E	2327	167.07	160.74	19A	4340.3	236	231.63
SD Size	30"						



Upstream Direction



Upstream Direction

3/14/2018

f:/projects/17046/Manhole ID Table-Outfall Pond 10- Colobel -SD A

T1 Heritage Trails Storm Drain	0
T2 Outfall Pond 10 to Colobel Ave	
T3 File: HT-COLOBEL-R2.WSW	
SO 1000.0005134.000 1	5137.310
TS 1008.0005134.100 2 .014	.000
JX 1008.1005134.150 3 .013	
R 1207.1005135.100 3 .013	.000 .000 1
JX 1217.1005135.200 6 4 5.013 18.380	18.3805141.1005141.100-45.0 90.0 .000
R 1407.4005136.500 6 .013	.000 .000 1
JX 1417.4005136.600 8 7 .013 102.400	5140.370 90.0 .000
R 1594.4005137.000 8 .013	.000 17.000 1
R 1778.9005138.080 8 .013	.000 -90.000 1
JX 1786.9005140.600 10 9 .013 107.810	5140.600 -17.0 .000
R 1809.0005141.800 10 .013	.000 -10.000 1
JX 1815.0005142.000 13 11 12.013 6.150	6.1505146.0005146.000-55.0 60.0 .000
R 1913.0005145.910 13 .013	.000 5.000 1
R 2019.8005149.400 13 .013	.000 .000 1
JX 2025.8005149.580 13 14 .013 159.500	5149.500 45.0 .000
R 2059.3005150.670 13 .013	.000 10.000 1
JX 2065.3005150.850 13 .013	
R 2216.4005155.510 15 .013	.000 -7.000 1
JX 2222.4005155.690 16 .013	
R 2327.0005159.370 16 .013	.000 -4.000 1
R 2592.5005167.660 16 .013	.000 -12.000 1
JX 2596.5005167.780 19 17 18.013 4.900	4.9005168.7605168.760-50.0 50.0 .000
R 2721.6705168.500 19 .013	.000 5.000 1
R 2936.7005179.820 19 .013	.000 .000 1
JX 2940.7005179.940 20 .013	
R 3236.4005191.770 20 .013	.000 .000 1
R 3284.6005193.320 20 .013	.000 .000 1
JX 3288.6005193.440 22 21 .013 11.400	5193.420 -90.0 .000
R 3530.1005202.830 22 .013	.000 .000 1
R 3828.4005215.600 22 .013	.000 .000 1
R 4110.6005227.700 22 .013	.000 60.000 1
R 4162.3005228.220 22 .013	.000 28.000 1
R 4340.3005230.000 22 .013	.000 .000 1
SH 4340.3005230.000 22	5234.430
CD 1 2 0 .000 7.500 13.000 .000 .000 -.01	
CD 2 2 0 .000 7.500 7.500 .000 .000 .00	
CD 3 4 1 .000 6.500 .000 .000 .000 .00	
CD 4 4 1 .000 2.000 .000 .000 .000 .00	
CD 5 4 1 .000 2.000 .000 .000 .000 .00	
CD 6 4 1 .000 6.500 .000 .000 .000 .00	
CD 7 4 1 .000 3.000 .000 .000 .000 .00	
CD 8 4 1 .000 6.500 .000 .000 .000 .00	
CD 9 4 1 .000 4.000 .000 .000 .000 .00	
CD 10 4 1 .000 4.000 .000 .000 .000 .00	
CD 11 4 1 .000 1.500 .000 .000 .000 .00	
CD 12 4 1 .000 1.500 .000 .000 .000 .00	
CD 13 4 1 .000 4.000 .000 .000 .000 .00	
CD 14 4 1 .000 4.000 .000 .000 .000 .00	
CD 15 4 1 .000 3.000 .000 .000 .000 .00	
CD 16 4 1 .000 2.500 .000 .000 .000 .00	
CD 17 4 1 .000 1.500 .000 .000 .000 .00	
CD 18 4 1 .000 1.500 .000 .000 .000 .00	
CD 19 4 1 .000 2.500 .000 .000 .000 .00	
CD 20 4 1 .000 2.000 .000 .000 .000 .00	
CD 21 4 1 .000 2.000 .000 .000 .000 .00	
CD 22 4 1 .000 2.000 .000 .000 .000 .00	
Q 20.560 .0	

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain

Outfall Pond 10 to Colobel Ave

File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope						HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	5134.000	1.646	5135.646	460.53	21.53	7.20	5142.85	.00	3.39	13.00	7.500	13.000	.00	0 .0
TRANS STR	.0125					.0230	.18	1.65	2.96		.014	.00	.00	RECTANG
1008.000	5134.100	3.095	5137.195	460.53	19.84	6.11	5143.31	.00	4.89	7.50	7.500	7.500	.00	0 .0
JUNCT STR	.4982					.0110	.00	3.10	1.99		.013	.00	.00	RECTANG
----- WARNING - Junction Analysis - Change in Channel Type -----														
1008.100	5134.150	5.656	5139.806	460.53	15.02	3.51	5143.31	.00	5.66	4.37	6.500	.000	.00	1 .0
31.521	.0048					.0069	.22	5.66	1.00	6.50	.013	.00	.00	PIPE
1039.621	5134.300	6.040	5140.340	460.53	14.33	3.19	5143.53	.00	5.66	3.33	6.500	.000	.00	1 .0
115.253	.0048					.0071	.81	6.04	.81	6.50	.013	.00	.00	PIPE
1154.874	5134.851	6.500	5141.351	460.53	13.88	2.99	5144.34	.00	5.66	.00	6.500	.000	.00	1 .0
52.226	.0048					.0076	.40	6.50	.00	6.50	.013	.00	.00	PIPE
1207.100	5135.100	6.693	5141.793	460.53	13.88	2.99	5144.78	.00	5.66	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0071	.07	6.69	.00		.013	.00	.00	PIPE
1217.100	5135.200	7.510	5142.709	423.77	12.77	2.53	5145.24	.00	5.47	.00	6.500	.000	.00	1 .0
190.300	.0068					.0065	1.24	7.51	.00	5.20	.013	.00	.00	PIPE
1407.400	5136.500	7.579	5144.080	423.77	12.77	2.53	5146.61	.00	5.47	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0051	.05	7.58	.00		.013	.00	.00	PIPE

OUTFALL1E2E

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT	Base Wt I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SE Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1417.400	5136.600	9.683	5146.283	321.37	9.68	1.46	5147.74	.00	4.81	.00	6.500	.000	.00	1 .0
177.000	.0023					.0038	.67	9.68	.00	6.50	.013	.00	.00	PIPE
1594.400	5137.000	10.102	5147.103	321.37	9.68	1.46	5148.56	.00	4.81	.00	6.500	.000	.00	1 .0
184.500	.0059					.0038	.69	10.10	.00	4.40	.013	.00	.00	PIPE
1778.900	5138.080	10.221	5148.301	321.37	9.68	1.46	5149.76	.00	4.81	.00	6.500	.000	.00	1 .0
JUNCT STR	.3150					.0129	.10	10.22	.00		.013	.00	.00	PIPE
1786.900	5140.600	5.902	5146.502	213.56	16.99	4.48	5150.99	.00	3.88	.00	4.000	.000	.00	1 .0
22.100	.0543					.0221	.49	5.90	.00	2.32	.013	.00	.00	PIPE
1809.000	5141.800	5.563	5147.363	213.56	16.99	4.48	5151.85	.00	3.88	.00	4.000	.000	.00	1 .0
JUNCT STR	.0334					.0209	.13	5.56	.00		.013	.00	.00	PIPE
1815.000	5142.000	6.435	5148.435	201.26	16.02	3.98	5152.42	.00	3.85	.00	4.000	.000	.00	1 .0
48.350	.0399					.0196	.95	6.43	.00	2.47	.013	.00	.00	PIPE
1863.350	5143.929	5.584	5149.514	201.26	16.02	3.98	5153.50	.00	3.85	.00	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
1863.350	5143.929	2.808	5146.737	201.26	21.36	7.08	5153.82	.00	3.85	3.66	4.000	.000	.00	1 .0
15.883	.0399					.0273	.43	2.81	2.35	2.47	.013	.00	.00	PIPE
1879.232	5144.563	2.850	5147.413	201.26	21.01	6.85	5154.27	.00	3.85	3.62	4.000	.000	.00	1 .0
33.768	.0399					.0253	.86	2.85	2.28	2.47	.013	.00	.00	PIPE

3E57E58E

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

*****														No Wth
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Top Dia.-FT or I.D.	ZL	Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	ZR	Type Ch	
*****														*****
1913.000	5145.911	2.982	5148.893	201.26	20.03	6.23	5155.12	.00	3.85	3.48	4.000	.00	1 .0	
20.865	.0327					.0234	.49	2.98	2.08	2.65	.013	.00	PIPE	
1933.865	5146.592	3.043	5149.635	201.26	19.62	5.98	5155.61	.00	3.85	3.41	4.000	.00	1 .0	
35.875	.0327					.0217	.78	3.04	1.99	2.65	.013	.00	PIPE	
1969.740	5147.765	3.194	5150.959	201.26	18.71	5.43	5156.39	.00	3.85	3.21	4.000	.00	1 .0	
24.901	.0327					.0197	.49	3.19	1.80	2.65	.013	.00	PIPE	
1994.642	5148.578	3.355	5151.943	201.26	17.84	4.94	5156.88	.00	3.85	2.92	4.000	.00	1 .0	
16.953	.0327					.0181	.31	3.37	1.60	2.65	.013	.00	PIPE	
2011.594	5149.132	3.567	5152.699	201.26	17.01	4.49	5157.19	.00	3.85	2.49	4.000	.00	1 .0	
8.206	.0327					.0173	.14	3.57	1.37	2.65	.013	.00	PIPE	
2019.800	5149.400	3.850	5153.250	201.26	16.21	4.08	5157.33	.00	3.85	1.52	4.000	.00	1 .0	
JUNCT STR	.0300					.0090	.05	3.85	1.00		.013	.00	PIPE	
2025.800	5149.580	7.933	5157.513	41.76	3.32	.17	5157.68	.00	1.93	.00	4.000	.00	1 .0	
33.500	.0325					.0008	.03	7.93	.00	1.09	.013	.00	PIPE	
2059.300	5150.670	6.886	5157.556	41.76	3.32	.17	5157.73	.00	1.93	.00	4.000	.00	1 .0	
JUNCT STR	.0300					.0008	.01	6.89	.00		.013	.00	PIPE	
2065.300	5150.850	6.711	5157.561	41.76	5.91	.54	5158.10	.00	2.10	.00	3.000	.00	1 .0	
120.066	.0308					.0039	.47	6.71	.00	1.24	.013	.00	PIPE	
*****														*****

56E55E

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
Outfall Pond 10 to Colobel Ave
File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top 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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2185.366	5154.553	3.509	5158.062	41.76	5.91	.54	5158.60	.00	2.10	.00	3.000	.000	.00	1 .0
HYDRAULIC JUMP														
2185.366	5154.553	1.195	5155.748	41.76	15.90	3.93	5159.68	.00	2.10	2.94	3.000	.000	.00	1 .0
31.034	.0308					.0355	1.10	1.19	2.96	1.24	.013	.00	.00	PIPE
2216.400	5155.510	1.186	5156.696	41.76	16.07	4.01	5160.70	.00	2.10	2.93	3.000	.000	.00	1 .0
JUNCT STR														
2222.400	5155.690	1.322	5157.012	41.76	15.85	3.90	5160.92	.00	2.17	2.50	2.500	.000	.00	1 .0
104.600	.0352					.0326	3.41	1.32	2.72	1.31	.013	.00	.00	PIPE
2327.000	5159.371	1.367	5160.738	41.76	15.21	3.59	5164.33	.00	2.17	2.49	2.500	.000	.00	1 .0
100.477	.0312					.0300	3.01	1.37	2.55	1.36	.013	.00	.00	PIPE
2427.477	5162.508	1.390	5163.898	41.76	14.89	3.44	5167.34	.00	2.17	2.48	2.500	.000	.00	1 .0
68.749	.0312					.0275	1.89	1.39	2.47	1.36	.013	.00	.00	PIPE
2496.225	5164.555	1.445	5166.100	41.76	14.20	3.13	5169.23	.00	2.17	2.47	2.500	.000	.00	1 .0
32.626	.0312					.0243	.79	1.45	2.29	1.36	.013	.00	.00	PIPE
2528.851	5165.673	1.503	5167.176	41.76	13.54	2.85	5170.02	.00	2.17	2.45	2.500	.000	.00	1 .0
20.210	.0312					.0215	.43	1.50	2.13	1.36	.013	.00	.00	PIPE
2549.062	5166.304	1.565	5167.869	41.76	12.91	2.59	5170.46	.00	2.17	2.42	2.500	.000	.00	1 .0
13.906	.0312					.0191	.26	1.57	1.97	1.36	.013	.00	.00	PIPE

54E

53E

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow 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	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2562.968	5166.738	1.631	5168.369	41.76	12.31	2.35	5170.72	.00	2.17	2.38	2.500	.000	.00	1	.0
10.062	.0312					.0169	.17	1.63	1.82	1.36	.013	.00	.00	PIPE	
2573.030	5167.052	1.701	5168.753	41.76	11.74	2.14	5170.89	.00	2.17	2.33	2.500	.000	.00	1	.0
7.333	.0312					.0151	.11	1.70	1.67	1.36	.013	.00	.00	PIPE	
2580.364	5167.281	1.777	5169.059	41.76	11.19	1.94	5171.00	.00	2.17	2.27	2.500	.000	.00	1	.0
5.392	.0312					.0135	.07	1.78	1.54	1.36	.013	.00	.00	PIPE	
2585.756	5167.450	1.858	5169.308	41.76	10.67	1.77	5171.08	.00	2.17	2.18	2.500	.000	.00	1	.0
3.692	.0312					.0121	.04	1.86	1.40	1.36	.013	.00	.00	PIPE	
2589.448	5167.565	1.948	5169.513	41.76	10.17	1.61	5171.12	.00	2.17	2.07	2.500	.000	.00	1	.0
2.268	.0312					.0109	.02	1.95	1.27	1.36	.013	.00	.00	PIPE	
2591.716	5167.636	2.048	5169.684	41.76	9.70	1.46	5171.14	.00	2.17	1.92	2.500	.000	.00	1	.0
.784	.0312					.0099	.01	2.05	1.14	1.36	.013	.00	.00	PIPE	
2592.500	5167.660	2.165	5169.825	41.76	9.24	1.33	5171.15	.00	2.17	1.70	2.500	.000	.00	1	.0
CONJCT STR	.0299					.0078	.03	2.17	1.00	.013	.00	.00	.00	PIPE	
2596.500	5167.780	3.134	5170.914	31.96	6.51	.66	5171.57	.00	1.93	.00	2.500	.000	.00	1	.0
99.127	.0058					.0061	.60	3.13	.00	2.12	.013	.00	.00	PIPE	
2695.627	5168.350	3.194	5171.543	31.96	6.51	.66	5172.20	.00	1.93	.00	2.500	.000	.00	1	.0
HYDRAULIC JUMP															

52A

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2695.627	5168.350	1.111	5169.461	31.96	15.17	3.57	5173.03	.00	1.93	2.48	2.500	.000	.00	1 .0
7.944	.0058					.0386	.31	1.11	2.90	2.12	.013	.00	.00	PIPE
2703.572	5168.396	1.079	5169.475	31.96	15.76	3.86	5173.33	.00	1.93	2.48	2.500	.000	.00	1 .0
9.207	.0058					.0434	.40	1.08	3.07	2.12	.013	.00	.00	PIPE
2712.779	5168.449	1.040	5169.489	31.96	16.53	4.24	5173.73	.00	1.93	2.46	2.500	.000	.00	1 .0
8.891	.0058					.0494	.44	1.04	3.29	2.12	.013	.00	.00	PIPE
2721.670	5168.500	1.004	5169.504	31.96	17.33	4.66	5174.17	.00	1.93	2.45	2.500	.000	.00	1 .0
52.496	.0526					.0526	2.76	1.00	3.52	1.00	.013	.00	.00	PIPE
2774.166	5171.263	1.004	5172.268	31.96	17.33	4.66	5176.93	.00	1.93	2.45	2.500	.000	.00	1 .0
120.362	.0526					.0499	6.01	1.00	3.52	1.00	.013	.00	.00	PIPE
2894.528	5177.600	1.035	5178.635	31.96	16.65	4.30	5182.94	.00	1.93	2.46	2.500	.000	.00	1 .0
42.172	.0526					.0443	1.87	1.04	3.32	1.00	.013	.00	.00	PIPE
2936.700	5179.820	1.073	5180.893	31.96	15.87	3.91	5184.80	.00	1.93	2.47	2.500	.000	.00	1 .0
JUNCT STR	.0300					.0407	.16	1.07	3.10	-	-	.00	.00	PIPE
2940.700	5179.940	1.240	5181.180	31.96	15.61	3.79	5184.97	.00	1.89	1.94	2.000	.000	.00	1 .0
87.157	.0400					.0400	3.49	1.24	2.68	1.24	.013	.00	.00	PIPE
3027.857	5183.427	1.240	5184.667	31.96	15.61	3.79	5188.45	.00	1.89	1.94	2.000	.000	.00	1 .0
129.487	.0400					.0379	4.90	1.24	2.68	1.24	.013	.00	.00	PIPE

SIE

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Dia.-Ft or I.D.	No Wth Prs/Pip		
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall ZR	Type Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
3157.343	5188.607	1.288	5189.895	31.96	14.93	3.46	5193.36	.00	1.89	1.92	2.000	.000	.00	1 .0
41.495	.0400					.0337	1.40	1.29	2.49	1.24	.013	.00	.00	PIPE
3198.839	5190.267	1.343	5191.610	31.96	14.24	3.15	5194.76	.00	1.89	1.88	2.000	.000	.00	1 .0
22.760	.0400					.0300	.68	1.34	2.30	1.24	.013	.00	.00	PIPE
3221.599	5191.178	1.402	5192.580	31.96	13.57	2.86	5195.44	.00	1.89	1.83	2.000	.000	.00	1 .0
14.801	.0400					.0268	.40	1.40	2.11	1.24	.013	.00	.00	PIPE
3236.400	5191.770	1.467	5193.236	31.96	12.94	2.60	5195.84	.00	1.89	1.77	2.000	.000	.00	1 .0
13.084	.0322					.0245	.32	1.47	1.93	1.34	.013	.00	.00	PIPE
3249.484	5192.190	1.506	5193.696	31.96	12.59	2.46	5196.16	.00	1.89	1.72	2.000	.000	.00	1 .0
15.610	.0322					.0226	.35	1.51	1.83	1.34	.013	.00	.00	PIPE
3265.094	5192.692	1.580	5194.272	31.96	12.00	2.24	5196.51	.00	1.89	1.63	2.000	.000	.00	1 .0
10.251	.0322					.0204	.21	1.58	1.65	1.34	.013	.00	.00	PIPE
3275.345	5193.022	1.663	5194.685	31.96	11.44	2.03	5196.72	.00	1.89	1.50	2.000	.000	.00	1 .0
6.451	.0322					.0187	.12	1.66	1.48	1.34	.013	.00	.00	PIPE
3281.796	5193.229	1.761	5194.991	31.96	10.91	1.85	5196.84	.00	1.89	1.30	2.000	.000	.00	1 .0
2.804	.0322					.0176	.05	1.76	1.28	1.34	.013	.00	.00	PIPE
3284.600	5193.320	1.889	5195.209	31.96	10.40	1.68	5196.89	.00	1.89	.91	2.000	.000	.00	1 .0
JUNCT STR	.0300					.0128	.05	1.89	1.00		.013	.00	.00	PIPE

31E

24E

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain
 Outfall Pond 10 to Colobel Ave
 File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top 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
3288.600	5193.440	3.797	5197.237	20.56	6.54	.67	5197.90	.00	1.63	.00	2.000	.000	.00	1 .0
36.424	.0389					.0083	.30	3.80	.00	.95	.013	.00	.00	PIPE
3325.024	5194.856	2.687	5197.542	20.56	6.54	.67	5198.21	.00	1.63	.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
3325.024	5194.856	.954	5195.810	20.56	13.91	3.00	5198.81	.00	1.63	2.00	2.000	.000	.00	1 .0
104.854	.0389					.0389	4.08	.95	2.85	.95	.013	.00	.00	PIPE
3429.877	5198.933	.954	5199.887	20.56	13.91	3.00	5202.89	.00	1.63	2.00	2.000	.000	.00	1 .0
100.223	.0389					.0408	4.09	.95	2.85	.95	.013	.00	.00	PIPE
3530.100	5202.830	.928	5203.758	20.56	14.42	3.23	5206.98	.00	1.63	1.99	2.000	.000	.00	1 .0
194.982	.0428					.0428	8.35	.93	3.00	.93	.013	.00	.00	PIPE
3725.082	5211.177	.928	5212.105	20.56	14.42	3.23	5215.33	.00	1.63	1.99	2.000	.000	.00	1 .0
103.318	.0428					.0428	4.43	.93	3.00	.93	.013	.00	.00	PIPE
3828.400	5215.600	.927	5216.527	20.56	14.43	3.23	5219.76	.00	1.63	1.99	2.000	.000	.00	1 .0
85.388	.0429					.0429	3.66	.93	3.01	.93	.013	.00	.00	PIPE
3913.789	5219.261	.927	5220.188	20.56	14.43	3.23	5223.42	.00	1.63	1.99	2.000	.000	.00	1 .0
100.524	.0429					.0405	4.07	.93	3.01	.93	.013	.00	.00	PIPE
4014.313	5223.571	.958	5224.529	20.56	13.81	2.96	5227.49	.00	1.63	2.00	2.000	.000	.00	1 .0
33.142	.0429					.0359	1.19	.96	2.82	.93	.013	.00	.00	PIPE

23E

22E

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain

Outfall Pond 10 to Colobel Ave

File: HT-COLOBEL-R2.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-Ft or I.D.	Base Wt	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
4047.455	5224.992	.995	5225.987	20.56	13.17	2.69	5228.68	.00	1.63	2.00	2.000	.000	.00 1 .0
18.330	.0429					.0316	.58	1.00	2.63	.93	.013	.00	.00 PIPE
4065.785	5225.778	1.033	5226.812	20.56	12.56	2.45	5229.26	.00	1.63	2.00	2.000	.000	.00 1 .0
12.143	.0429					.0278	.34	1.03	2.45	.93	.013	.00	.00 PIPE
4077.928	5226.299	1.073	5227.372	20.56	11.97	2.23	5229.60	.00	1.63	1.99	2.000	.000	.00 1 .0
8.753	.0429					.0246	.21	1.07	2.27	.93	.013	.00	.00 PIPE
4086.681	5226.674	1.115	5227.790	20.56	11.42	2.02	5229.81	.00	1.63	1.99	2.000	.000	.00 1 .0
6.603	.0429					.0217	.14	1.12	2.11	.93	.013	.00	.00 PIPE
4093.283	5226.958	1.159	5228.117	20.56	10.88	1.84	5229.96	.00	1.63	1.97	2.000	.000	.00 1 .0
5.070	.0429					.0192	.10	1.16	1.96	.93	.013	.00	.00 PIPE
4098.354	5227.175	1.206	5228.381	20.56	10.38	1.67	5230.05	.00	1.63	1.96	2.000	.000	.00 1 .0
3.938	.0429					.0170	.07	1.21	1.82	.93	.013	.00	.00 PIPE
4102.292	5227.344	1.256	5228.600	20.56	9.90	1.52	5230.12	.00	1.63	1.93	2.000	.000	.00 1 .0
3.062	.0429					.0150	.05	1.26	1.68	.93	.013	.00	.00 PIPE
4105.354	5227.475	1.309	5228.784	20.56	9.43	1.38	5230.17	.00	1.63	1.90	2.000	.000	.00 1 .0
2.360	.0429					.0134	.03	1.31	1.55	.93	.013	.00	.00 PIPE
4107.714	5227.576	1.365	5228.941	20.56	9.00	1.26	5230.20	.00	1.63	1.86	2.000	.000	.00 1 .0
1.719	.0429					.0119	.02	1.37	1.43	.93	.013	.00	.00 PIPE

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 6-2018 Time: 3:57:48

Heritage Trails Storm Drain

Outfall Pond 10 to Colobel Ave

File: HT-COLOBEL-R2.WSW

*****														*****														*****													
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Dia.-FT or I.D.	Base Wt	ZL	No Wth Prs/Pip																											
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch																											
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****																											
4109.433	5227.650	1.426	5229.076	20.56	8.58	1.14	5230.22	.00	1.63	1.81	2.000	.000	.00	1 .0																											
1.167	.0429					.0106	.01	1.43	1.31	.93	.013	.00	.00	PIPE																											
4110.600	5227.700	1.492	5229.192	20.56	8.18	1.04	5230.23	.00	1.63	1.74	2.000	.000	.00	1 .0																											
51.700	.0101					.0100	.52	1.49	1.20	1.49	.013	.00	.00	PIPE																											
4162.299	5228.220	1.496	5229.716	20.56	8.16	1.03	5230.75	.00	1.63	1.74	2.000	.000	.00	1 .0																											
123.015	.0100					.0100	1.23	1.50	1.19	1.50	.013	.00	.00	PIPE																											
4285.314	5229.450	1.496	5230.946	20.56	8.16	1.03	5231.98	.00	1.63	1.74	2.000	.000	.00	1 .0																											
47.342	.0100					.0096	.46	1.50	1.19	1.50	.013	.00	.00	PIPE																											
4332.656	5229.923	1.546	5231.469	20.56	7.89	.97	5232.44	.00	1.63	1.68	2.000	.000	.00	1 .0																											
7.644	.0100					.0088	.07	1.55	1.11	1.50	.013	.00	.00	PIPE																											
4340.300	5230.000	1.626	5231.626	20.56	7.52	.88	5232.50	.00	1.63	1.56	2.000	.000	.00	1 .0																											

21E20A19A

Table 3

Heritage Trails Subdivision							
WSPGW - Storm Drain Analysis							
Storm Drain "B"							
Manhole ID	WSPGW Station	Rim Estimate	WSEL	Manhole ID	WSPGW Station	Rim Estimate	WSEL
Storm Drain B - North of Pond				Storm Drain B - West of Pond			
OUTFALL	1000	0	0	24B	1102.6 1106.6	182.5	181.6
SD Size	54"			SD Size	36"		
10B	1080 1086	182.5	179.99	25B	1175.8 1179.8	183	182
SD Size	54"			SD Size	24"		
11B	1109.4 1115.4	182.8	180.33	26B	1458.5 0	199.1	194.5
SD Size	54"			Storm Drain B - East of Pond			
12B	1432.8 1438.8	185	181.38	1B	2019.8 2025.8	158.67	156.07
SD Size	54"			SD Size	54"		
13B	1519.9 1525.9	185.6	180.43	2B	2070.7	160.5	156.7
SD Size	42"			SD Size	54"		
14B	1959.4 1963.4	190	184.99	3B	2268.2	162	158.26
SD Size	36"			SD Size	48"		
15B	2002.8 2008.8	191	185.66	4B	2357.4	161	159.39
SD Size	36"			SD Size	48"		
16B	2258.2 2262.2	199.21	193.96	5B	2763.7	173.3	166.09
SD Size	30"			SD Size	48"		
17B	2306.4 2310.4	201.15	196.25	6B	2868.1	176	168.92
SD Size	30"			SD Size	48"		
18B	2439.5	202.7	197.66	7B	2906.8	177	169.98
SD Size	30"			SD Size	48"		
19B	2465.8 2469.8	205.8	203.24	8B	3043	185	174.18
SD Size	30"						
20B	2741.3 2745.3	214.9	210.09				
SD Size	24"						
21B	3033.3	228.85	224.3				
SD Size	24"						
22B	3085	230.3	225.99				
SD Size	24"						
23B	3268.7 3272.7	233.33	227.44				

Upstream Direction First Flush Pond B to Colobel Avenue

F:/projects/17046/

Manhole ID Table 17046-STORMDRAIN B

T1 Heritage Trails Storm Drain
T2 North Portion to First Flush Pond
T3 File: HT-SD-B-N.WSW

[illegible]

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond
File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1000.000	172.000	2.585	174.585	159.50	16.87	4.42	179.00	.00	3.69	4.45	4.500	.000	.00	1 .0
4.552	.0288					.0165	.08	2.59	2.04	2.19	.013	.00	.00	PIPE
1004.552	172.131	2.603	174.734	159.50	16.72	4.34	179.08	.00	3.69	4.44	4.500	.000	.00	1 .0
21.575	.0288					.0154	.33	2.60	2.01	2.19	.013	.00	.00	PIPE
1026.127	172.751	2.709	175.460	159.50	15.94	3.95	179.41	.00	3.69	4.41	4.500	.000	.00	1 .0
16.364	.0288					.0136	.22	2.71	1.86	2.19	.013	.00	.00	PIPE
1042.491	173.222	2.820	176.042	159.50	15.20	3.59	179.63	.00	3.69	4.35	4.500	.000	.00	1 .0
12.418	.0288					.0121	.15	2.82	1.73	2.19	.013	.00	.00	PIPE
1054.909	173.579	2.939	176.518	159.50	14.50	3.26	179.78	.00	3.69	4.28	4.500	.000	.00	1 .0
9.458	.0288					.0107	.10	2.94	1.59	2.19	.013	.00	.00	PIPE
1064.367	173.851	3.065	176.916	159.50	13.82	2.97	179.88	.00	3.69	4.19	4.500	.000	.00	1 .0
6.956	.0288					.0095	.07	3.07	1.47	2.19	.013	.00	.00	PIPE
1071.324	174.051	3.201	177.252	159.50	13.18	2.70	179.95	.00	3.69	4.08	4.500	.000	.00	1 .0
4.802	.0288					.0085	.04	3.20	1.35	2.19	.013	.00	.00	PIPE
1076.125	174.189	3.349	177.538	159.50	12.56	2.45	179.99	.00	3.69	3.93	4.500	.000	.00	1 .0
2.883	.0288					.0076	.02	3.35	1.23	2.19	.013	.00	.00	PIPE
1079.008	174.271	3.511	177.783	159.50	11.98	2.23	180.01	.00	3.69	3.73	4.500	.000	.00	1 .0
.992	.0288					.0069	.01	3.51	1.12	2.19	.013	.00	.00	PIPE

OUTFALL

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond

File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-FT	Base Wt or I.D.	ZL	NO Wth Prs/Pip
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1080.000	174.300	3.693	177.993	159.50	11.42	2.02	180.02	.00	3.69	3.45	4.500	.000	.00	1 .0
JUNCT STR	.0167					.0048	.03	3.69	1.00		.013	.00	.00	PIPE
1086.000	174.400	5.594	179.994	109.40	6.88	.73	180.73	.00	3.08	.00	4.500	.000	.00	1 .0
23.400	.0060					.0031	.07	5.59	.00	2.83	.013	.00	.00	PIPE
1109.400	174.540	5.563	180.103	109.40	6.88	.73	180.84	.00	3.08	.00	4.500	.000	.00	1 .0
JUNCT STR	.0167					.0028	.02	5.56	.00		.013	.00	.00	PIPE
1115.400	174.640	5.686	180.326	99.60	6.26	.61	180.93	.00	2.93	.00	4.500	.000	.00	1 .0
317.400	.0060					.0026	.81	5.69	.00	2.65	.013	.00	.00	PIPE
1432.800	176.540	4.630	181.170	99.60	6.26	.61	181.78	.00	2.93	.00	4.500	.000	.00	1 .0
JUNCT STR	.0167					.0023	.01	4.63	.00		.013	.00	.00	PIPE
1438.800	176.640	4.743	181.383	89.60	5.63	.49	181.88	.00	2.78	.00	4.500	.000	.00	1 .0
66.440	.0060					.0021	.14	4.74	.00	2.48	.013	.00	.00	PIPE
1505.240	177.041	4.500	181.541	89.60	5.63	.49	182.03	.00	2.78	.00	4.500	.000	.00	1 .0
14.660	.0060					.0020	.03	4.50	.00	2.48	.013	.00	.00	PIPE
1519.900	177.130	4.437	181.567	89.60	5.65	.50	182.06	.00	2.78	1.06	4.500	.000	.00	1 .0
JUNCT STR	.1667							4.44	.26		.013	.00	.00	PIPE
1525.900	178.130	2.299	180.429	78.00	11.64	2.10	182.53	.00	2.76	3.32	3.500	.000	.00	1 .0
37.755	.0101					.0102	.39	2.30	1.44	2.31	.013	.00	.00	PIPE

10B11B12B13B

WATER SURFACE PROFILE LISTING

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond
File: HT-SD-B-N.WSW

*****														*****														*****														*****													
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip																																									
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch																																									
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****																																									
1563.655	178.511	2.294	180.805	78.00	11.67	2.11	182.92	.00	2.76	3.33	3.500	.000	.00	1 .0																																									
144.676	.0101					.0109	1.58	2.29	1.45	2.31	.013	.00	.00	PIPE																																									
1708.331	179.969	2.201	182.170	78.00	12.24	2.33	184.50	.00	2.76	3.38	3.500	.000	.00	1 .0																																									
65.855	.0101					.0123	.81	2.20	1.57	2.31	.013	.00	.00	PIPE																																									
1774.186	180.633	2.114	182.747	78.00	12.83	2.56	185.30	.00	2.76	3.42	3.500	.000	.00	1 .0																																									
45.689	.0101					.0139	.63	2.11	1.70	2.31	.013	.00	.00	PIPE																																									
1819.875	181.093	2.032	183.126	78.00	13.46	2.81	185.94	.00	2.76	3.45	3.500	.000	.00	1 .0																																									
36.156	.0101					.0157	.57	2.03	1.83	2.31	.013	.00	.00	PIPE																																									
1856.031	181.458	1.954	183.412	78.00	14.12	3.09	186.51	.00	2.76	3.48	3.500	.000	.00	1 .0																																									
30.568	.0101					.0178	.54	1.95	1.97	2.31	.013	.00	.00	PIPE																																									
1886.599	181.766	1.880	183.646	78.00	14.81	3.40	187.05	.00	2.76	3.49	3.500	.000	.00	1 .0																																									
26.827	.0101					.0202	.54	1.88	2.12	2.31	.013	.00	.00	PIPE																																									
1913.425	182.037	1.810	183.847	78.00	15.53	3.74	187.59	.00	2.76	3.50	3.500	.000	.00	1 .0																																									
24.029	.0101					.0229	.55	1.81	2.28	2.31	.013	.00	.00	PIPE																																									
1937.455	182.279	1.743	184.022	78.00	16.29	4.12	188.14	.00	2.76	3.50	3.500	.000	.00	1 .0																																									
21.945	.0101					.0260	.57	1.74	2.45	2.31	.013	.00	.00	PIPE																																									
1959.400	182.500	1.680	184.180	78.00	17.08	4.53	188.71	.00	2.76	3.50	3.500	.000	.00	1 .0																																									
JUNCT STR	.1250					.0251	.10	1.68	2.63		.013	.00	.00	PIPE																																									

14B

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond
File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-Ft	Base Wt or I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	ZR Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1963.400	183.000	1.988	184.988	78.00	15.69	3.82	188.81	.00	2.75	2.84	3.000	.000	.00 1 .0
39.400	.0254					.0220	.87	1.99	2.09	1.91	.013	.00	PIPE
2002.800	184.000	2.029	186.029	78.00	15.33	3.65	189.68	.00	2.75	2.81	3.000	.000	.00 1 .0
JUNCT STR	.0167					.0279	.17	2.03	2.01		.013	.00	PIPE
2008.800	184.100	1.564	185.664	66.40	17.82	4.93	190.59	.00	2.61	3.00	3.000	.000	.00 1 .0
21.051	.0325					.0347	.73	1.56	2.82	1.59	.013	.00	PIPE
2029.851	184.784	1.557	186.341	66.40	17.91	4.98	191.32	.00	2.61	3.00	3.000	.000	.00 1 .0
92.362	.0325					.0373	3.44	1.56	2.84	1.59	.013	.00	PIPE
2122.213	187.783	1.500	189.284	66.40	18.78	5.48	194.76	.00	2.61	3.00	3.000	.000	.00 1 .0
50.151	.0325					.0423	2.12	1.50	3.05	1.59	.013	.00	PIPE
2172.364	189.412	1.445	190.857	66.40	19.70	6.03	196.88	.00	2.61	3.00	3.000	.000	.00 1 .0
35.301	.0325					.0481	1.70	1.45	3.27	1.59	.013	.00	PIPE
2207.665	190.559	1.393	191.952	66.40	20.66	6.63	198.58	.00	2.61	2.99	3.000	.000	.00 1 .0
27.616	.0325					.0547	1.51	1.39	3.51	1.59	.013	.00	PIPE
2235.280	191.456	1.343	192.799	66.40	21.67	7.29	200.09	.00	2.61	2.98	3.000	.000	.00 1 .0
22.920	.0325					.0622	1.43	1.34	3.77	1.59	.013	.00	PIPE
2258.200	192.200	1.295	193.495	66.40	22.73	8.02	201.52	.00	2.61	2.97	3.000	.000	.00 1 .0
JUNCT STR	.1250					.0758	.30	1.30	4.04		.013	.00	PIPE

15B

16B

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond
File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Dia.-FT	Base Wt or I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2262.200	192.700	1.258	193.958	60.60	24.49	9.32	203.27	.00	2.40	2.50	2.500	.000	1 .0
11.525	.0441					.0888	1.02	1.26	4.34	1.55	.013	.00	PIPE
2273.725	193.208	1.230	194.439	60.60	25.20	9.86	204.30	.00	2.40	2.50	2.500	.000	1 .0
17.310	.0441					.0985	1.70	1.23	4.53	1.55	.013	.00	PIPE
2291.035	193.972	1.185	195.157	60.60	26.43	10.85	206.01	.00	2.40	2.50	2.500	.000	1 .0
15.365	.0441					.1120	1.72	1.19	4.86	1.55	.013	.00	PIPE
2306.400	194.650	1.143	195.793	60.60	27.72	11.93	207.73	.00	2.40	2.49	2.500	.000	1 .0
JUNCT STR	.0250					.1919	.77	1.14	5.21		.013	.00	PIPE
2310.400	194.750	1.499	196.249	54.80	31.01	14.93	211.18	.00	1.50	.10	1.500	.000	1 .0
2310.400	194.750	2.028	196.778	54.80	12.85	2.56	199.34	.00	2.35	1.96	2.500	.000	1 .0
9.970	.0112					.0186	.19	2.03	1.53	2.50	.013	.00	PIPE
2320.370	194.862	1.978	196.840	54.80	13.15	2.69	199.53	.00	2.35	2.03	2.500	.000	1 .0
19.844	.0112					.0201	.40	1.98	1.62	2.50	.013	.00	PIPE
2340.214	195.085	1.886	196.971	54.80	13.79	2.95	199.93	.00	2.35	2.15	2.500	.000	1 .0
18.846	.0112					.0224	.42	1.89	1.79	2.50	.013	.00	PIPE
2359.060	195.297	1.801	197.098	54.80	14.47	3.25	200.35	.00	2.35	2.24	2.500	.000	1 .0
17.961	.0112					.0250	.45	1.80	1.96	2.50	.013	.00	PIPE
2377.022	195.498	1.724	197.222	54.80	15.17	3.57	200.80	.00	2.35	2.31	2.500	.000	1 .0
16.932	.0112					.0281	.48	1.72	2.14	2.50	.013	.00	PIPE

17B

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain

North Portion to First Flush Pond

File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT or I.D.	Base Wt	No Wth Prs/Pip
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR Type Ch
2393.954	195.688	1.652	197.341	54.80	15.91	3.93	201.27	.00	2.35	2.37	2.500	.000	.00 1 .0
16.017	.0112					.0316	.51	1.65	2.33	2.50	.013	.00	PIPE
2409.971	195.868	1.585	197.453	54.80	16.69	4.33	201.78	.00	2.35	2.41	2.500	.000	.00 1 .0
15.152	.0112					.0356	.54	1.59	2.52	2.50	.013	.00	PIPE
2425.123	196.039	1.522	197.561	54.80	17.51	4.76	202.32	.00	2.35	2.44	2.500	.000	.00 1 .0
14.377	.0112					.0402	.58	1.52	2.72	2.50	.013	.00	PIPE
2439.500	196.200	1.463	197.663	54.80	18.36	5.23	202.90	.00	2.35	2.46	2.500	.000	.00 1 .0
4.996	.1179					.0404	.20	1.46	2.94	1.08	.013	.00	PIPE
2444.496	196.789	1.518	198.307	54.80	17.57	4.79	203.10	.00	2.35	2.44	2.500	.000	.00 1 .0
4.562	.1179					.0360	.16	1.52	2.74	1.08	.013	.00	PIPE
2449.058	197.327	1.580	198.907	54.80	16.75	4.36	203.26	.00	2.35	2.41	2.500	.000	.00 1 .0
3.827	.1179					.0319	.12	1.58	2.53	1.08	.013	.00	PIPE
2452.885	197.778	1.647	199.425	54.80	15.97	3.96	203.39	.00	2.35	2.37	2.500	.000	.00 1 .0
3.229	.1179					.0283	.09	1.65	2.34	1.08	.013	.00	PIPE
2456.114	198.158	1.718	199.876	54.80	15.23	3.60	203.48	.00	2.35	2.32	2.500	.000	.00 1 .0
2.703	.1179					.0253	.07	1.72	2.15	1.08	.013	.00	PIPE
2458.816	198.477	1.795	200.272	54.80	14.52	3.27	203.55	.00	2.35	2.25	2.500	.000	.00 1 .0
2.241	.1179					.0226	.05	1.80	1.98	1.08	.013	.00	PIPE

18B

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain

North Portion to First Flush Pond

File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height Dia.-FT	Base I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	Type Ch
2461.058	198.741	1.879	200.620	54.80	13.84	2.98	203.60	.00	2.35	2.16	2.500	.000	1 .0
1.830	.1179	-	-	-	-	.0203	.04	1.88	1.80	1.08	.013	.00	PIPE
2462.887	198.957	1.971	200.928	54.80	13.20	2.71	203.63	.00	2.35	2.04	2.500	.000	1 .0
1.436	.1179	-	-	-	-	.0183	.03	1.97	1.63	1.08	.013	.00	PIPE
2464.324	199.126	2.074	201.200	54.80	12.58	2.46	203.66	.00	2.35	1.88	2.500	.000	1 .0
1.015	.1179	-	-	-	-	.0168	.02	2.07	1.46	1.08	.013	.00	PIPE
2465.338	199.246	2.195	201.441	54.80	12.00	2.24	203.68	.00	2.35	1.64	2.500	.000	1 .0
.462	.1179	-	-	-	-	.0158	.01	2.20	1.27	1.08	.013	.00	PIPE
2465.800	199.300	2.352	201.652	54.80	11.44	2.03	203.68	.00	2.35	1.18	2.500	.000	1 .0
JUNCT STR	.0250	-	-	-	-	.0131	.05	2.35	1.00	.013	.013	.00	PIPE
2469.800	199.400	3.836	203.236	42.40	8.64	1.16	204.39	.00	2.18	.00	2.500	.000	1 .0
16.865	.0331	-	-	-	-	.0107	.18	3.84	.00	1.35	.013	.00	PIPE
2486.665	199.959	3.461	203.420	42.40	8.64	1.16	204.58	.00	2.18	.00	2.500	.000	1 .0
HYDRAULIC JUMP	-	-	-	-	-	-	-	-	-	-	-	-	-
2486.665	199.959	1.349	201.308	42.40	15.70	3.83	205.13	.00	2.18	2.49	2.500	.000	1 .0
105.306	.0331	-	-	-	-	.0332	3.49	1.35	2.66	1.35	.013	.00	PIPE
2591.970	203.450	1.349	204.799	42.40	15.70	3.83	208.62	.00	2.18	2.49	2.500	.000	1 .0
149.330	.0331	-	-	-	-	.0350	5.23	1.35	2.66	1.35	.013	.00	PIPE

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 8-2018 Time: 1:33:46

Heritage Trails Storm Drain
North Portion to First Flush Pond

File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-FT	Base Wt I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SE Ave	HF	SE Dpth	Froude N	Norm Dp	"N" X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2741.300	208.400	1.307	209.707	42.40	16.34	4.14	213.85	.00	2.18	2.50	2.500	.000	1 .0
JUNCT STR	.1500					.0425	.17	1.31	2.82		.013	.00	PIPE
2745.300	209.000	1.093	210.093	28.80	16.39	4.17	214.26	.00	1.84	1.99	2.000	.000	1 .0
99.629	.0483					.0480	4.78	1.09	3.07	1.09	.013	.00	PIPE
2844.929	213.808	1.096	214.905	28.80	16.34	4.15	219.05	.00	1.84	1.99	2.000	.000	1 .0
102.549	.0483					.0450	4.62	1.10	3.06	1.09	.013	.00	PIPE
2947.478	218.758	1.139	219.897	28.80	15.58	3.77	223.67	.00	1.84	1.98	2.000	.000	1 .0
34.901	.0483					.0398	1.39	1.14	2.84	1.09	.013	.00	PIPE
2982.379	220.442	1.185	221.627	28.80	14.86	3.43	225.05	.00	1.84	1.97	2.000	.000	1 .0
20.135	.0483					.0352	.71	1.19	2.64	1.09	.013	.00	PIPE
3002.514	221.414	1.233	222.647	28.80	14.16	3.12	225.76	.00	1.84	1.94	2.000	.000	1 .0
13.574	.0483					.0312	.42	1.23	2.44	1.09	.013	.00	PIPE
3016.088	222.069	1.284	223.353	28.80	13.50	2.83	226.19	.00	1.84	1.92	2.000	.000	1 .0
9.823	.0483					.0277	.27	1.28	2.26	1.09	.013	.00	PIPE
3025.911	222.543	1.339	223.882	28.80	12.88	2.57	226.46	.00	1.84	1.88	2.000	.000	1 .0
7.389	.0483					.0246	.18	1.34	2.08	1.09	.013	.00	PIPE
3033.300	222.900	1.398	224.298	28.80	12.28	2.34	226.64	.00	1.84	1.83	2.000	.000	1 .0
10.907	.0280					.0227	.25	1.40	1.91	1.30	.013	.00	PIPE

20B21B

Date: 3- 8-2018 Time: 1:33:46

WATER SURFACE PROFILE LISTING

Heritage Trails Storm Drain

North Portion to First Flush Pond

File: HT-SD-B-N.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Dia.-FT	Base Wt I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
3044.208	223.206	1.421	224.627	28.80	12.06	2.26	236.89	.00	1.84	1.81	2.000	.000	1 .0
20.113	.0280					.0211	.42	1.42	1.85	1.30	.013	.00	PIPE
3064.321	223.770	1.486	225.256	28.80	11.50	2.05	227.31	.00	1.84	1.75	2.000	.000	1 .0
12.540	.0280					.0189	.24	1.49	1.69	1.30	.013	.00	PIPE
3076.860	224.122	1.558	225.680	28.80	10.97	1.87	227.55	.00	1.84	1.66	2.000	.000	1 .0
8.140	.0280					.0171	.14	1.56	1.54	1.30	.013	.00	PIPE
3085.000	224.350	1.638	225.988	28.80	10.46	1.70	227.69	.00	1.84	1.54	2.000	.000	1 .0
75.168	.0162					.0162	1.22	1.64	1.38	1.64	.013	.00	PIPE
3160.168	225.569	1.638	227.208	28.80	10.46	1.70	228.91	.00	1.84	1.54	2.000	.000	1 .0
93.489	.0162					.0156	1.46	1.64	1.38	1.64	.013	.00	PIPE
3253.657	227.086	1.727	228.813	28.80	9.98	1.55	230.36	.00	1.84	1.37	2.000	.000	1 .0
15.043	.0162					.0145	.22	1.73	1.21	1.64	.013	.00	PIPE
3268.700	227.330	1.843	229.173	28.80	9.52	1.41	230.58	.00	1.84	1.08	2.000	.000	1 .0
JUNCT STR	.0250							1.84	1.00	.013	.00	.00	PIPE
----- WARNING - Junction Analysis - Large Lateral Flow(s) -----													
3272.700	227.430	.011	227.441	.00	.48	.00	227.44	.00	.01	.29	2.000	.000	1 .0

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Date: 3- 8-2018 Time: 1:59: 8

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height Dia.-Ft	Base Wt I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	172.000	2.586	174.586	159.50	16.86	4.42	179.00	.00	3.69	4.45	4.500	.000	.00 1 .0
4.646	.0288					.0165	.08	2.59	2.04	2.19	.013	.00	PIPE
1004.647	172.134	2.604	174.738	159.50	16.72	4.34	179.08	.00	3.69	4.44	4.500	.000	.00 1 .0
21.619	.0288					.0154	.33	2.60	2.01	2.19	.013	.00	PIPE
1026.266	172.755	2.709	175.464	159.50	15.94	3.95	179.41	.00	3.69	4.41	4.500	.000	.00 1 .0
16.276	.0288					.0136	.22	2.71	1.86	2.19	.013	.00	PIPE
1042.542	173.223	2.821	176.044	159.50	15.20	3.59	179.63	.00	3.69	4.35	4.500	.000	.00 1 .0
12.462	.0288					.0121	.15	2.82	1.72	2.19	.013	.00	PIPE
1055.003	173.581	2.939	176.520	159.50	14.49	3.26	179.78	.00	3.69	4.28	4.500	.000	.00 1 .0
9.391	.0288					.0107	.10	2.94	1.59	2.19	.013	.00	PIPE
1064.394	173.851	3.066	176.917	159.50	13.82	2.96	179.88	.00	3.69	4.19	4.500	.000	.00 1 .0
6.947	.0288					.0095	.07	3.07	1.47	2.19	.013	.00	PIPE
1071.342	174.051	3.202	177.253	159.50	13.17	2.69	179.95	.00	3.69	4.08	4.500	.000	.00 1 .0
4.794	.0288					.0085	.04	3.20	1.35	2.19	.013	.00	PIPE
1076.136	174.189	3.350	177.539	159.50	12.56	2.45	179.99	.00	3.69	3.93	4.500	.000	.00 1 .0
2.877	.0288					.0076	.02	3.35	1.23	2.19	.013	.00	PIPE
1079.013	174.272	3.512	177.784	159.50	11.98	2.23	180.01	.00	3.69	3.73	4.500	.000	.00 1 .0
.987	.0288					.0069	.01	3.51	1.12	2.19	.013	.00	PIPE

Heritage Trails Storm Drain
West Portion to First Flush Pond

Date: 3- 8-2018 Time: 1:59: 8

File: HT-SD-B-W.wsw

*****															No Wth
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Base Wt Dia.-FT or I.D.	ZL	Prs/Pip	*****	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	
1080.000	174.300	3.694	177.994	159.50	11.42	2.02	180.02	.00	3.69	3.45	4.500	.000	.00	1 .0	
JUNCT STR															
	.0167					.0042	.03	3.69	1.00		.013	.00	.00	PIPE	
1086.000	174.400	7.106	181.506	29.20	4.13	.26	181.77	.00	1.75	.00	3.000	.000	.00	1 .0	
16.600	.0361					.0019	.03	7.11	.00	.98	.013	.00	.00	PIPE	
1102.600	175.000	6.577	181.577	29.20	4.13	.26	181.84	.00	1.75	.00	3.000	.000	.00	1 .0	
JUNCT STR															
	.0250					.0019	.01	6.58	.00		.013	.00	.00	PIPE	
1106.600	175.100	6.485	181.585	29.20	4.13	.26	181.85	.00	1.75	.00	3.000	.000	.00	1 .0	
69.200	.0202					.0019	.13	6.48	.00	1.14	.013	.00	.00	PIPE	
1175.800	176.500	5.264	181.764	29.20	4.13	.26	182.03	.00	1.75	.00	3.000	.000	.00	1 .0	
JUNCT STR															
	.1500					.0035	.01	5.26	.00		.013	.00	.00	PIPE	
1179.800	177.100	4.916	182.016	16.00	5.09	.40	182.42	.00	1.44	.00	2.000	.000	.00	1 .0	
42.825	.0574					.0050	.21	4.92	.00	.74	.013	.00	.00	PIPE	
1222.625	179.559	2.674	182.232	16.00	5.09	.40	182.64	.00	1.44	.00	2.000	.000	.00	1 .0	
HYDRAULIC JUMP															
1222.625	179.559	.745	180.303	16.00	15.02	3.50	183.80	.00	1.44	1.93	2.000	.000	.00	1 .0	
24.037	.0574					.0574	1.38	.74	3.57	.74	.013	.00	.00	PIPE	
1246.662	180.939	.745	181.683	16.00	15.02	3.50	185.18	.00	1.44	1.93	2.000	.000	.00	1 .0	
82.179	.0574					.0565	4.64	.74	3.57	.74	.013	.00	.00	PIPE	

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 8-2018 Time: 1:59: 8

Heritage Trails Storm Drain
West Portion to First Flush Pond

File: HT-SD-B-W.wsw

Station	Invert Elev	Depth (Ft)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	HF	Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt I.D.	No Wth ZL	Prs/Pip
L/Elem	Ch Slope					SF Ave			SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1328.841	185.656	.750	186.406	16.00	14.85	3.42	189.83	.00	1.44	1.94	2.000	.000	.00	1	.0
54.399	.0574					.0522	2.84		.75	3.51	.74	.013	.00	.00	PIPE
1383.240	188.779	.777	189.557	16.00	14.16	3.11	192.67	.00	1.44	1.95	2.000	.000	.00	1	.0
21.872	.0574					.0458	1.00		.78	3.28	.74	.013	.00	.00	PIPE
1405.112	190.035	.806	190.841	16.00	13.50	2.83	193.67	.00	1.44	1.96	2.000	.000	.00	1	.0
13.267	.0574					.0402	.53		.81	3.06	.74	.013	.00	.00	PIPE
1418.379	190.797	.835	191.632	16.00	12.87	2.57	194.20	.00	1.44	1.97	2.000	.000	.00	1	.0
9.175	.0574					.0353	.32		.84	2.86	.74	.013	.00	.00	PIPE
1427.554	191.323	.866	192.190	16.00	12.27	2.34	194.53	.00	1.44	1.98	2.000	.000	.00	1	.0
6.842	.0574					.0310	.21		.87	2.67	.74	.013	.00	.00	PIPE
1434.395	191.716	.898	192.614	16.00	11.70	2.13	194.74	.00	1.44	1.99	2.000	.000	.00	1	.0
5.314	.0574					.0273	.14		.90	2.49	.74	.013	.00	.00	PIPE
1439.709	192.021	.931	192.952	16.00	11.15	1.93	194.88	.00	1.44	2.00	2.000	.000	.00	1	.0
4.206	.0574					.0240	.10		.93	2.32	.74	.013	.00	.00	PIPE
1443.915	192.263	.966	193.229	16.00	10.63	1.76	194.99	.00	1.44	2.00	2.000	.000	.00	1	.0
3.378	.0574					.0211	.07		.97	2.16	.74	.013	.00	.00	PIPE
1447.293	192.457	1.003	193.460	16.00	10.14	1.60	195.06	.00	1.44	2.00	2.000	.000	.00	1	.0
2.734	.0574					.0186	.05		1.00	2.01	.74	.013	.00	.00	PIPE

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 8-2018 Time: 1:59: 8

Heritage Trails Storm Drain

West Portion to First Flush Pond

File: HT-SD-B-W.wsw

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 I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1450.028	192.614	1.042	193.656	16.00	9.67	1.45	195.11	.00	1.44	2.00	2.000	.000	.00	1 .0
2.241	.0574					.0164	.04	1.04	1.87	.74	.013	.00	.00	PIPE
1452.269	192.742	1.082	193.824	16.00	9.22	1.32	195.14	.00	1.44	1.99	2.000	.000	.00	1 .0
1.792	.0574					.0145	.03	1.08	1.74	.74	.013	.00	.00	PIPE
1454.061	192.845	1.125	193.970	16.00	8.79	1.20	195.17	.00	1.44	1.98	2.000	.000	.00	1 .0
1.435	.0574					.0128	.02	1.13	1.62	.74	.013	.00	.00	PIPE
1455.496	192.928	1.170	194.098	16.00	8.38	1.09	195.19	.00	1.44	1.97	2.000	.000	.00	1 .0
1.130	.0574					.0113	.01	1.17	1.50	.74	.013	.00	.00	PIPE
1456.626	192.992	1.217	194.210	16.00	7.99	.99	195.20	.00	1.44	1.95	2.000	.000	.00	1 .0
.846	.0574					.0100	.01	1.22	1.39	.74	.013	.00	.00	PIPE
1457.472	193.041	1.267	194.308	16.00	7.62	.90	195.21	.00	1.44	1.93	2.000	.000	.00	1 .0
.575	.0574					.0089	.01	1.27	1.29	.74	.013	.00	.00	PIPE
1458.048	193.074	1.321	194.395	16.00	7.26	.82	195.21	.00	1.44	1.89	2.000	.000	.00	1 .0
.353	.0574					.0079	.00	1.32	1.19	.74	.013	.00	.00	PIPE
1458.401	193.094	1.378	194.472	16.00	6.93	.74	195.22	.00	1.44	1.85	2.000	.000	.00	1 .0
.099	.0574					.0070	.00	1.38	1.09	.74	.013	.00	.00	PIPE
1458.500	193.100	1.442	194.542	16.00	6.60	.68	195.22	.00	1.44	1.79	2.000	.000	.00	1 .0

24B

WATER SURFACE PROFILE LISTING

Date: 3- 9-2018 Time: 9:58: 4

Heritage Trails Storm Drain

Storm Drain B Pond to Pond 10

File: HT-SD-B-E.WSW.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Height/Dia.-FT	Base Wt I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SE Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1000.000	5134.000	1.646	5135.646	460.53	21.53	7.20	5142.85	.00	3.39	13.00	7.500	13.000	.00	0 .0
TRANS STR	.0125					.0230	.18	1.65	2.96		.014	.00	.00	RECTANG
1008.000	5134.100	3.095	5137.195	460.53	19.84	6.11	5143.31	.00	4.89	7.50	7.500	7.500	.00	0 .0
JUNCT STR	.4982					.0110	.00	3.10	1.99		.013	.00	.00	RECTANG
----- WARNING - Junction Analysis - Change in Channel Type -----														
1008.100	5134.150	5.656	5139.806	460.53	15.02	3.51	5143.31	.00	5.66	4.37	6.500	.000	.00	1 .0
31.521	.0048					.0069	.22	5.66	1.00	6.50	.013	.00	.00	PIPE
1039.621	5134.300	6.040	5140.340	460.53	14.33	3.19	5143.53	.00	5.66	3.33	6.500	.000	.00	1 .0
115.253	.0048					.0071	.81	6.04	.81	6.50	.013	.00	.00	PIPE
1154.874	5134.851	6.500	5141.351	460.53	13.88	2.99	5144.34	.00	5.66	.00	6.500	.000	.00	1 .0
52.226	.0048					.0076	.40	6.50	.00	6.50	.013	.00	.00	PIPE
1207.100	5135.100	6.693	5141.793	460.53	13.88	2.99	5144.78	.00	5.66	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0071	.07	6.69	.00		.013	.00	.00	PIPE
1217.100	5135.200	7.510	5142.709	423.77	12.77	2.53	5145.24	.00	5.47	.00	6.500	.000	.00	1 .0
190.300	.0068					.0065	1.24	7.51	.00	5.20	.013	.00	.00	PIPE
1407.400	5136.500	7.579	5144.080	423.77	12.77	2.53	5146.61	.00	5.47	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0051	.05	7.58	.00		.013	.00	.00	PIPE

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 9-2018 Time: 9:58: 4

Heritage Trails Storm Drain

Storm Drain B Pond to Pond 10

File: HT-SD-B-E.WSW.WSW

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 I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SP Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR Type Ch
1417.400	5136.600	9.683	5146.283	321.37	9.68	1.46	5147.74	.00	4.81	.00	6.500	.000	.00 1 .0
177.000	.0023					.0038	.67	9.68	.00	6.50	.013	.00	.00 PIPE
1594.400	5137.000	10.102	5147.103	321.37	9.68	1.46	5148.56	.00	4.81	.00	6.500	.000	.00 1 .0
184.500	.0059					.0038	.69	10.10	.00	4.40	.013	.00	.00 PIPE
1778.900	5138.080	10.221	5148.301	321.37	9.68	1.46	5149.76	.00	4.81	.00	6.500	.000	.00 1 .0
JUNCT STR	.3150					.0129	.10	10.22	.00		.013	.00	.00 PIPE
1786.900	5140.600	5.902	5146.502	213.56	16.99	4.48	5150.99	.00	3.88	.00	4.000	.000	.00 1 .0
22.100	.0543					.0221	.49	5.90	.00	2.32	.013	.00	.00 PIPE
1809.000	5141.800	5.563	5147.363	213.56	16.99	4.48	5151.85	.00	3.88	.00	4.000	.000	.00 1 .0
JUNCT STR	.0334					.0209	.13	5.56	.00		.013	.00	.00 PIPE
1815.000	5142.000	6.435	5148.435	201.26	16.02	3.98	5152.42	.00	3.85	.00	4.000	.000	.00 1 .0
48.350	.0399					.0196	.95	6.43	.00	2.47	.013	.00	.00 PIPE
1863.350	5143.929	5.584	5149.514	201.26	16.02	3.98	5153.50	.00	3.85	.00	4.000	.000	.00 1 .0
HYDRAULIC JUMP													
1863.350	5143.929	2.808	5146.737	201.26	21.36	7.08	5153.82	.00	3.85	3.66	4.000	.000	.00 1 .0
15.883	.0399					.0273	.43	2.81	2.35	2.47	.013	.00	.00 PIPE
1879.232	5144.563	2.850	5147.413	201.26	21.01	6.85	5154.27	.00	3.85	3.62	4.000	.000	.00 1 .0
33.768	.0399					.0253	.86	2.85	2.28	2.47	.013	.00	.00 PIPE

Date: 3- 9-2018 Time: 9:58: 4

Heritage Trails Storm Drain

Storm Drain B Pond to Pond 10
File: HT-SD-B-E.WSW.WSW

WATER SURFACE PROFILE LISTING

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 I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SE Dpth	HF							
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1913.000	5145.911	2.982	5148.893	201.26	20.03	6.23	5155.12	.00	3.85	3.48	4.000	.000	.00	1 .0
20.865	.0327					.0234	.49	2.98	2.08	2.65	.013	.00	.00	PIPE
1933.865	5146.592	3.043	5149.635	201.26	19.62	5.98	5155.61	.00	3.85	3.41	4.000	.000	.00	1 .0
35.875	.0327					.0217	.78	3.04	1.99	2.65	.013	.00	.00	PIPE
1969.740	5147.765	3.194	5150.959	201.26	18.71	5.43	5156.39	.00	3.85	3.21	4.000	.000	.00	1 .0
24.901	.0327					.0197	.49	3.19	1.80	2.65	.013	.00	.00	PIPE
1994.642	5148.578	3.365	5151.943	201.26	17.84	4.94	5156.88	.00	3.85	2.92	4.000	.000	.00	1 .0
16.953	.0327					.0181	.31	3.37	1.60	2.65	.013	.00	.00	PIPE
2011.594	5149.132	3.567	5152.699	201.26	17.01	4.49	5157.19	.00	3.85	2.49	4.000	.000	.00	1 .0
8.206	.0327					.0173	.14	3.57	1.37	2.65	.013	.00	.00	PIPE
2019.800	5149.400	3.850	5153.250	201.26	16.21	4.08	5157.33	.00	3.85	1.52	4.000	.000	.00	1 .0
JUNCT STR	.0300					.0147	.09	3.85	1.00		.013	.00	.00	PIPE
2025.800	5149.580	6.493	5156.073	159.50	10.03	1.56	5157.63	.00	3.69	.00	4.500	.000	.00	1 .0
44.900	.0094					.0066	.30	6.49	.00	3.15	.013	.00	.00	PIPE
2070.700	5150.000	6.782	5156.782	159.50	10.03	1.56	5158.34	.00	3.69	.00	4.500	.000	.00	1 .0
197.500	.0101					.0066	1.30	6.78	.00	3.06	.013	.00	.00	PIPE
2268.200	5152.000	6.262	5158.262	159.50	10.03	1.56	5159.82	.00	3.69	.00	4.500	.000	.00	1 .0
89.200	.0101					.0066	.59	6.26	.00	3.07	.013	.00	.00	PIPE

WATER SURFACE PROFILE LISTING

Date: 3- 9-2018 Time: 9:58: 4

Heritage Trails Storm Drain

Storm Drain B Pond to Pond 10

File: HT-SD-B-E.WSW.WSW

*****														*****
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Height/Dia.-FT	Base Wt I.D.	No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
2357.400	5152.900	6.491	5159.391	159.50	12.69	2.50	5161.89	.00	3.66	.00	4.000	.000	.00	1 .0
79.953	.0263					.0123	.99	6.49	.00	2.43	.013	.00	.00	PIPE
2437.353	5155.005	5.537	5160.542	159.50	12.69	2.50	5163.04	.00	3.66	.00	4.000	.000	.00	1 .0
HYDRAULIC JUMP														
2437.353	5155.005	2.429	5157.434	159.50	19.97	6.19	5163.63	.00	3.66	3.91	4.000	.000	.00	1 .0
17.520	.0263					.0263	.46	2.43	2.46	2.43	.013	.00	.00	PIPE
2454.873	5155.467	2.429	5157.896	159.50	19.97	6.19	5164.09	.00	3.66	3.91	4.000	.000	.00	1 .0
308.827	.0263					.0254	7.83	2.43	2.46	2.43	.013	.00	.00	PIPE
2763.700	5163.600	2.493	5166.093	159.50	19.37	5.83	5171.92	.00	3.66	3.88	4.000	.000	.00	1 .0
104.400	.0263					.0234	2.44	2.49	2.34	2.43	.013	.00	.00	PIPE
2868.100	5166.350	2.567	5168.917	159.50	18.72	5.44	5174.36	.00	3.66	3.84	4.000	.000	.00	1 .0
38.700	.0264					.0218	.84	2.57	2.21	2.43	.013	.00	.00	PIPE
2906.800	5167.370	2.614	5169.984	159.50	18.33	5.22	5175.20	.00	3.66	3.81	4.000	.000	.00	1 .0
21.976	.0267					.0208	.46	2.61	2.14	2.42	.013	.00	.00	PIPE
2928.776	5167.956	2.651	5170.606	159.50	18.04	5.05	5175.66	.00	3.66	3.78	4.000	.000	.00	1 .0
46.433	.0267					.0193	.89	2.65	2.08	2.42	.013	.00	.00	PIPE
2975.209	5169.193	2.767	5171.960	159.50	17.20	4.59	5176.55	.00	3.66	3.69	4.000	.000	.00	1 .0
30.955	.0267					.0172	.53	2.77	1.91	2.42	.013	.00	.00	PIPE

Date: 3- 9-2018 Time: 9:58: 4

Heritage Trails Storm Drain

Storm Drain B Pond to Pond 10

File: HT-SD-B-E.WSW.WSW

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 or I.D.	Base Wt	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
3006.164	5170.018	2.891	5172.909	159.50	16.40	4.17	5177.08	.00	3.66	3.58	4.000	.000	.00	1 .0
21.655	.0267					.0154	.33	2.89	1.75	2.42	.013	.00	.00	PIPE
3027.819	5170.595	3.026	5173.621	159.50	15.63	3.80	5177.42	.00	3.66	3.43	4.000	.000	.00	1 .0
15.181	.0267					.0138	.21	3.03	1.60	2.42	.013	.00	.00	PIPE
3043.000	5171.000	3.176	5174.176	159.50	14.91	3.45	5177.63	.00	3.66	3.24	4.000	.000	.00	1 .0
24.110	.0161					.0128	.31	3.18	1.44	2.90	.013	.00	.00	PIPE
3067.110	5171.388	3.258	5174.646	159.50	14.55	3.29	5177.93	.00	3.66	3.11	4.000	.000	.00	1 .0
28.358	.0161					.0119	.34	3.26	1.37	2.90	.013	.00	.00	PIPE
3095.468	5171.845	3.439	5175.284	159.50	13.87	2.99	5178.27	.00	3.66	2.78	4.000	.000	.00	1 .0
9.632	.0161					.0111	.11	3.44	1.20	2.90	.013	.00	.00	PIPE
3105.100	5172.000	3.663	5175.664	159.50	13.23	2.72	5178.38	.00	3.66	2.22	4.000	.000	.00	1 .0

8B

Table 3

Heritage Trails Subdivision							
WSPGW - Storm Drain Analysis							
Storm Drain "C"							
Manhole # - WSPGW Station ID							
Manhole ID	WSPGW Station	Rim Estimate	WSEL	Manhole ID	WSPGW Station	Rim Estimate	WSEL
1E	1207.1 1217.1	145.9	142.7	2C	1063.8	54	48.67
SD Size	78"			SD Size	48"		
2E	1407.4 1417.4	147.2	146.2	3C	1128.2 1134.2	54.4	49.35
SD Size	78"			SD Size	48"		
3E	1594.4	148.7	147.1	4C	1166.2 1172.2	54.6	49.41
SD Size	78"			SD Size	42"		
57E	1778.9 1786.9	51.52	150.7	5C	1209.7 1215.7	54.8	50.82
SD Size	72"			SD Size	42"		
1C	1814.3 1820.3	152	150	6C	1425.2 1431.2	56.7	51.49
SD Size	48"			SD Size	36"		
OUTFALL	1904.7	155	150.54	7C	1683 1687	57.9	53.8
To First Flush Pond				SD Size	36"		
				8C	1725.6	58.9	54.01
				SD Size	36"		
				9C	1926.9	59.6	54.91
				SD Size	36"		
				10C	1965.2 1969.2	60.5	55.86
				SD Size	24"		
				11C	2021.2 2025.2	58.5	57.1
				SD Size	24"		
				12C	2203.2	59	57.8
				SD Size	24"		
				13C	2281.3	61.5	58.11



Upstream Direction



Upstream Direction

[illegible]

Program Package Serial Number: 1454

Date: 3- 7-2018 Time: 9:26:12

WATER SURFACE PROFILE LISTING

Heritage Trails Storm Drain

Outfall Pond 10 to SD C POND

File: HT-GRASS POND.WSW

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						HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1000.000	5134.000	1.646	5135.646	460.53	21.53	7.20	5142.85	.00	3.39	13.00	7.500	13.000	.00	0 .0
TRANS STR	.0125					.0230	.18	1.65	2.96		.014	.00	.00	RECTANG
1008.000	5134.100	3.095	5137.195	460.53	19.84	6.11	5143.31	.00	4.89	7.50	7.500	7.500	.00	0 .0
JUNCT STR	.4982					.0110	.00	3.10	1.99		.013	.00	.00	RECTANG
----- WARNING - Junction Analysis - Change in Channel Type -----														
1008.100	5134.150	5.656	5139.806	460.53	15.02	3.51	5143.31	.00	5.66	4.37	6.500	.000	.00	1 .0
31.521	.0048					.0069	.22	5.66	1.00	6.50	.013	.00	.00	PIPE
1039.621	5134.300	6.040	5140.340	460.53	14.33	3.19	5143.53	.00	5.66	3.33	6.500	.000	.00	1 .0
115.253	.0048					.0071	.81	6.04	.81	6.50	.013	.00	.00	PIPE
1154.874	5134.851	6.500	5141.351	460.53	13.88	2.99	5144.34	.00	5.66	.00	6.500	.000	.00	1 .0
52.226	.0048					.0076	.40	6.50	.00	6.50	.013	.00	.00	PIPE
1207.100	5135.100	6.693	5141.793	460.53	13.88	2.99	5144.78	.00	5.66	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0071	.07	6.69	.00		.013	.00	.00	PIPE
1217.100	5135.200	7.510	5142.709	423.77	12.77	2.53	5145.24	.00	5.47	.00	6.500	.000	.00	1 .0
190.300	.0068					.0065	1.24	7.51	.00	5.20	.013	.00	.00	PIPE
1407.400	5136.500	7.579	5144.080	423.77	12.77	2.53	5146.61	.00	5.47	.00	6.500	.000	.00	1 .0
JUNCT STR	.0100					.0051	.05	7.58	.00		.013	.00	.00	PIPE

1E

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WATER SURFACE PROFILE LISTING

Date: 3-7-2018 Time: 9:26:12

Heritage Trails Storm Drain

Outfall Pond 10 to SD C POND

File: HT-GRASS POND.WSW

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El	Super Elev	Critical Depth	Flow Top Width	Height/ Base Wt Dia.-FT or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Proude N	Norm Dp	"N"	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1417.400	5136.600	9.683	5146.283	321.37	9.68	1.46	5147.74	.00	4.81	.00	6.500	.00	1 .0
177.000	.0023					.0038	.67	9.68	.00	6.50	.013	.00	PIPE
1594.400	5137.000	10.102	5147.103	321.37	9.68	1.46	5148.56	.00	4.81	.00	6.500	.00	1 .0
184.500	.0059					.0038	.69	10.10	.00	4.40	.013	.00	PIPE
1778.900	5138.080	9.870	5147.950	321.37	9.68	1.46	5149.41	.00	4.81	.00	6.500	.00	1 .0
JUNCT STR	.0125					.0022	.02	9.87	.00		.013	.00	PIPE
1786.900	5138.180	12.518	5150.698	107.81	3.81	.23	5150.92	.00	2.80	.00	6.000	.00	1 .0
27.400	.0128					.0006	.02	12.52	.00	1.94	.013	.00	PIPE
1814.300	5138.530	12.235	5150.765	107.81	3.81	.23	5150.99	.00	2.80	.00	6.000	.00	1 .0
JUNCT STR	.3333					.0031	.02	12.23	.00		.013	.00	PIPE
1820.300	5140.530	9.472	5150.002	107.81	8.58	1.14	5151.15	.00	3.14	.00	4.000	.00	1 .0
84.400	.0174					.0056	.48	9.47	.00	2.16	.013	.00	PIPE
1904.700	5142.000	8.535	5150.535	107.81	8.58	1.14	5151.68	.00	3.14	.00	4.000	.00	1 .0

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Q	13.200	.0
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Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 2-2018 Time:10:50:27

Heritage Trails Unit 1 Storm Drain

Grass Mountain- Winsor

Outfall to First Flush Pond

*****														*****														*****														*****													
Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Flow Top Dia.-FT	Height/ 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																																									
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****																																									
1000.000	5142.000	1.664	5143.664	91.90	18.58	5.36	5149.02	.00	2.91	3.94	4.000	.000	.00	1 .0																																									
5.209	.0627					.0304	.16	1.66	2.92	1.38	.013	.00	.00	PIPE																																									
1005.209	5142.327	1.687	5144.014	91.90	18.23	5.16	5149.18	.00	2.91	3.95	4.000	.000	.00	1 .0																																									
11.668	.0627					.0279	.33	1.69	2.85	1.38	.013	.00	.00	PIPE																																									
1016.877	5143.058	1.750	5144.808	91.90	17.39	4.69	5149.50	.00	2.91	3.97	4.000	.000	.00	1 .0																																									
9.493	.0627					.0245	.23	1.75	2.65	1.38	.013	.00	.00	PIPE																																									
1026.370	5143.653	1.814	5145.467	91.90	16.58	4.27	5149.73	.00	2.91	3.98	4.000	.000	.00	1 .0																																									
7.770	.0627					.0215	.17	1.81	2.48	1.38	.013	.00	.00	PIPE																																									
1034.140	5144.141	1.882	5146.023	91.90	15.81	3.88	5149.90	.00	2.91	3.99	4.000	.000	.00	1 .0																																									
6.436	.0627					.0189	.12	1.88	2.31	1.38	.013	.00	.00	PIPE																																									
1040.576	5144.544	1.953	5146.497	91.90	15.07	3.53	5150.02	.00	2.91	4.00	4.000	.000	.00	1 .0																																									
5.336	.0627					.0167	.09	1.95	2.15	1.38	.013	.00	.00	PIPE																																									
1045.911	5144.878	2.028	5146.907	91.90	14.37	3.21	5150.11	.00	2.91	4.00	4.000	.000	.00	1 .0																																									
4.446	.0627					.0147	.07	2.03	2.00	1.38	.013	.00	.00	PIPE																																									
1050.357	5145.157	2.106	5147.263	91.90	13.70	2.91	5150.18	.00	2.91	3.99	4.000	.000	.00	1 .0																																									
3.677	.0627					.0129	.05	2.11	1.86	1.38	.013	.00	.00	PIPE																																									
1054.034	5145.388	2.188	5147.576	91.90	13.06	2.65	5150.23	.00	2.91	3.98	4.000	.000	.00	1 .0																																									
3.020	.0627					.0114	.03	2.19	1.73	1.38	.013	.00	.00	PIPE																																									

Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3-2-2018 Time: 10:50:27

Heritage Trails Unit 1 Storm Drain

Grass Mountain- Winsor

Outfall to First Flush Pond

Station	Invert Elev	Depth (Ft)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Base Wt Dia.-FT or I.D.	No Wth Prs/Pip
L/Elem	Ch slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N" X-Fall	ZR Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1057.055	5145.577	2.274	5147.851	91.90	12.45	2.41	5150.26	.00	2.91	3.96	4.000	.00 1 .0
2.414	.0627					.0101	.02	2.27	1.61	1.38	.013	.00 PIPE
1059.468	5145.729	2.366	5148.095	91.90	11.87	2.19	5150.28	.00	2.91	3.93	4.000	.00 1 .0
1.917	.0627					.0089	.02	2.37	1.49	1.38	.013	.00 PIPE
1061.385	5145.849	2.462	5148.311	91.90	11.32	1.99	5150.30	.00	2.91	3.89	4.000	.00 1 .0
1.423	.0627					.0079	.01	2.46	1.38	1.38	.013	.00 PIPE
1062.808	5145.938	2.565	5148.503	91.90	10.80	1.81	5150.31	.00	2.91	3.84	4.000	.00 1 .0
.992	.0627					.0070	.01	2.57	1.28	1.38	.013	.00 PIPE
1063.800	5146.000	2.674	5148.674	91.90	10.29	1.65	5150.32	.00	2.91	3.77	4.000	.00 1 .0
54.939	.0068					.0063	.35	2.67	1.18	2.64	.013	.00 PIPE
1118.739	5146.375	2.779	5149.155	91.90	9.86	1.51	5150.66	.00	2.91	3.68	4.000	.00 1 .0
9.461	.0068					.0056	.05	2.78	1.09	2.64	.013	.00 PIPE
1128.200	5146.440	2.906	5149.346	91.90	9.40	1.37	5150.72	.00	2.91	3.57	4.000	.00 1 .0
JUNCT STR	.0167							2.91	1.00		.013	.00 PIPE
1134.200	5146.540	2.596	5149.136	82.10	9.51	1.41	5150.54	.00	2.75	3.82	4.000	.00 1 .0
32.000	.0059					.0055	.18	2.60	1.11	2.57	.013	.00 PIPE
1166.200	5146.730	2.682	5149.413	82.10	9.16	1.30	5150.72	.00	2.75	3.76	4.000	.00 1 .0
JUNCT STR	.0833					.0056	.03	2.68	1.05		.013	.00 PIPE

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Program Package Serial Number: 1454

WATER SURFACE PROFILE LISTING

Date: 3- 2-2018 Time:10:50:27

Heritage Trails Unit 1 Storm Drain

Grass Mountain- Winsor

Outfall to First Flush Pond

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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1172.200	5147.230	2.631	5149.861	70.50	9.09	1.28	5151.14	.00	2.63	3.02	3.500	.000	.00	1 .0
	.0009					.0059	.00	2.63	1.00	2.63	.013	.00	.00	PIPE
1172.200	5147.230	2.631	5149.861	70.50	9.09	1.28	5151.14	.00	2.63	3.02	3.500	.000	.00	1 .0
37.500	.0059					.0058	.22	2.63	1.00	2.63	.013	.00	.00	PIPE
1209.700	5147.450	2.631	5150.082	70.50	9.09	1.28	5151.36	.00	2.63	3.02	3.500	.000	.00	1 .0
JUNCT STR	.0166					.0046	.03	2.63	1.00		.013	.00	.00	PIPE
1215.700	5147.550	3.266	5150.815	62.10	6.65	.69	5151.50	.00	2.47	1.75	3.500	.000	.00	1 .0
80.360	.0052					.0034	.27	3.27	.51	2.50	.013	.00	.00	PIPE
1295.060	5147.964	3.054	5151.018	62.10	6.97	.75	5151.77	.00	2.47	2.33	3.500	.000	.00	1 .0
57.999	.0052					.0036	.21	3.05	.63	2.50	.013	.00	.00	PIPE
1354.059	5148.263	2.889	5151.152	62.10	7.31	.83	5151.98	.00	2.47	2.66	3.500	.000	.00	1 .0
49.959	.0052					.0040	.20	2.89	.72	2.50	.013	.00	.00	PIPE
1404.018	5148.520	2.746	5151.266	62.10	7.67	.91	5152.18	.00	2.47	2.88	3.500	.000	.00	1 .0
21.182	.0052					.0042	.09	2.75	.81	2.50	.013	.00	.00	PIPE
1425.200	5148.630	2.686	5151.316	62.10	7.84	.95	5152.27	.00	2.47	2.96	3.500	.000	.00	1 .0
JUNCT STR	.0833					.0055	.03	2.69	.84		.013	.00	.00	PIPE
1431.200	5149.130	2.363	5151.493	52.10	8.72	1.18	5152.67	.00	2.35	2.45	3.000	.000	.00	1 .0
12.647	.0050					.0063	.08	2.36	.99	3.00	.013	.00	.00	PIPE

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Date: 3- 2-2018 Time:10:50:27

WATER SURFACE PROFILE LISTING

Heritage Trails Unit 1 Storm Drain

Grass Mountain- Winsor

Outfall to First Flush Pond

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 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
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
1443.847	5149.194	2.486	5151.680	52.10	8.32	1.07	5152.75	.00	2.35	2.26	3.000	.000	.00	1 .0
65.881	.0050					.0057	.38	2.49	.88	3.00	.013	.00	.00	PIPE
1509.728	5149.526	2.630	5152.156	52.10	7.93	.98	5153.13	.00	2.35	1.97	3.000	.000	.00	1 .0
173.272	.0050					.0054	.94	2.63	.77	3.00	.013	.00	.00	PIPE
1683.000	5150.400	2.759	5153.159	52.10	7.66	.91	5154.07	.00	2.35	1.63	3.000	.000	.00	1 .0
JUNCT STR	.0250					.0047	.02	2.76	.66		.013	.00	.00	PIPE
1687.000	5150.500	3.299	5153.799	42.90	6.07	.57	5154.37	.00	2.13	.00	3.000	.000	.00	1 .0
38.600	.0052					.0041	.16	3.30	.00	2.21	.013	.00	.00	PIPE
1725.600	5150.700	3.317	5154.017	42.90	6.07	.57	5154.59	.00	2.13	.00	3.000	.000	.00	1 .0
201.300	.0055					.0041	.83	3.32	.00	2.16	.013	.00	.00	PIPE
1926.900	5151.800	3.109	5154.909	42.90	6.07	.57	5155.48	.00	2.13	.00	3.000	.000	.00	1 .0
38.300	.0078					.0041	.16	3.11	.00	1.90	.013	.00	.00	PIPE
1965.200	5152.100	3.026	5155.126	42.90	6.07	.57	5155.70	.00	2.13	.00	3.000	.000	.00	1 .0
JUNCT STR	.2500					.0065	.03	3.03	.00		.013	.00	.00	PIPE
1969.200	5153.100	2.765	5155.865	21.20	6.75	.71	5156.57	.00	1.65	.00	2.000	.000	.00	1 .0
52.000	.0054					.0088	.46	2.77	.00	2.00	.013	.00	.00	PIPE
2021.200	5153.380	2.977	5156.357	21.20	6.75	.71	5157.06	.00	1.65	.00	2.000	.000	.00	1 .0
JUNCT STR	.0250					.0061	.02	2.98	.00		.013	.00	.00	PIPE

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Date: 3-2-2018 Time: 10:50:27

WATER SURFACE PROFILE LISTING

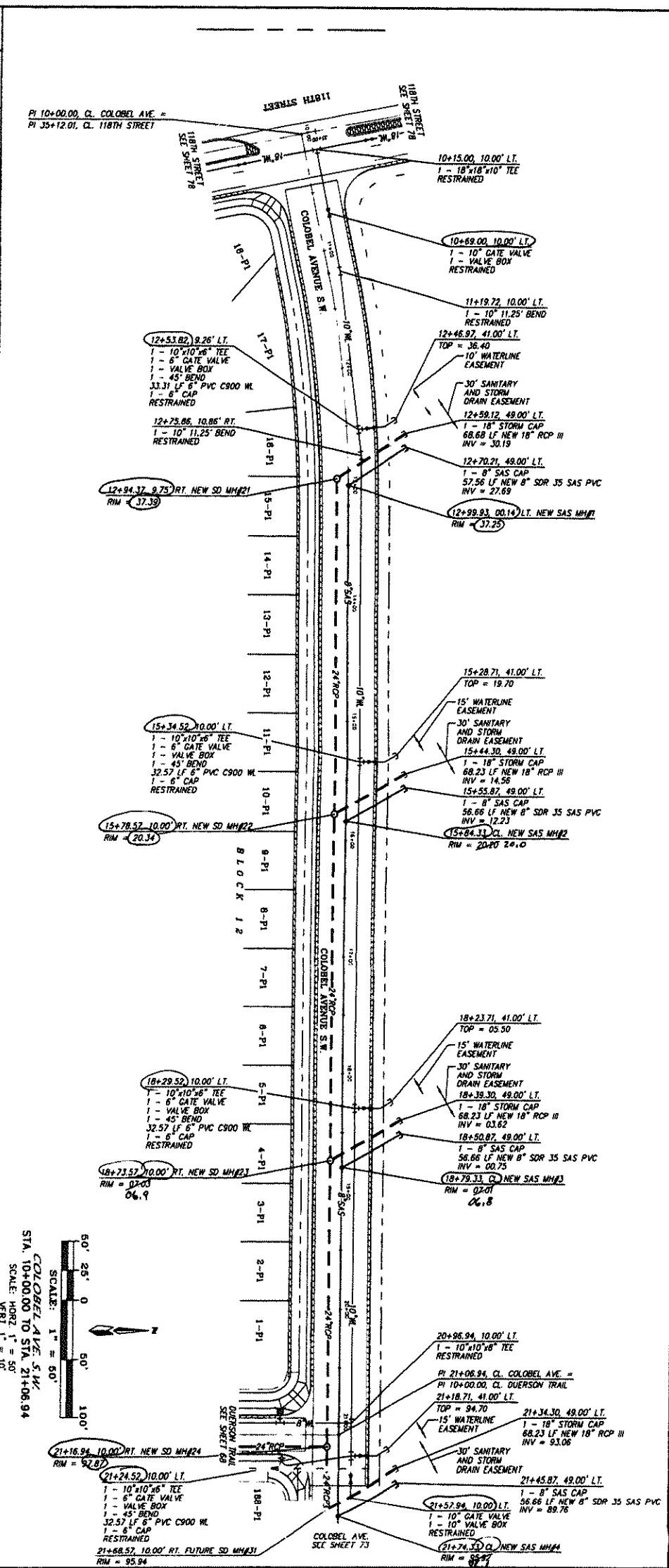
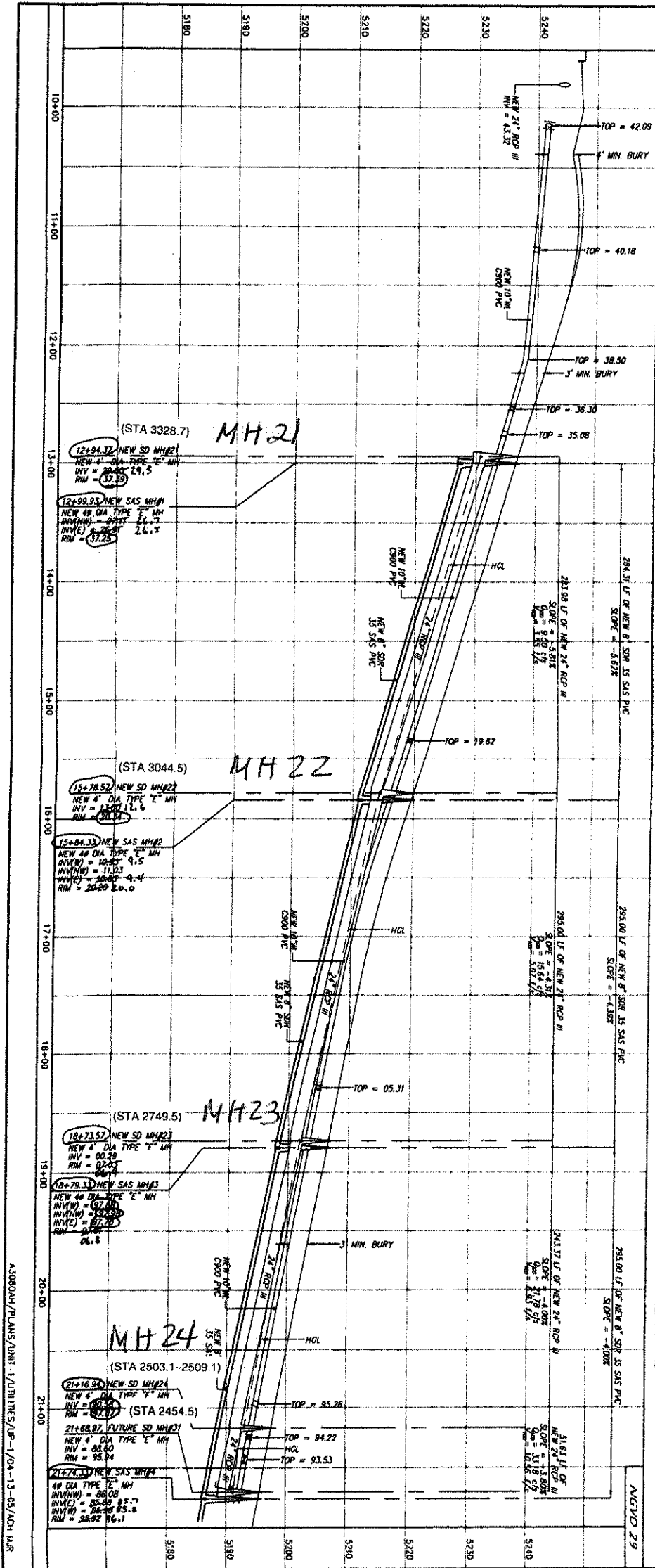
Heritage Trails Unit 1 Storm Drain

Grass Mountain- Winsor

Outfall to First Flush Pond

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Width	Top Dia.	Height or I.D.	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR Type Ch
2025.200	5153.480	3.616	5157.096	13.20	4.20	.27	5157.37	.00	1.31	.00	2.000	.000	.00 1 .0
178.000	.0052					.0034	.61	3.62	.00	1.37	.013	.00	.00 PIPE
2203.200	5154.400	3.397	5157.797	13.20	4.20	.27	5158.07	.00	1.31	.00	2.000	.000	.00 1 .0
78.100	.0050					.0034	.27	3.40	.00	1.39	.013	.00	.00 PIPE
2281.300	5154.790	3.328	5158.118	13.20	4.20	.27	5158.39	.00	1.31	.00	2.000	.000	.00 1 .0

12C13C



CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
UTILITY IMPROVEMENTS
ANDERSON HEIGHTS S.W.
COLOBEL AVE. S.W.

DESIGNER: GJK
CHECKED BY: DMG
DATE: 06/04

NO. DATE REMARKS BY

DESIGN REVISIONS

DESIGNED BY: GJK DATE: 06/04
DRAWN BY: ACH DATE: 06/04
CHECKED BY: DMG DATE: 06/04

NOTES
1. ALL STATIONING IS CENTERLINE STATIONING.

RESTRAINED JOINT LENGTH FOR BENDS	RESTRAINED JOINT LENGTH FOR REDUCERS (F.T.)
PIPE SIZE	VALVE
6"	45"
8"	45"
10"	45"
12"	45"
14"	45"
16"	45"
18"	45"
20"	45"
24"	45"
30"	45"
36"	45"
42"	45"
48"	45"
54"	45"
60"	45"
66"	45"
72"	45"
78"	45"
84"	45"
90"	45"
96"	45"
102"	45"
108"	45"
114"	45"
120"	45"
126"	45"
132"	45"
138"	45"
144"	45"
150"	45"
156"	45"
162"	45"
168"	45"
174"	45"
180"	45"
186"	45"
192"	45"
198"	45"
204"	45"
210"	45"
216"	45"
222"	45"
228"	45"
234"	45"
240"	45"
246"	45"
252"	45"
258"	45"
264"	45"
270"	45"
276"	45"
282"	45"
288"	45"
294"	45"
300"	45"

ENGINEER'S SEAL

SURVEY INFORMATION

FIELD NOTES

NO. BY DATE

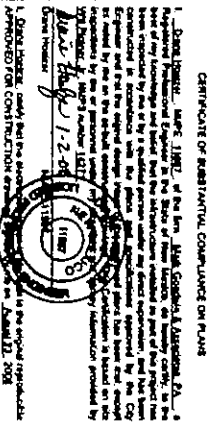
BENCH MARKS

AS BUILT INFORMATION

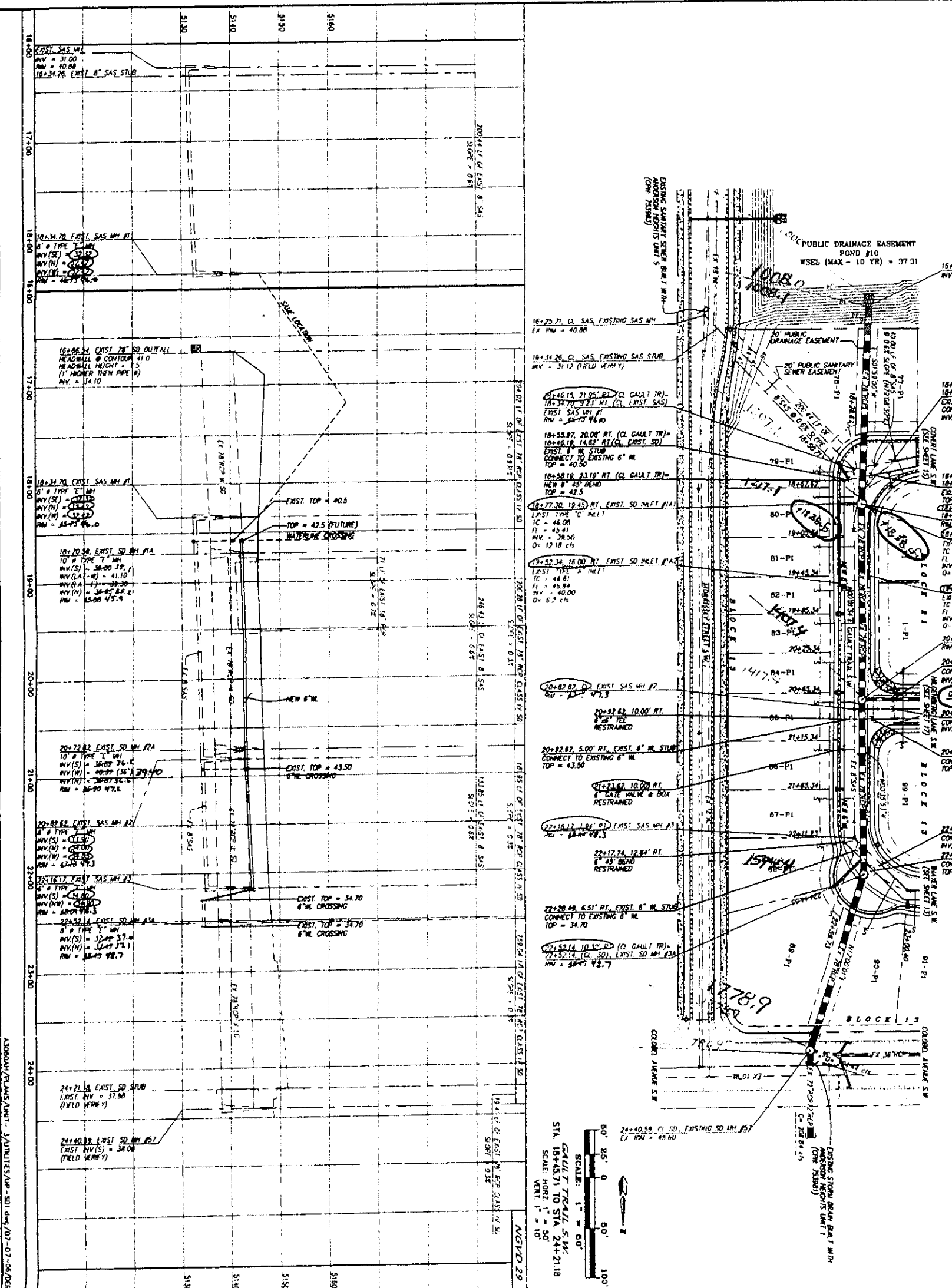
CONTRACTOR: FRANKLIN

DATE: 06/04

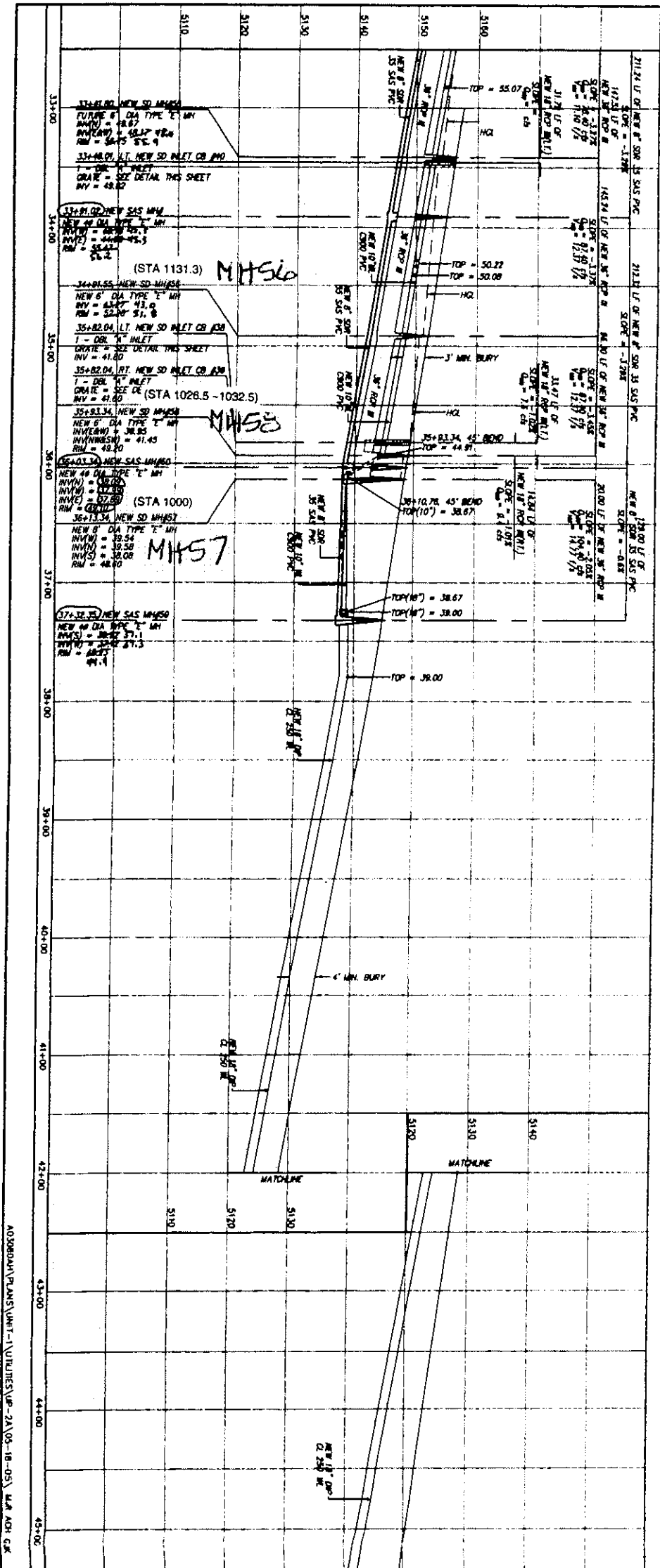
RECORDED BY: DATE: 06/04



NOTE: STORM DRAIN SANITARY SEWER AND WATERLINE CROSSINGS BUILT WITH ANDERSON HEIGHTS UNIT 3 (27% TYPICAL) AS A WORK ORDER CHANGE.



CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT ANDERSON HEIGHTS UNIT 3 GULF TRAIL S.W. UTILITY IMPROVEMENTS		PROJECT NO. 753983 DATE 10/11/00 DESIGNED BY DLM DRAWN BY DER CHECKED BY DMG	
RESTRAINED JOINT LENGTH FOR BENDS VALUES: 90° 45' 22.5' 11.25' 45'		EXISTING SANITARY SEWER SERVICES BLOCK LOT STATION INV. ELEV. AT PUE. LENGTH AT PUE.	
RESTRAINED JOINT LENGTH FOR TEES VALUES: 90° 45' 22.5' 11.25' 45'		SECTION 29 SCALE: 1" = 100'	
REVISIONS NO. DATE REMARKS		ENGINEER'S SEAL DAVID L. HESTER STATE OF NEW MEXICO LICENSE NO. 12000 EXPIRATION DATE 12-12-00	
DESIGNED BY DLM DRAWN BY DER CHECKED BY DMG		DATE 05/06 DATE 05/06 DATE 05/06	
CONTRACTOR WORK STARTED BY: [Signature] ACCEPTED BY: [Signature] DATE: [Date]		AS BUILT INFORMATION RECORDED BY: [Signature] DATE: [Date]	



CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT

ANDERSON HEIGHTS - UNIT 1
UTILITY IMPROVEMENTS

COLONEL AVENUE S.W.

753981

74-83

ENGINEER'S SEAL

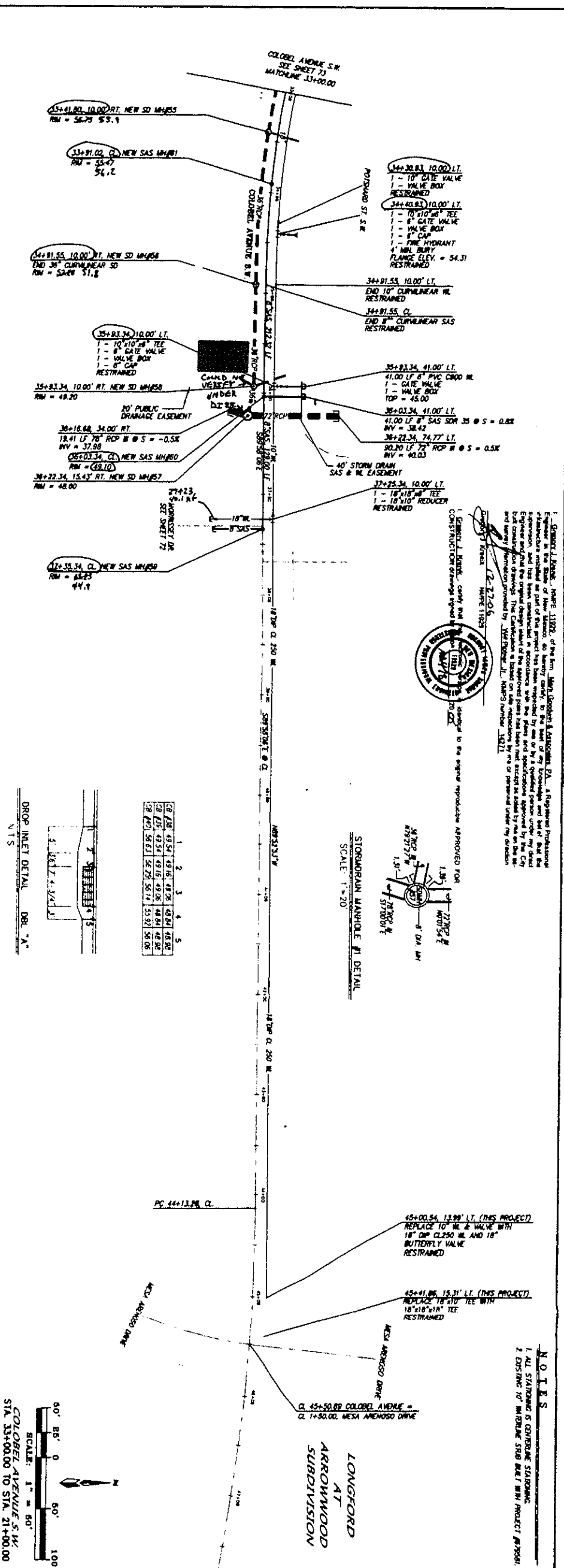
MARK OGDON & ASSOCIATES, P.A.
P.O. BOX 80606
ALBUQUERQUE, NEW MEXICO 87189
(505) 263-7200 FAX (505) 797-8534

DESIGNED BY: GJK
DRAWN BY: ACH
CHECKED BY: DMG

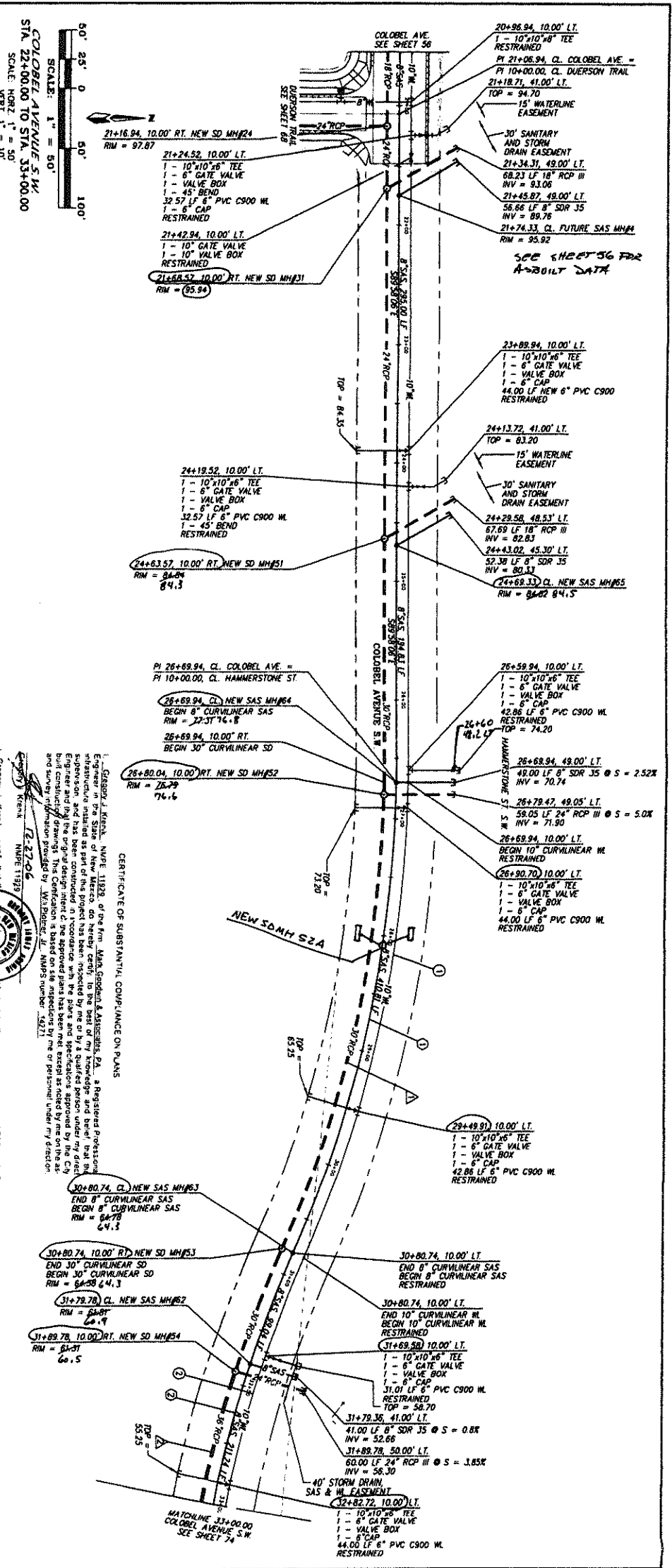
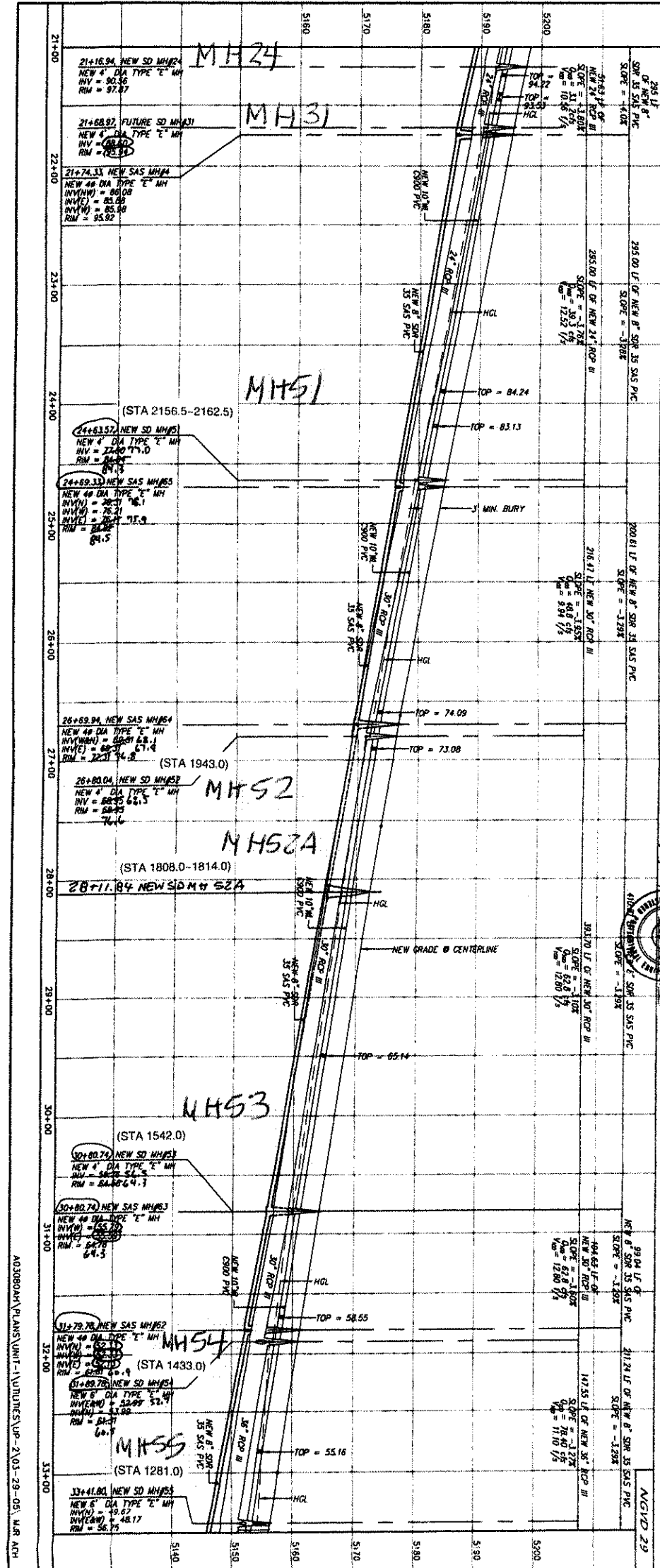
DATE: 08/05

REVISIONS

NO.	DATE	REMARKS	BY
1	08/05	DESIGN	GJK
2	08/05	DATE	ACH
3	08/05	DATE	DMG



SURVEY INFORMATION			BENCH MARKS		AS-BUILT INFORMATION	
FIELD NOTES						
NO.	BY	DATE			CONTRACTOR	DATE
1	BY	DATE			753981	08/05
2	BY	DATE			753981	08/05
3	BY	DATE			753981	08/05
4	BY	DATE			753981	08/05
5	BY	DATE			753981	08/05
6	BY	DATE			753981	08/05
7	BY	DATE			753981	08/05
8	BY	DATE			753981	08/05
9	BY	DATE			753981	08/05
10	BY	DATE			753981	08/05



CITY PROJECT NO.		ZONE MAP NO.		SHEET	
753981		N-8/P-8		73 OF 83	
DESIGN REVIEW COMMITTEE					
CITY ENGINEER APPROVAL					
CITY ENGINEER					
LAST DESIGN UPDATE					
NO. DATE					
REVISIONS					
DESIGN					
DESIGNED BY					
DATE					
DRAWN BY					
DATE					
CHECKED BY					
DATE					
ENGINEER'S SEAL					
SURVEY INFORMATION					
FIELD NOTES					
NO. BY DATE					
BENCH MARKS					
STATION 3+100 IS LOCATED 5.9 MI. SW OF DOWNTOWN ALBUQUERQUE TO REACH STATION FROM INT. OF COORS AND DENNIS CHAVEZ BLVD. (FORMERLY RIO BRAVO). GO S. ON COORS BLVD. 0.62 MI. TO THE STATION WHICH IS ON AN EARTHEN BERM 162.2' WEST OF THE CENTERLINE OF COORS BLVD. THE STATION IS A STANDARD ACS 3 1/4" ALUMINUM CAP PLACED TO A PIPE 0.25' ABOVE THE GROUND AND IS STAMPED "3+100, 1988".					
X=360733.56, Y=1462437.48 (NAD 27) ELEV=4935.735 (SLD 28)					
AS BUILT INFORMATION					
CONTRACTOR					
STARTED					
INSPECTOR'S					
ACCEPTANCE BY					
DATE					
FIELD					
VERIFICATION BY					
DATE					
DRAWINGS					
CORRECTED BY					
DATE					
MICRO-FILM INFORMATION					
RECORDED BY					
DATE					
NO.					

NOTES

1. ALL STATIONING IS CENTERLINE STATIONING.

CURVE DATA - DESIGNS STORM DRAIN

① Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

② Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

③ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

④ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑤ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑥ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

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⑧ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

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⑩ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑪ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑫ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑬ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑭ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑮ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

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⑰ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

⑱ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

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㊸ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

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㊺ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

㊻ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

㊼ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

㊽ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

㊾ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

㊿ Δ = 233°15' R = 100.00' L = 100.00' T = 100.00'

RESTRAINED JOINT LENGTHS FOR REDUCERS (FT)

PIPE SIZE LARGE SIDE SMALL SIDE

10" X 6" 4' 4"

RESTRAINED JOINT LENGTH FOR TEES (FT)

PIPE SIZE RUN BRANCH

10" X 10" 15' 5'

10" X 10" 6' 1'

6" X 6" 10' 2'

CERTIFICATION

THE CHANGES SHOWN HEREON ARE BASED UPON A FIELD SURVEY CONDUCTED BY ME OR UNDER MY SUPERVISION AND REFLECT THE LOCATION OF THE UTILITY AS SHOWN ON THE PLANS TO THE BEST OF MY KNOWLEDGE AND BELIEF.

MARK GOODMAN & ASSOCIATES, P.A.

REGISTERED PROFESSIONAL ENGINEER

ALBUQUERQUE, NEW MEXICO 87109

(505) 828-2200, FAX (505) 797-8539

CITY OF ALBUQUERQUE

PUBLIC WORKS DEPARTMENT

ANDERSON HEIGHTS - UNIT 1

COLOMBIA AVENUE S.W.

UTILITY IMPROVEMENTS

DESIGN REVIEW COMMITTEE

CITY ENGINEER APPROVAL

CITY ENGINEER

LAST DESIGN UPDATE

NO. DATE

REVISIONS

DESIGN

DESIGNED BY

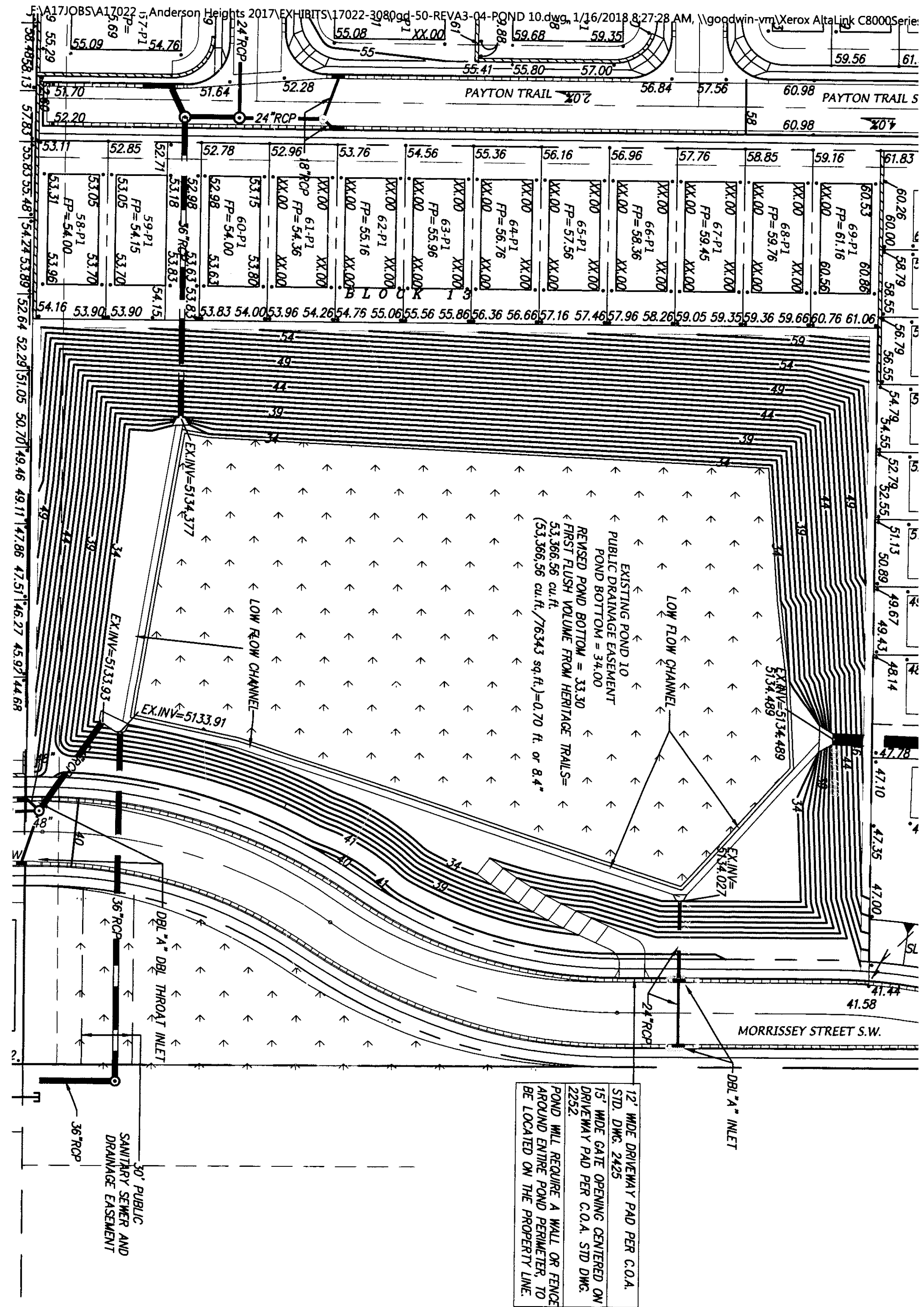
DATE

DRAWN BY

DATE

CHECKED BY

DATE



APPENDIX E –

EXISTING DRAINAGE COVENANT *(recorded 9-18-08)*

For Onsite Temporary Interim Ponds

FEMA Offsite Powerline Ponds Exhibit

(NO PUBLIC EASEMENT)

DRAINAGE COVENANT

9/17/08

This Drainage Covenant ("Covenant"), between KB HOME New Mexico, Inc. ("Owner"), whose address is 6330 Riverside Plaza Lane, NW, Suite 200, Albuquerque, NM 87120 and the City of Albuquerque, New Mexico, a municipal corporation ("City"), whose address is P.O. Box 1293, Albuquerque, New Mexico 87103, is made in Albuquerque, Bernalillo County, New Mexico and is entered into as of the date Owner signs this Covenant.

1. **Recital.** Owner is the owner of certain real property described as:

Ponds #1, #4, #5, #6 and #7

*A portion of Parcel 4, Anderson Heights, Unit 1,
recorded in the Bernalillo County Clerk's office 5/4/2006, Book 2005C, Page 138;*

Ponds #2, #3 and #8

*A portion of Parcel 6A, Anderson Heights, Unit 9,
recorded in the Bernalillo County Clerk's office 10/9/2007, Book 2007C, Page O291;*

Pond #9

*Lots 62-66, Block 1 and portions of Lots 59-63, Block 5, Anderson Heights, Unit 9,
recorded in the Bernalillo County Clerk's office 10/9/2007, Book 2007C, Page O291;*

Pond #10

*Lots 11-16, Block 2, Anderson Heights, Unit 9,
recorded in the Bernalillo County Clerk's office 10/9/2007, Book 2007C, Page O291*

in Bernalillo County, New Mexico (the "Property"). (Give legal description and filing information).

Pursuant to City ordinances, regulations and other applicable laws, the Owner is required to construct and maintain certain drainage facilities ("Drainage Facility") on the Property, and the parties wish to enter into this Covenant to establish the obligations and responsibilities of the parties.

2. **Description and Construction of Drainage Facilities.** Owner shall construct the following Drainage Facility within the Property at Owner's sole expense in accordance with the standard plans and specifications approved by the City pursuant to Drainage File No. N8 / D3B

Ten (10) retention ponds and nine (9) berms

The Drainage Facility is more particularly described in the attached Exhibit A. The Owner will not permit the Drainage Facility to constitute a hazard to the health or safety of the general public.

3. **Maintenance of Drainage Facility.** The Owner will maintain the Drainage Facility at the Owner's cost in accordance with the approved Drainage Report and plans.

4. **City's Right of Entry.** The City has the right to enter upon the Property at any time

Doc# 2008103543

09/18/2008 03:40 PM Page: 1 of 6
COV R:\$19.00 M. Toulouse Oliver, Bernalillo County



and perform whatever inspection, maintenance or repair of the Drainage Facility it deems appropriate, without liability to the Owner.

5. Demand for Construction or Repair. The City may send written notice ("Notice") to the Owner requiring the Owner to construct or repair the Drainage Facility within thirty (30) days ("Deadline") of receipt of the Notice, as provided in Section 11, and the Owner will comply promptly with the requirements of the Notice. The Owner will perform all required work by the Deadline, at Owner's sole expense.

6. Failure to Perform by Owner and Emergency Work by City. If the Owner fails to comply with the terms of the Notice by the Deadline, or if the City determines that an emergency condition exists, the City may perform the work itself. The City may assess the Owner for the cost of the work and for any other expenses or damages, which result from Owner's failure to perform. The Owner agrees promptly to pay the City the amount assessed. If the Owner fails to pay the City within thirty (30) days after the City gives the Owner written notice of the amount due, the City may impose a lien against Owner's Property for the total resulting amount.

7. Liability of City for Repair after Notice or as a Result of Emergency. The City shall not be liable to the Owner for any damages resulting from the City's maintenance or repair following Notice to the Owner as required in this Covenant or in an emergency unless the damages are the result of the reckless conduct or gross negligence of the City

8. Indemnification. The Owner agrees to indemnify and save the City, its officials, agents and employees harmless from all claims, actions, suits and proceedings arising out of, or resulting from the Owner's negligent maintenance, construction, repair or use of the Drainage Facility. To the extent, if at all, Section 56-7-1 NMSA 1978 is applicable to this Covenant, this Covenant to indemnify will not extend to liability, claims, damages, losses or expenses, including attorneys' fees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications by the Owner or its agents or employees; or (2) the giving of or the failure to give directions or instructions by the Owner, where such giving or failure to give directions or instructions is the primary cause of bodily injury to persons or damage to property.

9. Cancellation of Agreement and Release of Covenant. This Covenant may be released if the Drainage Facility is no longer required for the protection of the public health, safety and welfare by the City filing a "Notice of Release" with the Bernalillo County Clerk. The Notice of Release must be signed by the City's Chief Administrative Officer or his designee, and the approval of the City Hydrologist must be endorsed thereon.

10. Assessment. Nothing in this Covenant shall be construed to relieve the Owner, its heirs, assigns and successors from an assessment against the Owner's Property for improvements to the Property under a duly authorized and approved Special Assessment District. The parties specifically agree that the value of the Drainage Facility will not reduce the amount assessed by the City.

11. Notice. For purposes of giving formal written notice to the Owner, Owner's address is:

*KB HOME New Mexico, Inc.
6330 Riverside Plaza Lane NW, Suite 200
Albuquerque, NM 87120*

Notice may be given to the Owner either in person or by mailing the Notice by regular U.S. mail, postage paid. Notice will be considered to have been received by the Owner within three (3) days after the Notice is mailed if there is no actual evidence of receipt. The Owner may change Owner's address by giving written notice of the change by Certified Mail-Return Receipt Requested, to City Hydrologist, P.O. Box 1293, Albuquerque, New Mexico 87103.

12. Term. This Covenant shall continue until terminated by the City pursuant to Section 9 above.

13. Binding on Owner's Property. The covenants and obligations of the Owner set forth herein shall be binding on Owner, its heirs, personal representatives, assigns and successors and on Owner's Property and shall constitute covenants running with the Owner's Property until released by the City.

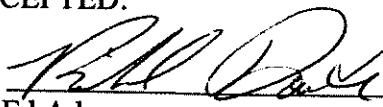
14. Entire Agreement. This Covenant contains the entire agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith regarding this subject matter.

15. Changes to Agreement. Changes to this Covenant are not binding unless made in writing, signed by both parties.

16. Construction and Severability. If any part of this Covenant is held to be invalid or unenforceable, the remainder of the Covenant will remain valid and enforceable if the remainder is reasonably capable of completion.

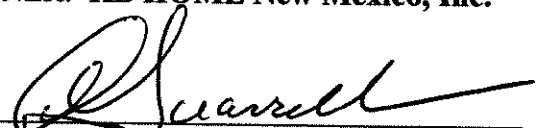
17. Captions. The captions to the sections or paragraphs of this Covenant are not part of this Covenant and will not affect the meaning of construction of any of its provisions.

CITY OF ALBUQUERQUE:
ACCEPTED:

By: 
Ed Adams
Chief Administrative Officer

Dated: 9-17-08

OWNER: **KB HOME New Mexico, Inc.**

By: 
Its: Vice President - LANY

Dated: 9.8.08


City Engineer

by 9/12/02

9-10-08

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

My Commission Expires:

10-07-12

Sandra Chans
Notary Public

STATE OF New Mexico)
) ss
COUNTY OF Bernalillo)

Simon Painslie
Notary Public

My Commission Expires:

9.10.12



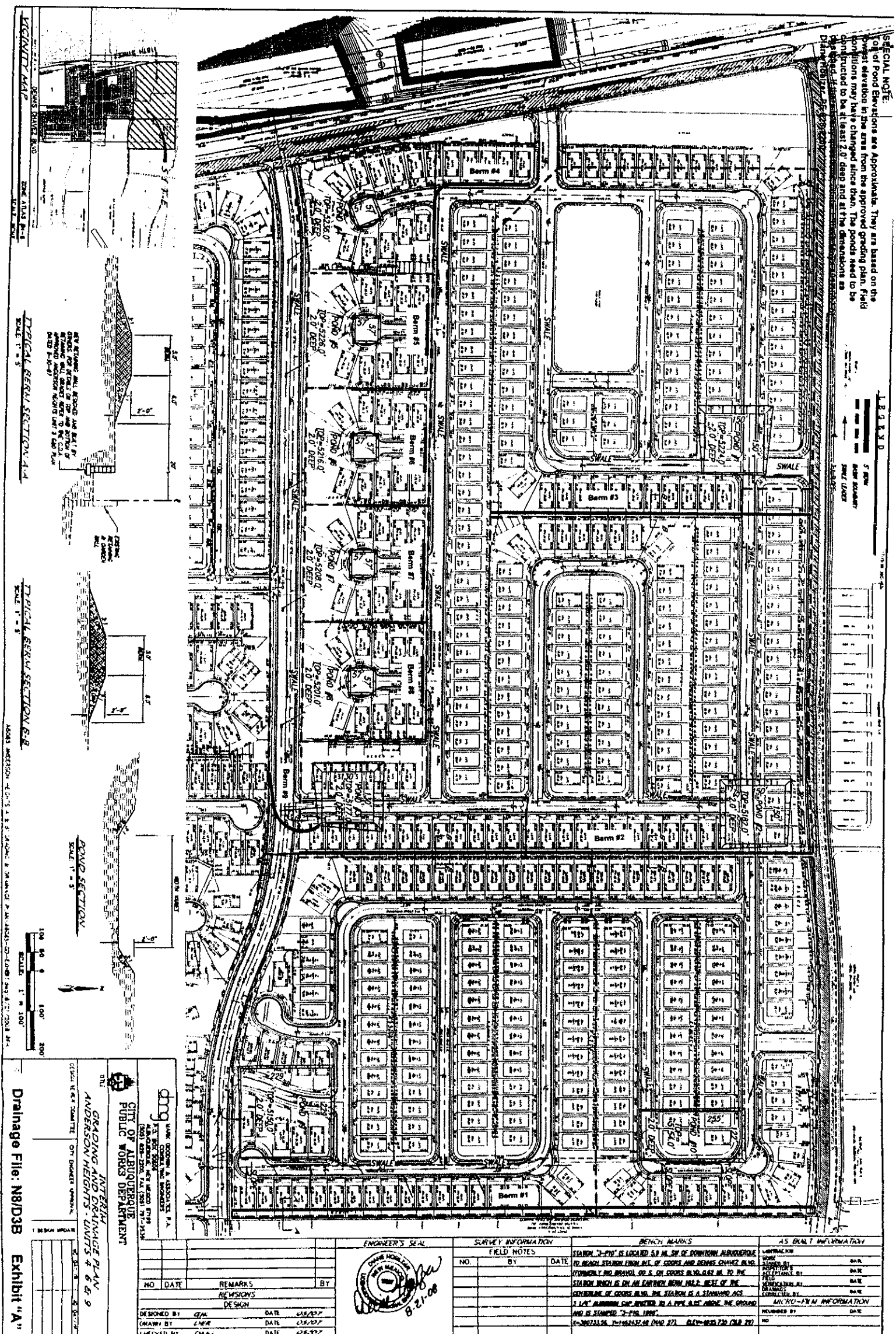
OFFICIAL SEAL

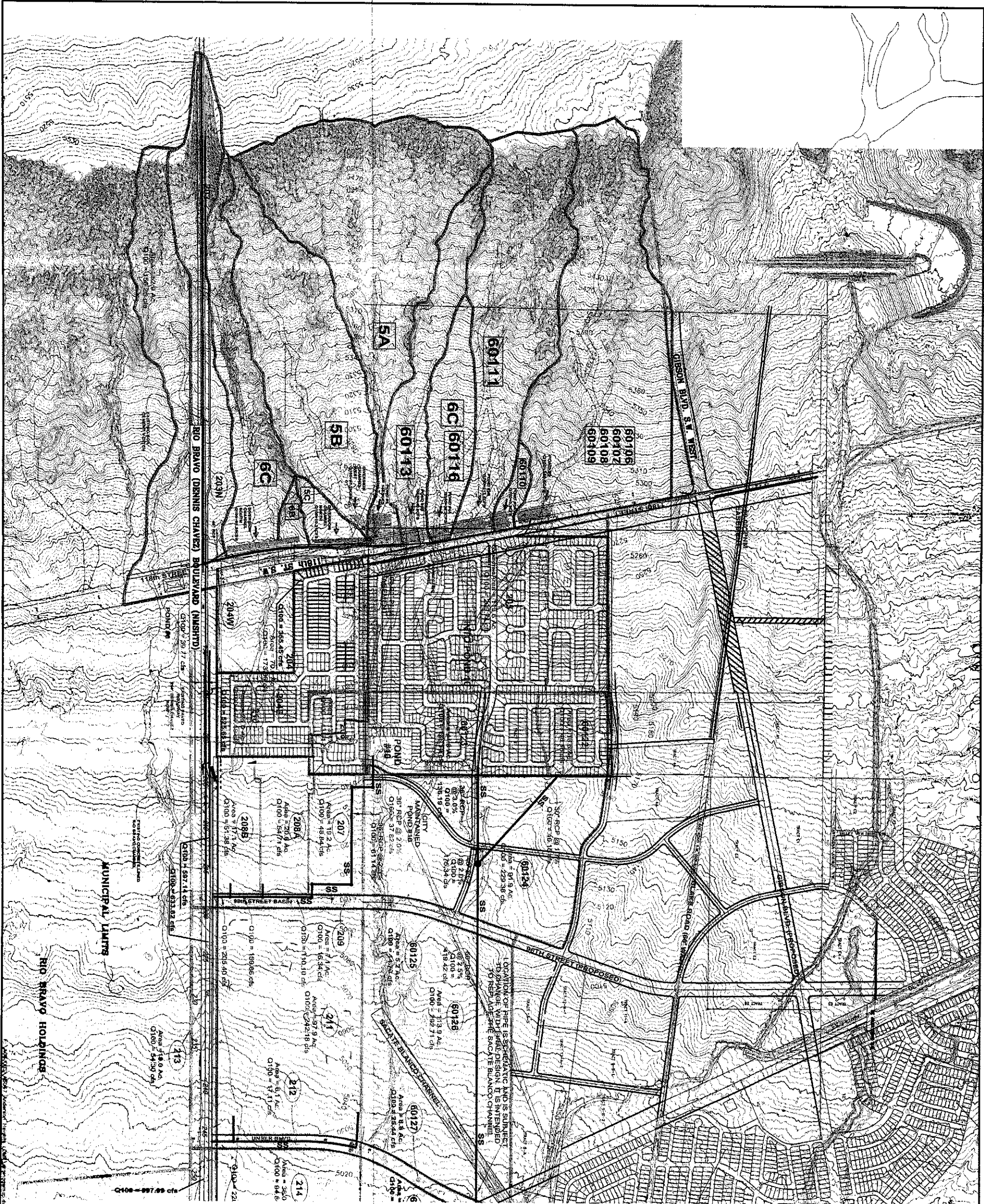
SUBJ: MURKIN

NOTARY PUBLIC STATE OF NEW MEXICO

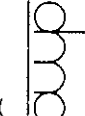
NY connection code: 4-10-12

(EXHIBIT A ATTACHED)



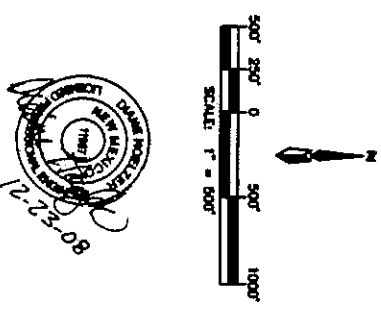


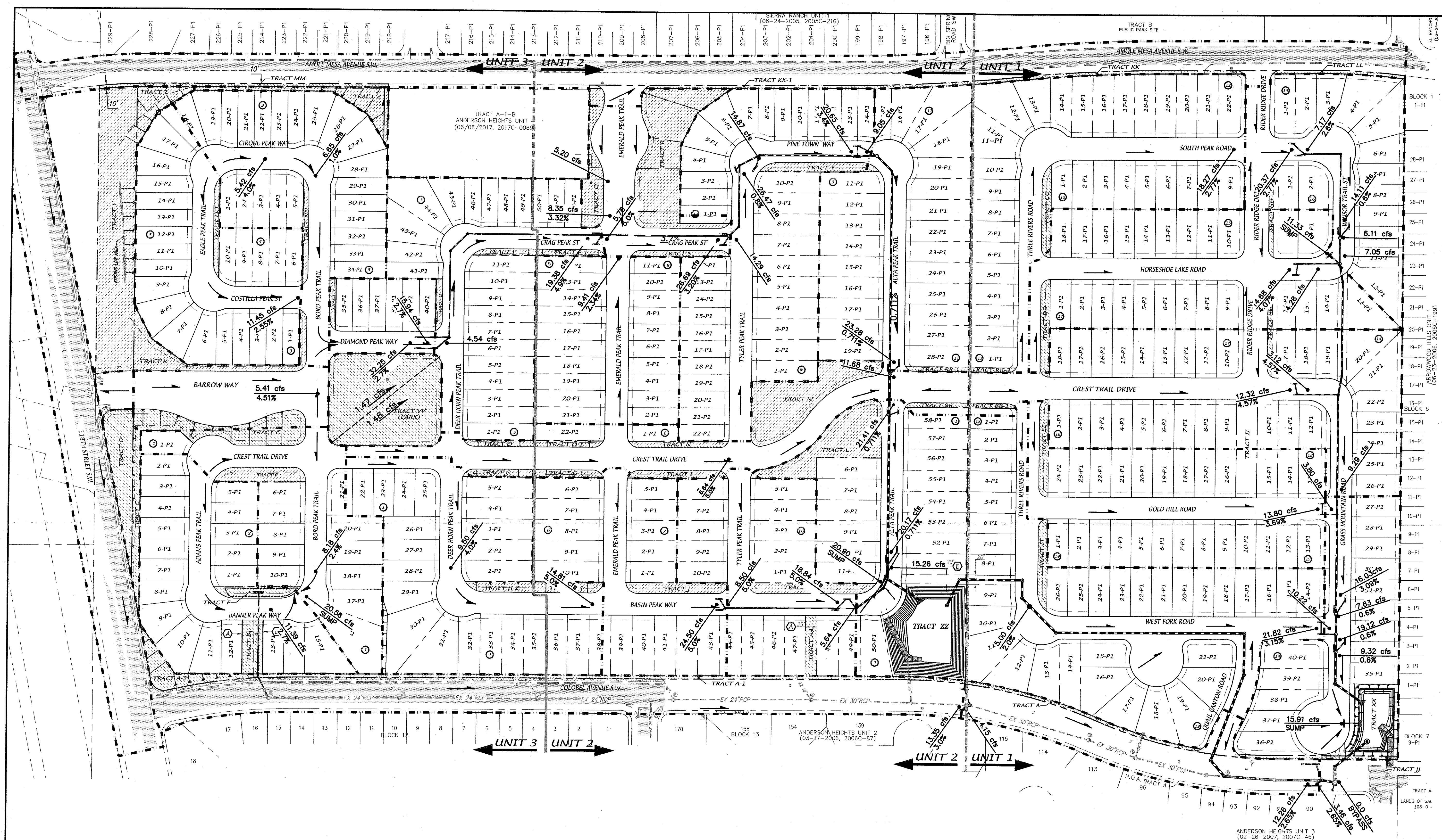
Anderson Heights
Drainage Map



MARK GOODMAN & ASSOCIATES, P.A.
CONSULTING ENGINEERS
P.O. BOX 90806
ALBUQUERQUE, NEW MEXICO 87199
(505)828-2200, FAX (505)797-9539

Designed	Drawn	SPS	Checked	DWC	Sheet	1 of 1
Scale: 1" = 500'	Date: 7/23/2006	Job:	AG0417			





AS BUILT INFORMATION			
CONTRACTOR	DATE	INSPECTOR'S	DATE
STANDARD	DATE	FIELD	DATE
VERIFICATION	DATE	CORRECTION	DATE
MICRO-FILM INFORMATION			
RECORDED BY	DATE	NO.	
BENCH MARKS			
AGRS MONUMENT & BENCHMARK "1-N8"	DATE	BY	
N=1470741.879, E=1488701.820			
G-G=0.999676466			
Aa=-0.01772770"			
CENTRAL ZONE			
ELEVATION=5307.250			
(NAD83/NAVD88)			
SURVEY INFORMATION			
FIELD NOTES	NO.	BY	
ENGINEER'S SEAL			
REMARKS	BY	DATE	
REVISIONS			
DESIGN			
DESIGNED BY DLH	DATE 12/17		
DRAWN BY DER	DATE 12/17		
CHECKED BY DMG	DATE 12/17		
CITY OF ALBUQUERQUE PUBLIC WORKS DEPARTMENT			
TITLE: HERITAGE TRAILS SUBDIVISION STREET CAPACITY EXHIBIT			
DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	MO./DAY/YR.	MO./DAY/YR.
CITY PROJECT NO.	ZONE MAP NO.	SHEET	OF
	N-8-Z	2	3

