

**CORRECTIVE ACTION MANAGEMENT UNIT
(CAMU) – STORM DRAIN
FINAL AS-BUILT
HENDERSON, NV**

Prepared for:



ENTACT Environmental Services, LLC
699 South Friendswood Dr.
Suite 101
Friendswood, TX. 77546
(281) 996-9892

Prepared by:



Absolute Boundary & Control Solutions
6440 Sky Point Drive
Suite 140 – PMB 321
Las Vegas, NV 89131
(702) 953-7452

February 14, 2010



2/15/10

Attn: Erik Gehringer, Project Manager
ENTACT Environmental Services, LLC
699 South Friendswood Drive
Friendswood, TX. 77546

Re: CAMU – Storm Drain – FINAL As-Built

Mr. Gehringer,

This report outlines the results of an as-built survey performed on the Storm Drain and its various appurtenances constructed within the Corrective Action Management Unit (CAMU).

The intent of said report is to provide information such as but not limited to, Data, Calculations, Drawings, Tables, Charts, Electronic Files and other required media to satisfy the Submittal Requirements as outlined in Section 01050 of the Project Technical Specifications, Dated May, 2008.

Absolute Boundary & Control Solutions (ABCS) is pleased you have chosen us to complete these services, and assures you that every attempt has been made to prepare same in a fashion meeting or exceeding the Project Specifications. If however after your review you determine that revisions, clarifications or other modifications are needed, please do not hesitate to bring them to our attention.

In closing, thank you again for the opportunity to serve ENTACT. If you have any questions, comments or concerns, please do not hesitate to contact me.

Sincerely,

Craig A. Givant, PLS
President

(702) 953-7452
(702) 839-9750 fax

CERTIFICATION PAGE

CAMU – STORM DRAIN
FINAL AS-BUILT
HENDERSON, NV

I, Craig A. Givant, a Professional Land Surveyor registered in the State of Nevada, certify (as defined by Nevada Revised Statutes 625.403) that:

1. This report and any Land Surveying Practices (N.R.S. 625.040) on which it is based were performed directly by me or under my responsible charge (N.R.S. 625.080) in accordance with the Standards and Practices Governing Land Surveyors in the State of Nevada as defined by any applicable sections of the Nevada Revised Statutes (N.R.S.) or the Nevada Administrative Code (N.A.C.).
2. By affixing my official seal and signature below I am confirming that I am a Registered Land Surveyor in the State of Nevada and thereby satisfy the requirements of Section 01050, Part 1.03, Subpart A or the Project Technical Specifications.

Craig A. Givant, PLS
PLS 14348

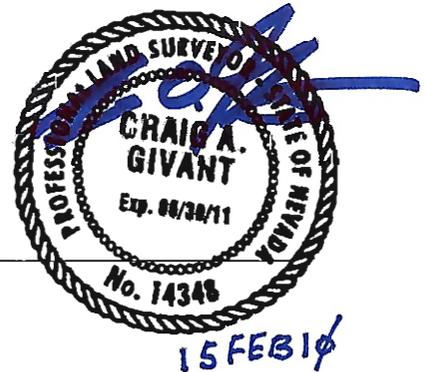


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FIELD NOTES

The elevations of the installed RCP were measured at each manhole and headwall location using Differential Leveling survey methods prior forming the Concrete Box Structures. Copies of the corresponding field notes have been scanned to PDF format and are included on the Compact Disk (CD) in the back of this report. The following Field Note Copies are included:

1. (Field Notes) - 2009-04-14 (Storm Drain Pipe)
2. (Field Notes) - 2009-08-04 (Storm Drain Pipe)

The lineal feet installed RCP was measured using a Global Positioning System (GPS) Receiver and was shot at the Top of Pipe before construction of the Concrete Box Structures. Since this data was collected electronically as Raw Data, pertinent parameters required to be input into the software and which were obtained by means of human interaction, were verified as correct by performing field checks. These field checks and their resultant accuracies can be viewed within the Electronic Field Notes (Raw Data). The following data files were utilized and they are included on the CD in the back of this report.

1. 2009-4-14 (SD ASB MH#s 4-7+SDHW2)-TG+MC
2. 2009-8-4 (MHs 1-3 ASB)-TG

The Manhole Rim positions and elevations were measured using Conventional surveying methods (Electronic Total Station). Since this data was collected electronically as Raw Data, pertinent parameters required to be input into the software and which were obtained by means of human interaction, were verified as correct by performing field checks. These field checks and their resultant accuracies can be viewed within the Electronic Field Notes (Raw Data). The following data files were utilized and they are included on the CD in the back of this report.

1. 2009-09-16 (Storm Drain ASB) - CAG

Raw Data files (.dc) have not been printed for inclusion in this report however a Portable Document File (PDF) of each raw data printout is included electronically on the attached Compact Disk (CD). It should be noted that the contents of these Raw Data files may not pertain solely to the report herein presented and may include additional data from other "tasks" performed on the same day.

SURVEY DATA

As required by the project specification Absolute Boundary & Control Solutions (ABCS) utilized field survey methods which resulted in precisions equal to or better than the following:

Horizontal Coordinates: $\pm 1.0'$ (One Foot)

Vertical Coordinates: $\pm 0.10'$ (One Tenth of a Foot)

The following coordinates were collected electronically as outlined in the Field Notes Section of this report and were utilized to prepare the attached drawing(s):

Point No.	Northing	Easting	Elevation	Description
60000	18099.84	14903.04	1742.64	STA-15+54.27-TP
60001	18100.29	14898.98	1742.83	STA-15+50.27-TP
60002	18132.02	14917.05	1749.63	CP-424-CHK
60003	18024.50	15291.37	1744.73	STA-22+50.31-TP
60004	18023.82	15287.83	1744.73	STA-22+46.31-TP
60005	18101.46	15465.73	1745.87	STA-24+40.62-TP
60006	18102.39	15469.33	1745.87	STA-24+44.62-TP
60007	18113.92	15809.81	1747.78	STA-27+85.1-TP
60008	18114.61	15813.35	1747.05	STA-27+89.1-TP
60009	18134.16	15899.59	1747.82	ASB-INV-IN-TP OF SDHW2
83000	18136.82	14603.60	1749.83	8-4-09prechk
83001	18112.25	14604.97	1741.24	SDMH3-OUT-15+55.89
83002	18112.32	14608.90	1741.08	SDMH3-IN-15+59.89
83003	18112.26	14224.20	1738.99	SDMH2-IN-11+74.66
83004	18113.45	14221.12	1739.14	SDMH2-OUT-11+70.66
83005	18157.67	14173.10	1738.50	SDMH1-IN-11+05.7
83006	18160.63	14170.75	1738.64	SDMH1-OUT-11+01.7
83007	18136.81	14603.58	1749.83	8-4-09postchk
83008	18177.67	14261.09	1752.91	8-11-09PRECHK
83009	18257.47	14136.06	1733.93	SDHW1-OUT-10+00
83010	18177.67	14261.14	1752.93	8-11-09POSTCHK
300000	19123.46	14353.67	1738.12	CP430
300001	18956.75	14189.10	1725.31	EDGE OUT
300002	18957.30	14187.63	1726.25	EDGE OUT
300003	18963.48	14171.68	1731.26	EDGE OUT
300004	18963.93	14171.26	1731.31	EDGE OUT
300005	18979.99	14186.16	1731.37	EDGE OUT
300006	18979.53	14186.61	1731.35	EDGE OUT

Point No.	Northing	Easting	Elevation	Description
300007	18964.13	14194.09	1726.15	EDGE OUT
300008	18962.97	14194.70	1725.33	EDGE OUT
300009	18962.53	14194.22	1725.30	EDGE IN
300010	18963.68	14193.85	1725.98	EDGE IN
300011	18979.20	14186.20	1731.37	EDGE IN
300012	18963.86	14171.90	1731.28	EDGE IN
300013	18957.82	14187.78	1726.23	EDGE IN
300014	18957.34	14189.46	1725.34	EDGE IN
300015	18957.36	14189.53	1725.32	EDGE FLOOR
300016	18968.71	14176.83	1724.74	EDGE FLOOR
300017	18974.14	14181.85	1724.68	EDGE FLOOR
300018	18962.48	14194.22	1725.32	EDGE FLOOR
300019	18960.12	14192.11	1725.30	EDGE FLOOR
300020	18963.02	14183.27	1725.05	EDGE FLOOR
300021	18968.16	14187.91	1725.00	EDGE FLOOR
300022	18971.37	14179.17	1724.66	EDGE FLOOR
300023	18971.52	14179.31	1725.19	FL 60IN PIPE
300024	18988.81	14131.19	1731.71	CP432
300025	18985.49	14128.87	1731.78	CONC COR
300026	18992.25	14131.33	1731.64	CONC COR
300027	18989.82	14138.78	1731.62	CONC COR
300028	18982.84	14136.28	1731.73	CONC COR
300029	18988.69	14133.97	1731.65	RIM N
300030	18986.72	14133.21	1731.70	RIM S
300031	18988.06	14132.46	1731.69	RIM W
300032	18987.40	14134.47	1731.68	RIM E
300033	18987.75	14133.52	1731.69	RIM CTR
300034	18259.83	14143.34	1738.60	TOP COR HW
300035	18259.34	14143.53	1738.62	TOP COR HW
300036	18254.91	14128.82	1738.64	TOP COR HW
300037	18254.36	14129.01	1738.67	TOP COR HW
300038	18260.50	14143.07	1732.71	COR LEDGE
300039	18255.35	14128.75	1732.78	COR LEDGE
300040	18258.10	14135.86	1732.76	EDGE LEDGE
300041	18257.32	14136.02	1733.98	FL PIPE REPAIR
300042	18177.67	14261.04	1752.90	CP426
300043	18159.07	14171.92	1745.50	SDMH1 RIM EAST
300044	18159.76	14170.64	1745.51	SDMH1 RIM NORTH
300045	18158.59	14169.92	1745.53	SDMH1 RIM WEST
300046	18157.73	14170.90	1745.52	SDMH1 RIM SOUTH

Point No.	Northing	Easting	Elevation	Description
300047	18158.75	14170.94	1745.48	SDMH1 CTR
300048	18112.93	14222.48	1746.06	SDMH2 RIM NORTH
300049	18110.86	14222.31	1746.10	SDMH2 RIM SOUTH
300050	18111.91	14221.35	1746.08	SDMH2 RIM WEST
300051	18111.56	14223.42	1746.08	SDMH2 RIM EAST
300052	18111.87	14222.39	1746.05	SDMH2 RIM CTR
300053	18112.20	14606.67	1747.73	SSMH3 RIM NORTH
300054	18110.18	14606.89	1747.73	SSMH3 RIM SOUTH
300055	18111.03	14605.74	1747.76	SSMH3 RIM WEST
300056	18111.23	14607.84	1747.73	SSMH3 RIM EAST
300057	18097.98	14900.53	1749.50	SDMH4 RIM SOUTH
300058	18099.96	14900.99	1749.46	SDMH4 RIM NORTH
300059	18098.85	14901.71	1749.48	SDMH4 RIM EAST
300060	18099.22	14899.65	1749.48	SDMH4 RIM WEST
300061	18098.98	14900.69	1749.44	SDMH4 CTR
300062	18021.37	15289.36	1750.80	SDMH5 RIM SOUTH
300063	18022.59	15288.42	1750.80	SDMH5 RIM WEST
300064	18022.14	15290.49	1750.78	SDMH5 RIM EAST
300065	18023.43	15289.36	1750.79	SDMH5 RIM NORTH
300066	18022.41	15289.49	1750.75	SDMH5 RIM CTR
300067	18102.20	15467.31	1749.95	SDMH6 RIM SOUTH
300068	18103.11	15466.23	1749.98	SDMH6 RIM WEST
300069	18103.38	15468.30	1749.98	SDMH6 RIM EAST
300070	18104.25	15467.16	1749.99	SDMH6 RIM NORTH
300071	18103.27	15467.25	1749.93	SDMH6 RIM CTR
300072	18173.89	16128.87	1746.70	CP428
300073	18134.46	15899.92	1744.45	SDHW2 FL
300074	18127.06	15901.29	1748.55	CONC COR
300075	18126.86	15900.81	1748.56	CONC COR
300076	18141.70	15897.48	1748.55	CONC COR
300077	18141.79	15897.94	1748.53	CONC COR
300078	18111.91	15811.17	1749.04	SDMH7 RIM SOUTH
300079	18114.03	15811.07	1748.96	SDMH7 RIM NORTH
300080	18113.04	15810.01	1749.02	SDMH7 RIM WEST
300081	18113.02	15812.10	1748.98	SDMH7 RIM EAST

DRAWINGS

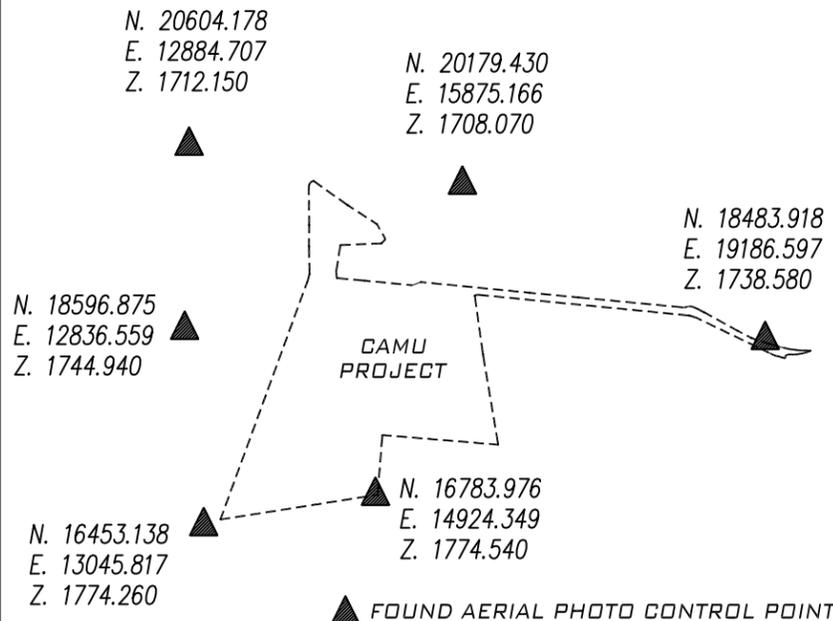
The following Measurement Drawings, Topographic Survey Drawings and/or Cross-Section Drawings are attached.

1. **CAMU – Storm Drain As-built, dated February 15, 2010**

This drawing (consisting of 3 sheets) depicts the as-built elevations of the Storm Drain RCP, the Lineal Feet of installed pipe, the rim elevation of each manhole and headwall and the stack-out details for each manhole. A detail (cross section) of the concrete channel and trash rack area is also included. It also contains information regarding the control network utilized, and other pertinent survey data. Due to the scale at which this drawing was prepared, the intended correlation representation may not be entirely clear. In ALL cases the Survey Data herein provided takes precedence over any graphical representation(s).

PROJECT CONTROL

1" = 2000'



BENCHMARK

CLARK COUNTY BENCHMARK (6C22 2E4), BEING A RIVET AND SQUARE ALUMINUM PLATE IN A CONCRETE CENTERLINE ISLAND, 4' WEST OF THE NOSE IN THE MIDDLE OF SUNSET ROAD, WEST SIDE OF THE INTERSECTION OF BOULDER HIGHWAY AND SUNSET ROAD.

PUBLISHED ELEVATION - 505.816 METERS = 1659.50 FEET
 NAVD 1988 DATUM - PUBLISHED (2003)

BASIS OF BEARINGS

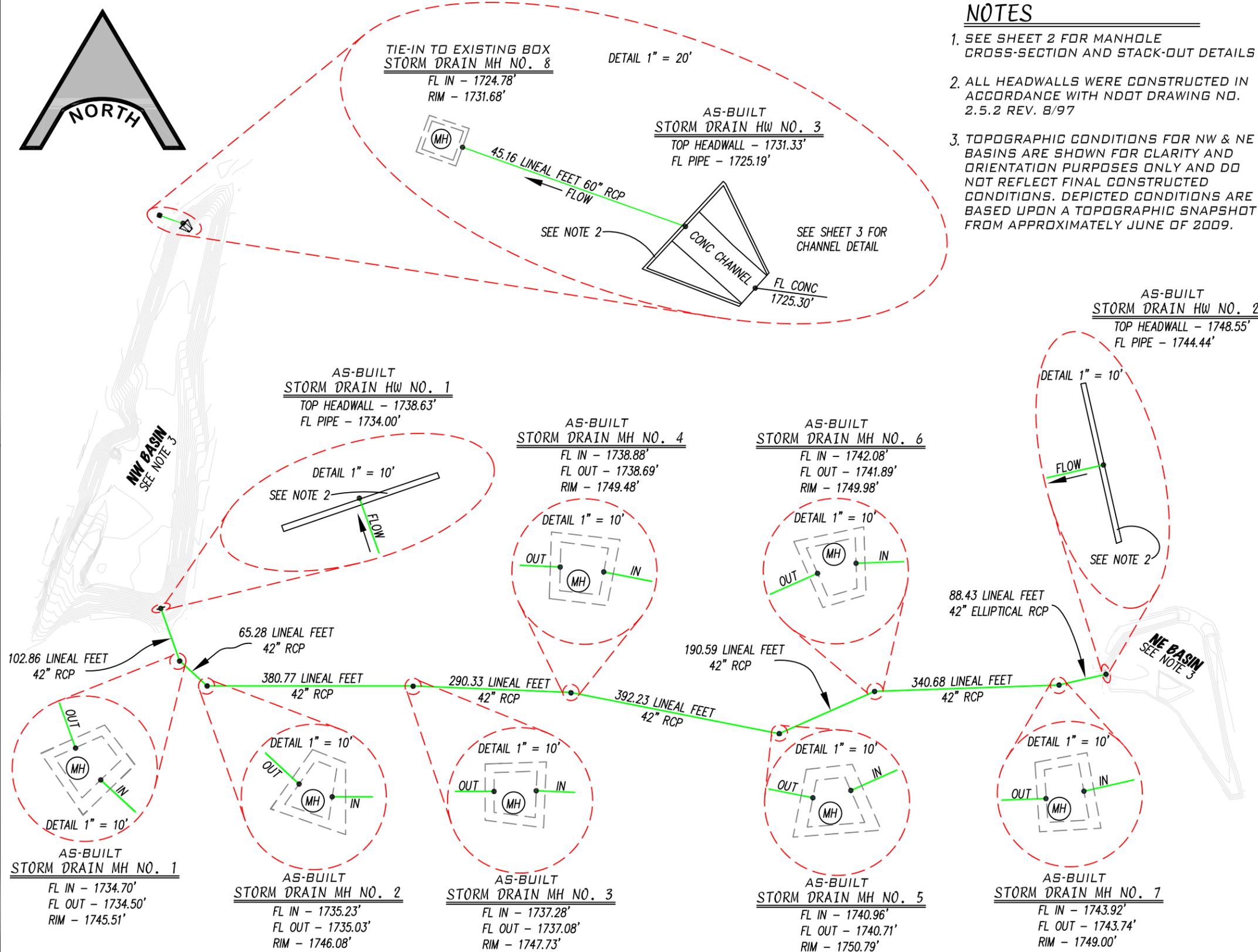
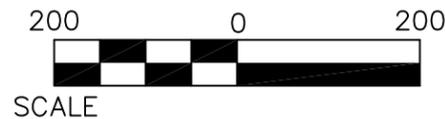
SOUTH 85°36'52" WEST, BEING THE BEARING BETWEEN CLARK COUNTY GIS CONTROL POINTS "CC-GIS 848" AND "CC-GIS W51", AS SHOWN ON THE MAP IN FILE 88 OF SURVEYS, PAGE 53, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

COORDINATE SYSTEM

THE COORDINATE SYSTEM AND ASSOCIATED BEARING ROTATION INFORMATION WAS ESTABLISHED AND PROVIDED BY PBS&J.

LINE LEGEND

CONCRETE STORM DRAIN BOX
 RCP STORM DRAIN PIPE
 DETAIL AREA



NOTES

- SEE SHEET 2 FOR MANHOLE CROSS-SECTION AND STACK-OUT DETAILS
- ALL HEADWALLS WERE CONSTRUCTED IN ACCORDANCE WITH NDOT DRAWING NO. 2.5.2 REV. 8/97
- TOPOGRAPHIC CONDITIONS FOR NW & NE BASINS ARE SHOWN FOR CLARITY AND ORIENTATION PURPOSES ONLY AND DO NOT REFLECT FINAL CONSTRUCTED CONDITIONS. DEPICTED CONDITIONS ARE BASED UPON A TOPOGRAPHIC SNAPSHOT FROM APPROXIMATELY JUNE OF 2009.

NO.	REVISION	DATE
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CORRECTIVE ACTION MANAGEMENT UNIT - (CAMU)
STORM DRAIN AS-BUILT
 PIPE RUNS, BOX CONFIGURATIONS AND HEADWALLS
 (PLAN VIEW)

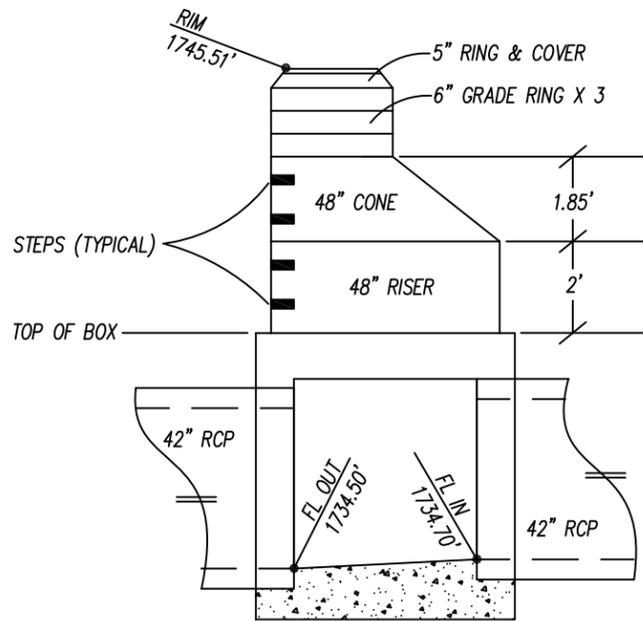
FIELD SURVEY DATE: MULTIPLE
 FIELD CREW: C.G. / M.C. / T.G.

JOB # 2008-06-23-01

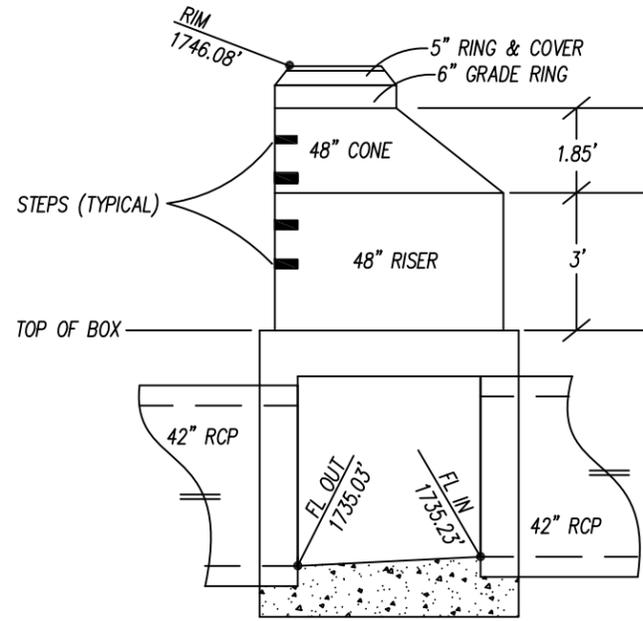
ABSOLUTE BOUNDARY & CONTROL SOLUTIONS
 6440 SKY POINT DRIVE
 SUITE 140 - PMB 321
 LAS VEGAS, NV. 89131
 (702) 953-7452
 (702) 987-5943 FAX
 WWW.AB-CS.COM

Date:	February 15, 2010
Drawn:	C. Givant
Checked:	C. Givant
Task:	2009.09.16.01
Sheet No.	1 of 3

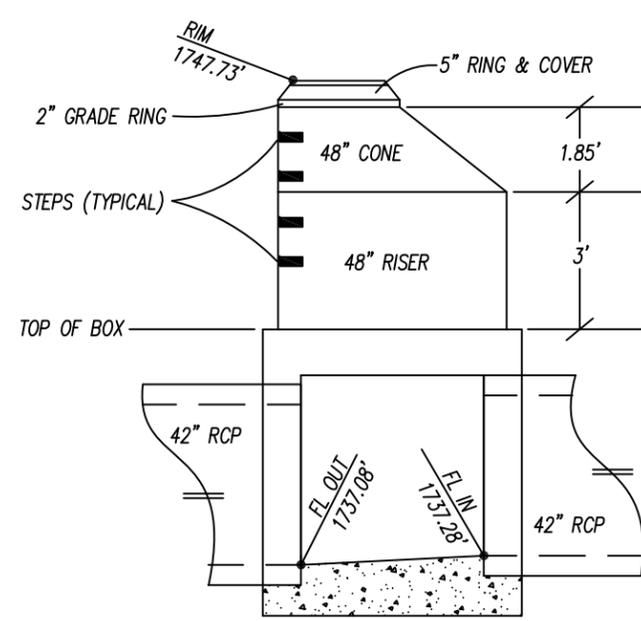
AS-BUILT
STORM DRAIN MH NO. 1
DETAIL 1" = 4'



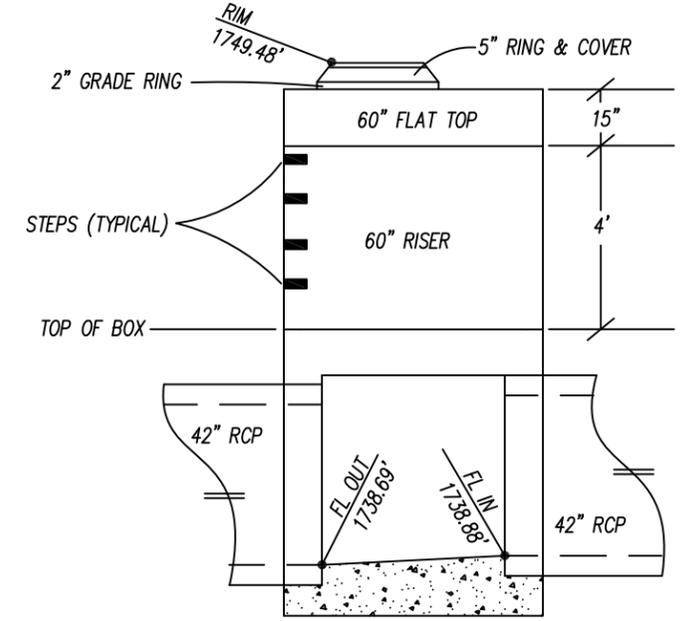
AS-BUILT
STORM DRAIN MH NO. 2
DETAIL 1" = 4'



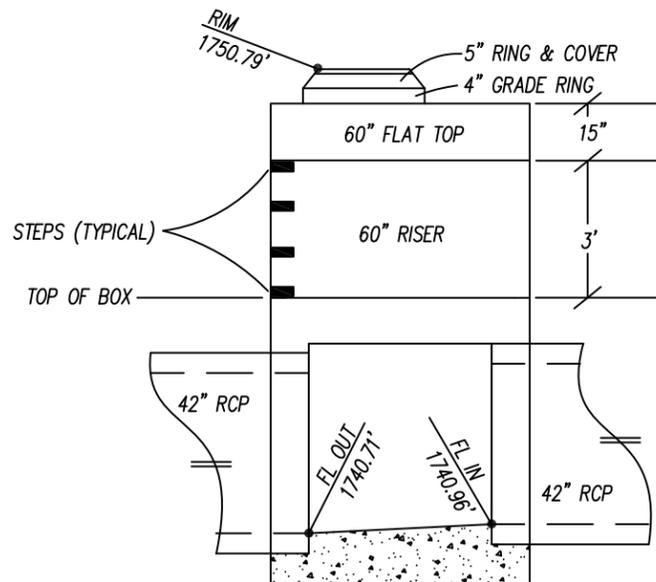
AS-BUILT
STORM DRAIN MH NO. 3
DETAIL 1" = 4'



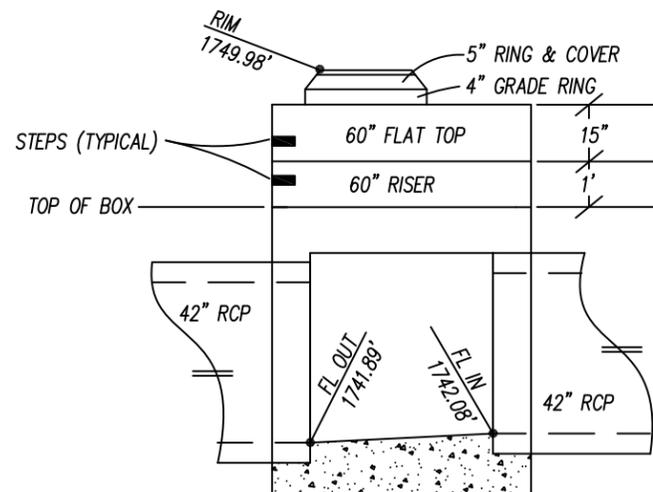
AS-BUILT
STORM DRAIN MH NO. 4
DETAIL 1" = 4'



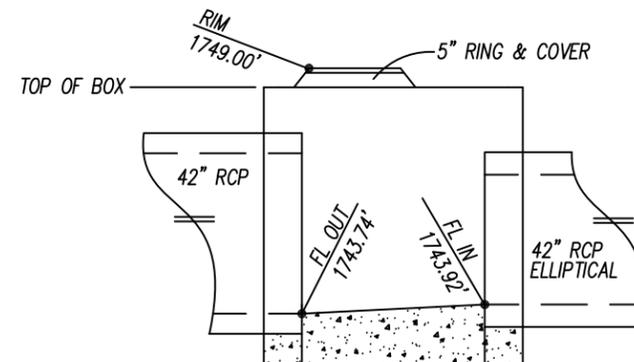
AS-BUILT
STORM DRAIN MH NO. 5
DETAIL 1" = 4'



AS-BUILT
STORM DRAIN MH NO. 6
DETAIL 1" = 4'



AS-BUILT
STORM DRAIN MH NO. 7
DETAIL 1" = 4'



NOTES

1. FOR CLARITY STACK-OUT DETAIL CROSS SECTIONS HAVE NOT BEEN DRAWN PERPENDICULAR TO PIPE FLOW LINE.
2. ALL MANHOLES WERE CONSTRUCTED IN ACCORDANCE WITH CLARK COUNTY UNIFORM STANDARD DRAWING NO. 406 - TYPE III MANHOLE ENGINEERING SPECIFICATIONS.
3. FIELD MODIFICATIONS FROM DESIGN DRAWINGS AS APPROVED BY BRC WERE AS FOLLOWS:
 - A. SDMH #2 BOX ORIENTATION WAS SHIFTED APPROXIMATELY 1' EAST TO ACCOMMODATE CONSTRUCTION
 - B. SDHW #2 WAS SHIFTED APPROXIMATELY 0.7' WEST TO ACCOMMODATE CONSTRUCTION
 - C. THE RIM ELEVATION OF SDMH #7 WAS RAISED 0.6' TO ACCOMMODATE A STANDARD 5" RING AND COVER.

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CORRECTIVE ACTION MANAGEMENT UNIT - (CAMU)
STORM DRAIN AS-BUILT
MANHOLE STACK-OUT DEALS
(CROSS-SECTION)

FIELD SURVEY DATE: MULTIPLE
FIELD CREW: C.G. / M.C. / T.G.

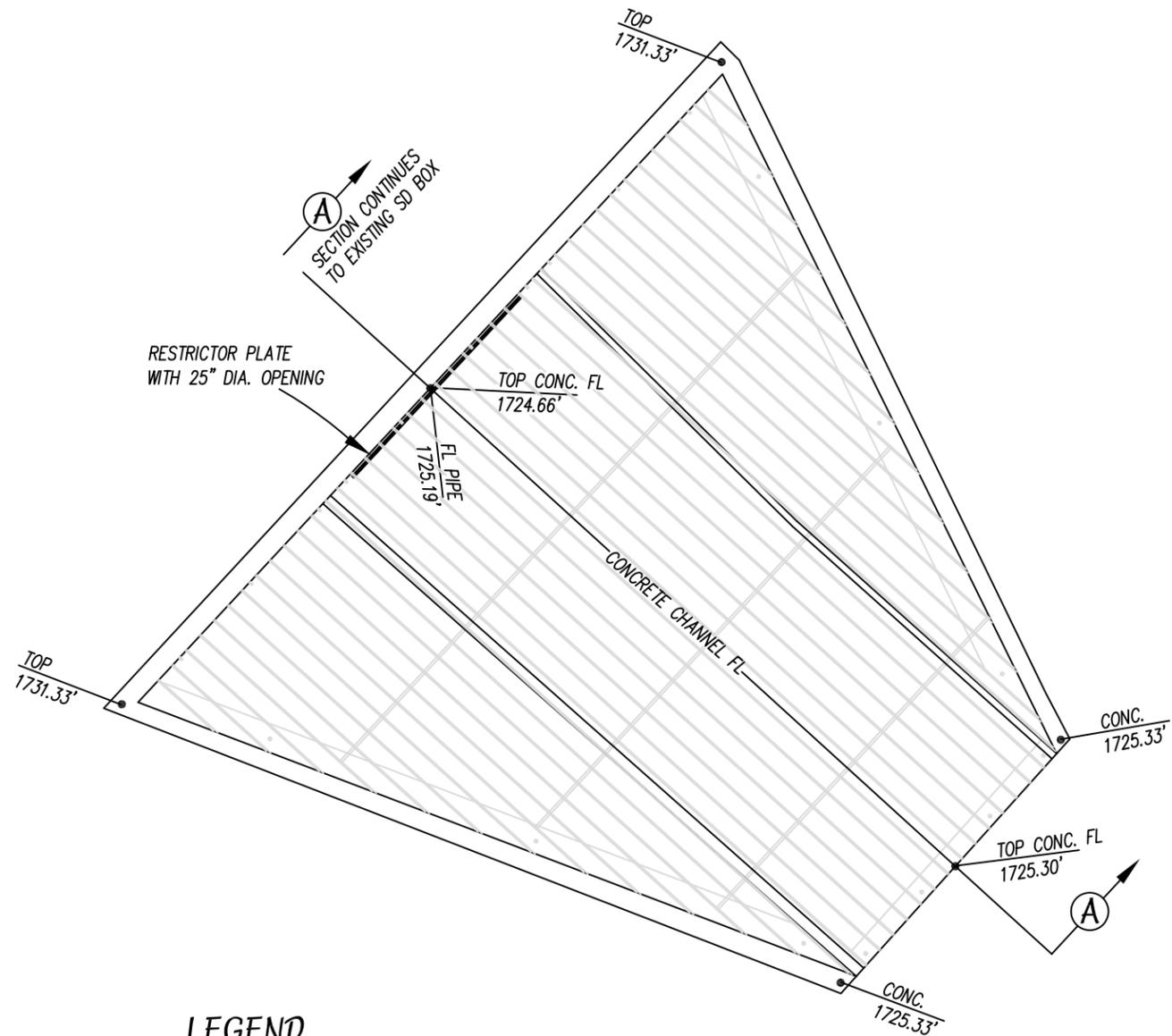
JOB # 2008-06-23-01



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Date: February 15, 2010
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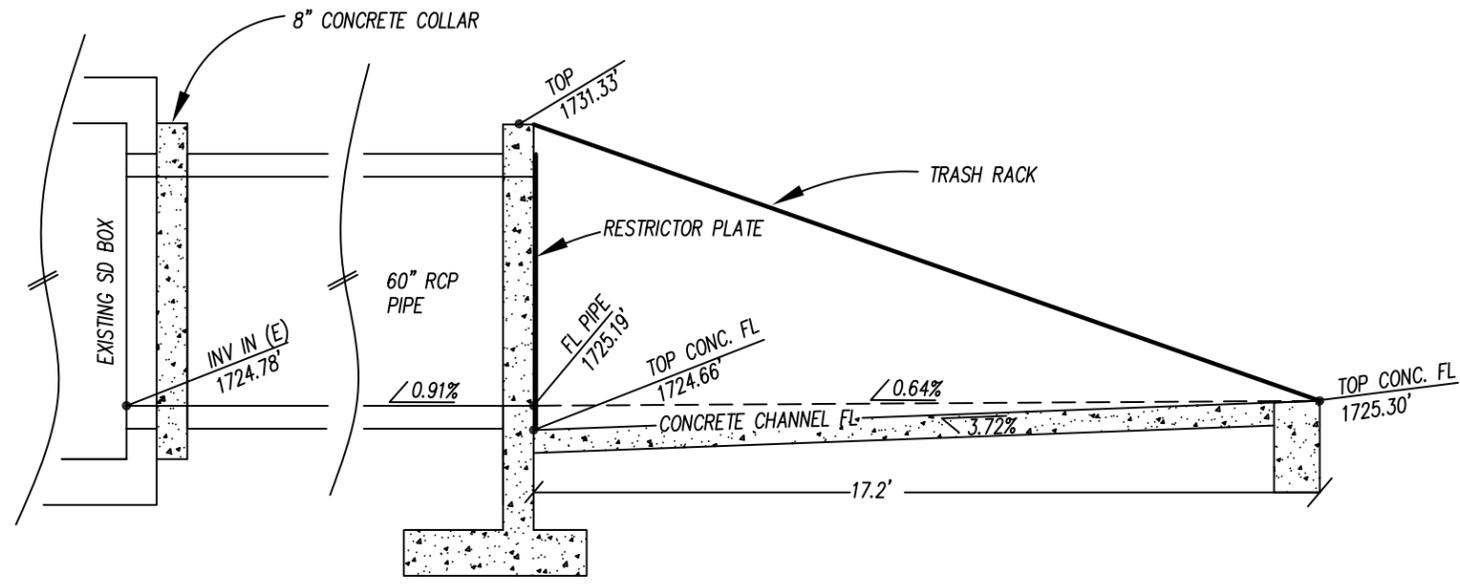
AS-BUILT
CHANNEL (PLAN VIEW)
DETAIL 1" = 4'



LEGEND

- TRASH RACK STEEL PLATE (AS-BUILT)
- TRASH RACK STIFFENER (AS-BUILT)
- ANCHOR BOLT LOCATION (AS-BUILT)

AS-BUILT
CHANNEL (SECTION A-A)
DETAIL 1" = 4'



NOTES

1. 60" HEADWALL CONSTRUCTED IN ACCORDANCE WITH NDOT DRAWING NO. 2.5.2 REV. 8/97
2. GALVANIZED STEEL TRASH RACK & RESTRICTOR PLATE MANUFACTURED/INSTALLED IN ACCORDANCE WITH DRAWING D2 OF THE PBS&J EASTSIDE LANDFILL IMPROVEMENT PLANS REV 8/12/09

NO.	REVISION	DATE
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CORRECTIVE ACTION MANAGEMENT UNIT - (CAMU)
STORM DRAIN AS-BUILT
HEADWALL # 3, CONCRETE CHANNEL
& TRASH RACK DETAILS

FIELD SURVEY DATE: MULTIPLE
FIELD CREW: C.G. / M.C. / T.G.

JOB # 2008-06-23-01



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ELECTRONIC FILES

The Compact Disk (CD) included in the pocket at the end of this report contains the following Directories and Files:

PDF Files (.pdf)

The following files are adobe Portable Document Files which can be viewed using a readily available free version of Adobe Acrobat Reader.

1. (Report) - CAMU Storm Drain As-Built
2. (Field Notes) - 2009-04-14 (Storm Drain Pipe)
3. (Field Notes) - 2009-4-14 (SD ASB MH#s 4-7+SDHW2)
4. (Field Notes) - 2009-08-04 (Storm Drain Pipe)
5. (Field Notes) - 2009-8-4 (MHs 1-3 ASB)
6. (Field Notes) - 2009-09-16 (Storm Drain ASB)

CAD Files (.dwg)

The following files are AutoCAD Drawing files created in Civil 3D 2009. Filenames proceeded by “2007” have been exported or “saved down” to a version 2007 drawing file.

1. 2010-02-15 (SD ASB) - 2007
2. 2010-02-15 (SD ASB)

Coordinate Files (.csv)

The following files are Comma Separated Value Files in the following format:

Point Name, Northing, Easting, Elevation, Description

1. 2010-02-15 (SD ASB)

Raw Data Files (.dc)

The following files are Trimble Data Collector (.DC) files that contain the Raw Field Data.

1. 2009-4-14 (SD ASB MH#s 4-7+SDHW2)-TG+MC
2. 2009-8-4 (MHs 1-3 ASB)-TG
3. 2009-09-16 (Storm Drain ASB) - CAG