J-17 2000.

Gannett Fleming West, Inc.

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July 2, 2013

Manh Tran, P.E., Project Manager
Department of Municipal Development
City of Albuquerque
1 Civic Plaza
P.O. Box 1293
Albuquerque, NM 87103

Re: Final Drainage Analysis
Near Heights Flood Control Project
COA Project #5498.91

Dear Mr. Tran,

This letter presents the final results of our drainage analysis for the Near Heights Flood Control project. In accordance with Exhibit I, Part B.1 of our contract scope of services, GFW has performed an analysis of the hydrology, street hydraulics and location of proposed inlets for the project area. This analysis was based on; our conceptual analysis, which was done for our proposal effort and the topographic survey, which was performed by our subconsultant Terra Survey, LLC.

Gannett Fleming West, Inc. submitted a preliminary drainage analysis, dated November 14, 2012. At that time we received only editorial comments. The report was amended to include the results of a camera inspection of the existing storm drain. We also modified recommendations to account for grade differences that were discovered in the initial stages of the preliminary design and amended this report clarify some existing utility conditions after new information was obtained.

The final version dated April 5, 2013 was submitted to DRC along with 65% design plans. Comments that were received from City Hydrology during the DRC review on April 29, 2013 have also been addressed. This final version dated July 2, 2013 is being submitted along with the 95% DRC plans for final review.

Due to funding restrictions the full recommended build-out (Option 2) will not be constructed. Therefore, the project can only improve the existing conditions by increasing the capacity of the inlets and the connector pipes. The mainline storm drain will still be under capacity. One way to save money and maximize the benefit of the storm drain that will be constructed will be to leave the three inlets in Summer Ave. that are not hydraulically deficient.

Analysis Criteria

The analysis for this project was performed according to the requirements of the City of Albuquerque (COA) Development Process Manual (DPM). The design storm was the 100 year, 6 hour storm. The flow depth requirement for residential streets is 0.2 feet above the curb line (0.87 feet). However, we felt a more conservative approach is warranted. Therefore, we used a flow depth requirement for a collector street of 0.5 feet.

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fs.

GFW used the following methods/programs for the analysis of the project. AHYMO_S4 was used to create a hydrologic model. An excel spreadsheet was used to analyze the street hydraulics and determine inlet placement. Bentley's StormCAD was used to create a hydraulic model of the existing storm drain.

Existing Conditions

The project consists of a four block area bounded by Mountain Road to the south, Summer Avenue to the north, Washington Street to the west and Monroe Street to the east. The area is generally north and east of the intersection of Lomas and Washington. The project area is fully developed with curb & gutter, sidewalk and an existing storm drain system. Prior to its development in the 1950's, the area was the site of an arroyo. The general path of the arroyo can still be seen in the topography of the area. **Figure 1** on the following page shows the project area.

A review of the City's information on the existing storm drain system and actual conditions has uncovered a considerable discrepancy. We made a comparison of the following sources; 'as-built' records, City GIS mapping, the Albuquerque Master Drainage Study, our own project survey and finally a visual inspection.

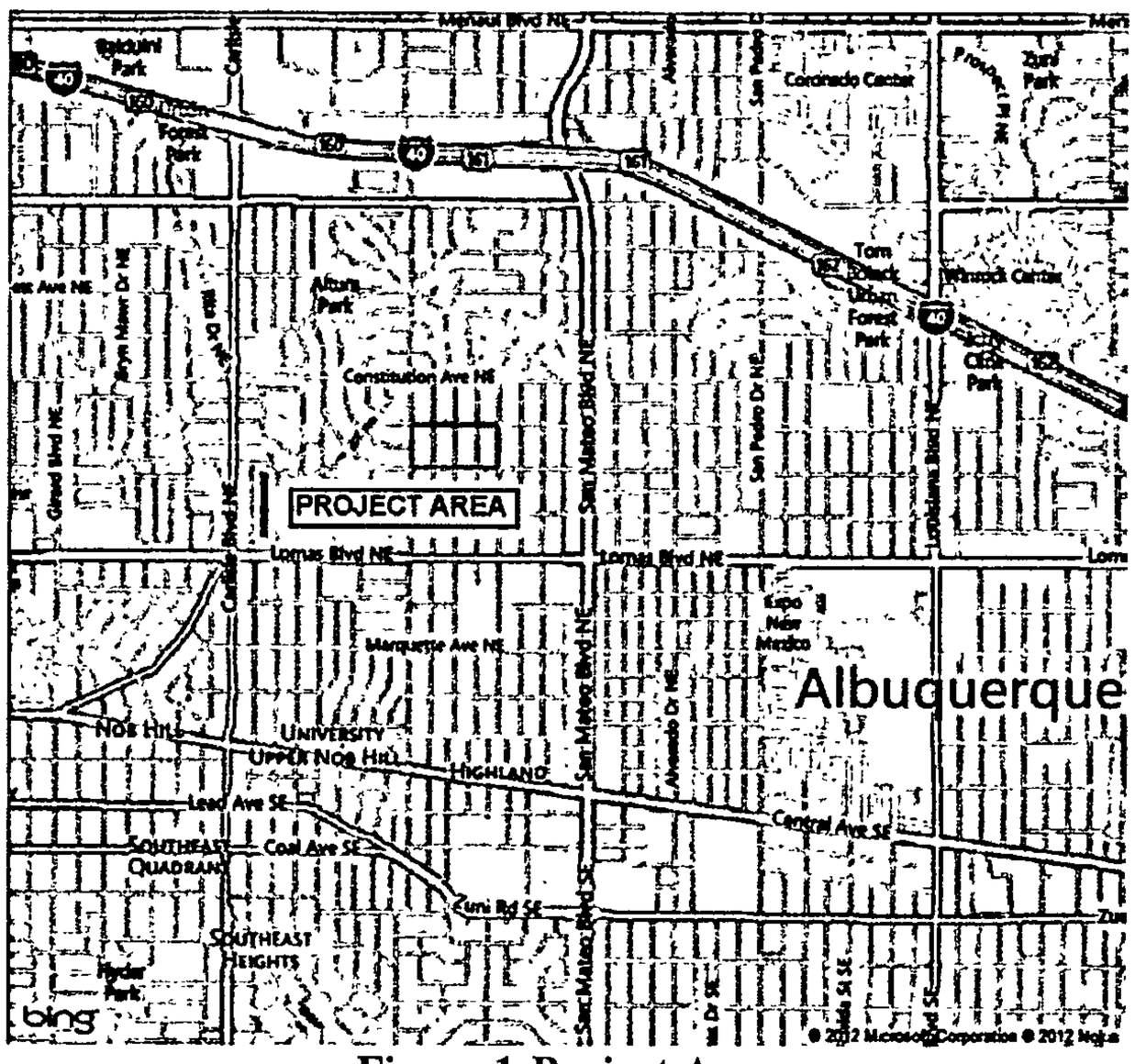


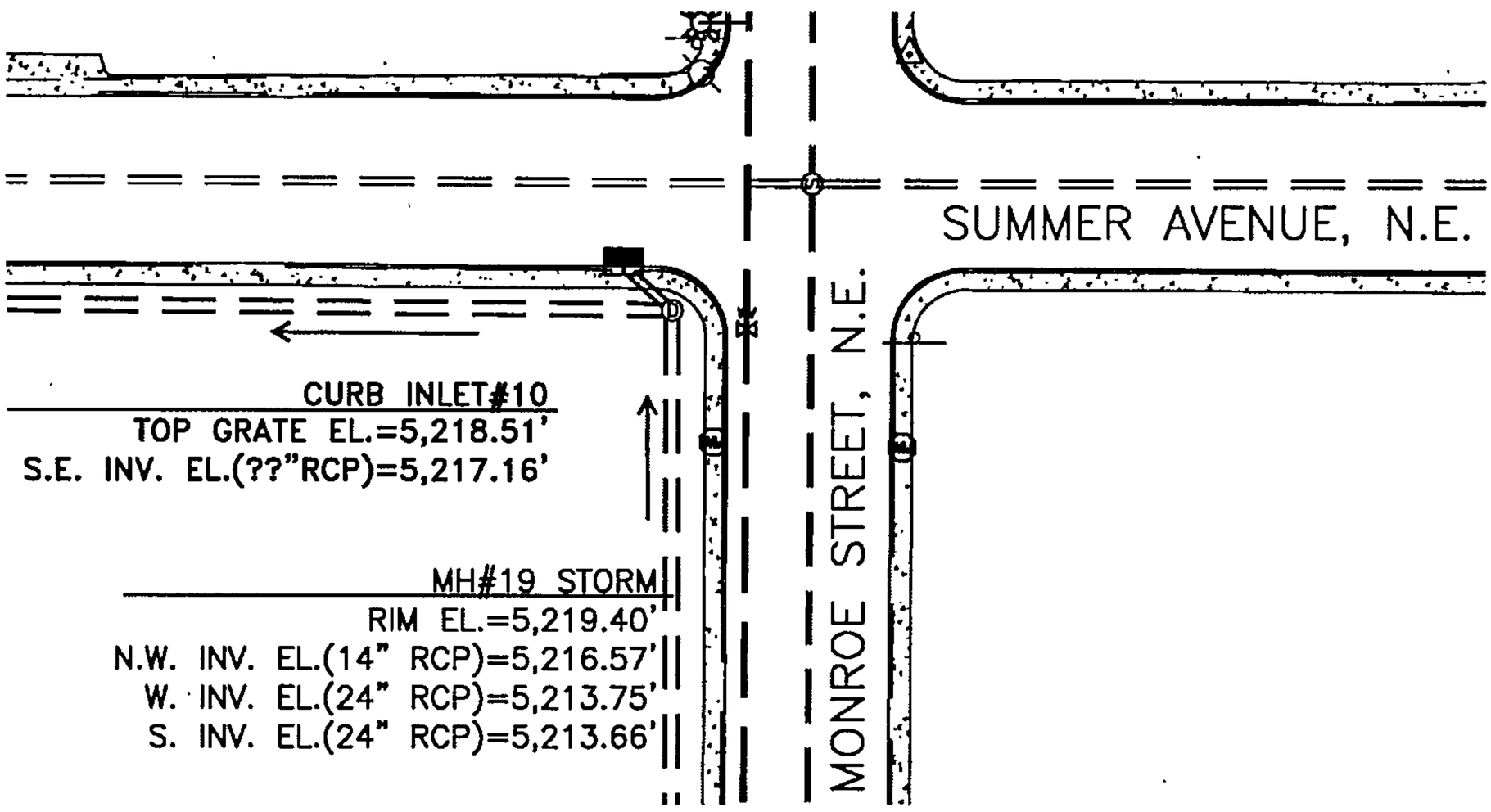
Figure 1-Project Area

All of the City's information on the storm drain alignment is consistent. However, the project survey and a visual inspection indicate that; from the intersection of Jefferson Street and Summer Avenue (MH S-663) to the intersection of Morning Side Drive and Avenida La Rosalano (MH S-632), the mainline storm drain takes a different alignment than shown in City records. In addition, many of the inlets shown in City records do not exist. Specifically, the inlets shown at the intersections of Mountain Road with Jefferson Street, Adams Street and Washington Street do not exist. **Figure 2** was taken from the Albuquerque Master Drainage Study and shows the recorded alignment and **Figure 3** shows the actual alignment based on survey information and visual inspection.

The Albuquerque Master Drainage Study (AMDS) was prepared by Bohannon Huston in January 1981. A review of the AMDS shows that Mountain Road and Washington Street was identified as a problem area

and was included in their analysis. The study recommends that the existing 24" main line be supplemented with a parallel 30" main line from the intersection of Washington Street and Mountain Road to Morningside Drive. However, that study also appears to assume that the historical storm drain alignment shown was correct. Therefore, it appears that their recommendations stem from an assumption that the storm drain lacked capacity, not that there was no capture of runoff in this location.

The existing storm drain itself appears to have many serious hydraulic deficiencies. The existing inlets are a mix of very old types and most appear to be clogged. Three of the inlets along Summer Avenue are connected to the main line storm drain at angles far less than 90 degrees from the downstream alignment. In addition, it appears that several of the manholes in the project do not maintain positive grade through the manhole. An example that illustrates both conditions is shown below. The figure shows the intersection of Summer Avenue and Monroe Street, the red arrows show the direction of flow. The inlet is connected to the main line with a 14" connector pipe that comes into the manhole at an angle of approximately 45 degrees from the downstream pipe. In addition the inverts in the manhole show that the 'upstream' invert is actually below the 'downstream' invert. To compound the problem, the mainline storm drain makes a 90 degree turn through the manhole.



Example of Hydraulic Deficiencies in Existing Storm Drain

Given the hydraulic issues with the existing storm drain system it may be possible that storm water could actually be discharging from the inlets on Summer Avenue rather than being collected. At the very least, the capture capacity of the inlets would be severely restricted.

As part of the scope of services for this project, GFW's subconsultant, Cobb Fendley performed a video inspection of the existing mainline storm drain system. The results of that inspection found that the main line is in relatively good condition within the extents of the project. However, there are three areas of concern. The 18" mainline in Jefferson Street and the 14" lateral at the intersection of Summer Avenue and Adams Street have concrete in the bottom of the pipes, which reduce their capacity. Also, it appears that there is sewage leaking into the 24" mainline in Avenida Manana, west of Washington Street. See **Figure 3** for the approximate locations of these issues. A copy of the inspection logs is included in the back of this report.

Hydrology

Figure 4 shows the project area, divided into drainage basins. These basins were developed from a combination of direct observation and the topographic survey. There are high points just to the north, east and south of the project area, which determine the limits of the contributing basins. Runoff in the project area generally flows from northeast to southwest. The drainage patterns and basins were evaluated without the impact of existing inlets, so that a determination of the need for inlet locations could be made. The drainage patterns and basins are more fully described as follows:

North of Summer Ave, Monroe Street (Basin A) drains south to Analysis Point 1, at the intersection of Monroe Street and Summer Avenue. South of Summer Avenue, Monroe Street (Basin B) drains north to Analysis Point 2 at the intersection of Monroe Street and Summer Avenue. Basins A and B drain west into Basins C and D. North of Summer Avenue, Madison Street (Basin C) drains south to Analysis Point 4 at the intersection of Madison Street and Summer Avenue. South of Summer Avenue, Madison Street (Basin D) drains north to Analysis Point 4 at the intersection of Madison Street and Summer Avenue. Basins C and D drain west into Basin E. Basin E consists of Jefferson Street between Constitution and Mountain Road. This basin drains to a lowpoint (Analysis Point 5) on Jefferson Street, midway between Summer Avenue and Mountain Road. Basin F consists of Adams Street between Constitution and Mountain Road. This basin also drains to a lowpoint (Analysis Point 6) on Adams Street, midway between Summer Avenue and Mountain Road. Basin G consists of Washington Street from Constitution to Mountain Road. Basin G drains south to Analysis Point 7 at the intersection of Washington Street and Mòuntain Road. Basin H consists of portions of Adams Street, Jefferson Street, Madison Street and Monroe Street, all of which drain north to Mountain Road. It appears that Mountain Road drains west to Analysis Point 8. It does not appear that the flow on Mountain Road splits between going west and going north on any of the intersecting streets. However, the addition of valley gutters at each of the intersecting streets and inlets where appropriate will help ensure that flow stays on Mountain Road and continues west.

GFW prepared a hydrologic model using AHYMO_S4 to determine the 100 year design storm. Rainfall amounts were taken from the National Weather Service's Precipitation Frequency Data Server. A copy of the Point Precipitation Frequency Estimates is attached. Initially, land treatments were determined using the equation in Table A-5 of the DPM, for single family residential areas. However, observation of the area determined that the back half of each of the properties does not drain to the street. Therefore, a more direct computation of land treatments was done using a measurement of impervious area from the aerial mapping. The result was that the land treatments for each basin were determined to be: %A=0, %B=0, %C=42, %D=58. The AHYMO Summary and Output files are also attached. The table on the following page summarizes the results of the hydrologic analysis.

Hydrology for the 100-Year, 6-Hour Storm Event

Basin	Area (Sq-Mi)	Q (cfs)	Total Volume (Ac-Ft)
A	0.00357	15.57	0.544
B	0.00380	1.16	0.046

Hydrology for the 100-Year, 6-Hour Storm Event			
Basin	**Area (Sq-Mi)**	**Q (cfs)**	**Total Volume (Ac-Ft)**
C	0.00392	17.69	0.618
D	0.00373	16.84	0.589
E	0.00798	1.16	0.046
F	0.00797	17.22	0.602
G	0.00507	34.94	1.222
H	0.01687	35.11	1.228

Street Hydraulics

Using the hydrology shown above, GFW analyzed the street capacity at the analysis points shown in **Figure 4** for flow depth to determine the need for inlets. If an inlet was found to be necessary, we are proposing a conservative approach using only Type Double C inlets. The street hydraulics calculations spreadsheet is attached. The table below summarizes the hydraulic analysis.

Hydraulic Analysis 100-Year, 6-Hour Storm Event					
Analysis Point	Q (cfs)	Depth (ft)	New Inlet	Grate Capacity	Notes
1	9.39	0.40	None	0	Bypass to C
2	10.00	0.41	None	0	Bypass to D
3	19.70	0.49	Dbl C	9.5	Bypass to E
4	18.42	0.49	Dbl C	10.0	Bypass to E
5	15.26	0.80	Dbl C	29.7	Low Point

Hydraulic Analysis 100-Year, 6-Hour Storm Event					
Analysis Point	Q (cfs)	Depth (ft)	New Inlet	Grate Capacity	Notes
6	10.47	0.80	Dbl C	29.7	Low Point
7	13.33	0.70	Dbl C	12.0	No Bypass
8	22.16	0.49	Dbl C(x2)	13.5	Bypass to Washington
Street Flow Depths and Velocities taken from COA DPM Plate 22.3 D-1					
Grate Capacities Taken from COA DPM Plates 22.3 D-5 & D-6					
Throat Capacities calculated using Orifice Equation (Using 50% Clogging Factor)					

Storm Drain Hydraulics
The scope of services for this project was limited to an analysis of the street hydraulics, placement of new inlets and sizing of lateral connector pipes. An analysis of the mainline storm drain hydraulics was not included. However, given the extent of the deficiencies in the existing storm drain, GFW did create a hydraulic model of the existing storm drain using proposed inlet locations. This was done to verify the capacity of the existing system.

Our analysis has found that in addition to the geometric deficiencies, the existing storm drain appears undersized and does not have adequate capacity to handle the runoff for the project area. The existing main line storm drain is 24" in diameter and our analysis indicates that the system needs to be upsized to between 30" and 48" diameter pipes. However, upsizing the pipes in the project area create another problem because the mainline system downstream is only 30" in diameter.

Rather than expanding the hydraulic analysis of this project to determine the point downstream where upsizing of the system would end, a feasible alternative would be to create a detention pond in the park area between Avenida del Sol and Avenida Manana.

Conclusions and Recommendations
The project survey has revealed that the existing storm drain was not constructed as it was designed or as it is shown in City records. The inlets proposed for the intersection of Washington Street and Mountain Road were never constructed. The Albuquerque Master Drainage Study, prepared in the early 80's assumed that the inlets did exist and recommended augmenting a storm drain line that was never built. A video inspection of the existing storm drain has found a potentially serious leak in the main line west of Washington Street.

Based on the findings of our analysis, it is apparent that the existing storm drain is deficient because of several factors, which are impeding the collection of runoff as well as the conveyance downstream.

- Existing curb inlets are a mix of very old and inefficient types. Their placement does not appear to be capturing runoff and a lack of maintenance has caused them to become clogged.

- Lateral connector pipes are a mix of sizes that are all less than 18". The geometry of many of the laterals is hydraulically deficient.

- The mainline storm drain is undersized for the proposed inlet placement and the vertical geometry is hydraulically deficient.

GFW has determined two options for this project. The first option would address only the inlet locations and the second option would address the mainline storm drain as well. **Figure 5** shows the recommended improvements and includes all of the elements for option 2.

The first option would be to construct new inlets and laterals to improve runoff collection in the project area. While the existing storm drain is undersized, new inlets would improve the capture of runoff and reduce the flooding experienced at low points. The undersized storm drain would mean conveyance of runoff would take longer but the roadways would still drain in time.

Option 1

- The addition of new Type Double C Inlets in the following locations:
    - 1 Inlet on each side of Summer Avenue, West of Madison
    - 1 Inlet on each side of Jefferson Street at the Low Point between Mountain Road and Summer Avenue
    - 1 Inlet on each side of Adams Street at the Low Point between Mountain Road and Summer Avenue
    - 1 Inlet on each side of Washington Street at Mountain Road
    - 2 Inlets on each side of Mountain Road West of Washington Street
- The construction of a 36" mainline storm drain connection, from the proposed inlets at the intersection of Mountain Road and Washington Street to the existing main line storm drain. This connection will have to go either west to the intersection of Avenida Del Sol and Avenida La Rosolano or south to the intersection of Verde Avenue and Washington Street. It was discovered that the grades prohibit a connection at Avenida Manana and Washington Street.
- All connector pipes should be a minimum of 18" in diameter.

The second option would be to construct new inlets and laterals as well as upsizing the existing storm drain. Rather than expand the scope of the project to chase the pipe size to the end of the main line, a detention pond could be constructed in the park area as shown.

Option 2-All improvements in Option 1 plus the following:

- Upsize the existing main line storm drain to the following
    - Summer Ave between Jefferson Street and Washington Street from 24" to 36".
    - Washington Street between Summer Ave and Avenida Manana from 24" to 36".
    - Jefferson Street from 18" to 24"
    - Adams Street from 18" to 24"
    - Avenida Manana between Washington Street and Avenida Roselano from 24" to 48"
- Construct a detention pond in the park area between Avenida Manana and Avenida Del Sol.

A spreadsheet is attached which shows the conceptual cost estimate for each option. The cost of a proposed detention pond was not included. The costs are summarized below and include tax.

Option 1 - $294,000
Option 2 - $966,000

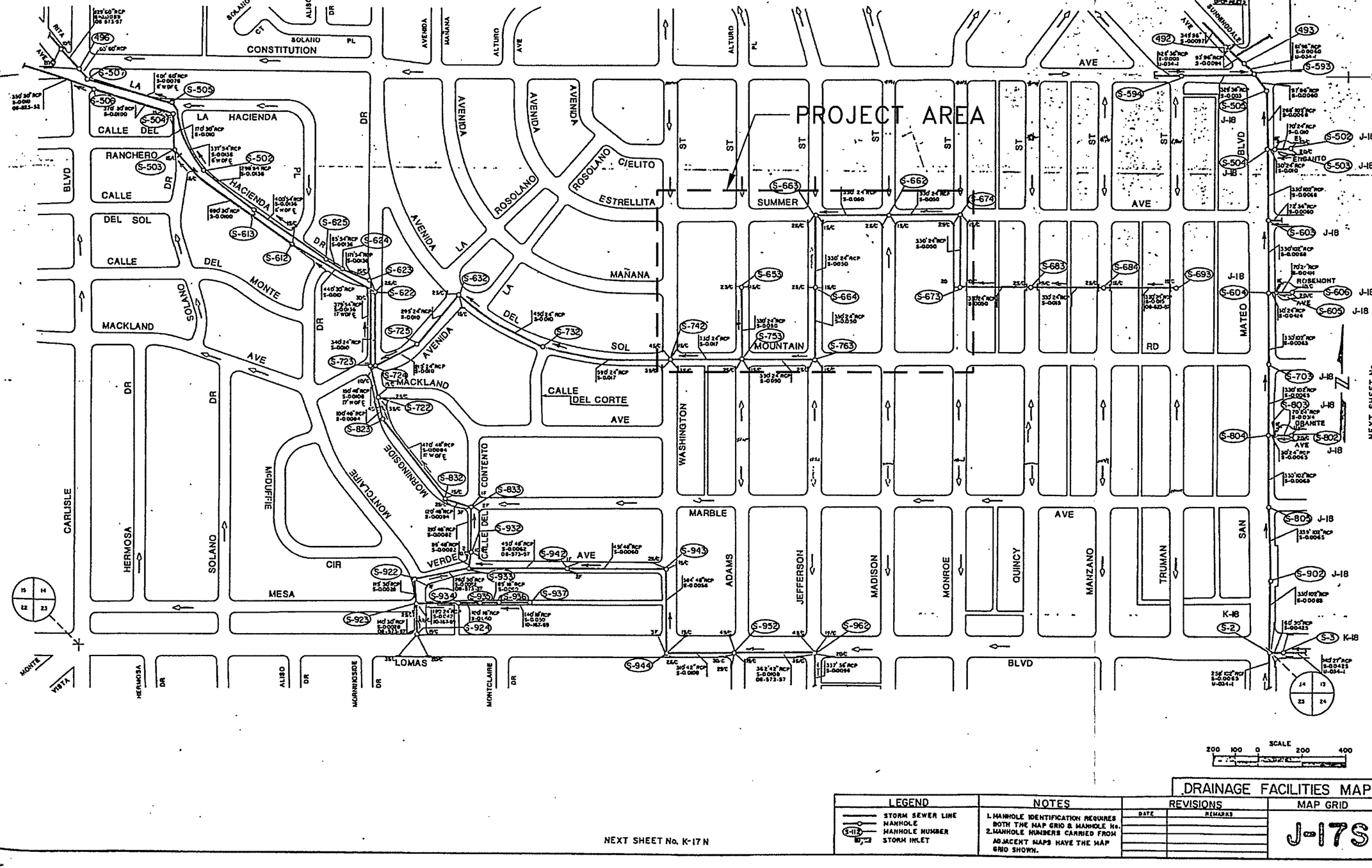
After a review of this preliminary study GFW will finalize this analysis and begin on the design. Please let me know if there are any questions regarding this report and if you would like to meet to discuss comments from City personnel.

Sincerely,
Gannett Fleming West, Inc.

Raymond J. Smith, P.E.
Project Manager

Attachments: Figure 2- City of Albuquerque Drainage Facilities Map
Figure 3-Actual Alignment of Existing Storm Drain
Figure 4-Drainage Basin Map
Figure 5-Recommended Improvements
NOAA Atlas 14 Point Precipitation Frequency Estimates
AHYMO Summary Output
Street Hydraulics Spreadsheet
Cost Estimate Spreadsheets (2)
Cobb Fendley Video Inspection Logs

Cc: Project File 56036



DRAINAGE FACILITIES MAP

LEGEND	NOTES	REVISIONS		MAP GRID
STORM SEWER LINE MANHOLE S-112 MANHOLE NUMBER STORM INLET	1. MANHOLE IDENTIFICATION REQUIRES BOTH THE MAP GRID & MANHOLE No. 2. MANHOLE NUMBERS CARRIED FROM ADJACENT MAPS HAVE THE MAP GRID SHOWN.	DATE	REMARKS	J-17S

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NEAR HEIGHTS FLOOD CONTROL PROJECT—COA GIS MAPPING FIGURE 2

NOT TO SCALE

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NEAR HEIGHTS FLOOD CONROL PROJECT–EXISTING CONDITIONS FIGURE 3

SCALE:1"=100'

DRAINAGE BASIN AREAS

BASIN	AREA (SQ MI)
A	0.00357
B	0.00380
C	0.00392
D	0.00373
E	0.00798
F	0.00797
G	0.00507
H	0.01687
TOTAL AREA	0.05291

LEGEND

- BASIN BOUNDARY
- SUB BASIN BOUNDARY
- EXISTING STORM DRAIN
- FLOW ARROW
- ANALYSIS POINT • 1

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NEAR HEIGHTS FLOOD CONTROL PROJECT–BASIN MAPPING

FIGURE 4

NOT TO SCALE

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NEAR HEIGHTS FLOOD CONTROL PROJECT–PROPOSED IMPROVEMENTS FIGURE 5

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, US*
Coordinates: 35.0899, -106.5920
Elevation: 5235ft*
* source Google Maps

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_&_aerials

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	0.176 (0.151-0 207)	0.228 (0 195-0 268)	0.306 (0 261-0 358)	0.366 (0 311-0 428)	0.449 (0 379-0 523)	0.513 (0 431-0 598)	0.580 (0 485-0.676)	0.651 (0 540-0 758)	0.747 (0 613-0 870)	0.823 (0 672 -0 959)
10-min	0.268 (0 230-0 314)	0.347 (0 296-0 407)	0.466 (0 396-0 545)	0.558 (0 473-0 651)	0.683 (0 577-0 796)	0.780 (0 656-0 910)	0.883 (0 737-1 03)	0.991 (0 822-1 15)	1.14 (0 933-1 33)	1.25 (1 02-1 46)
15-min	0.332 (0 285-0 389)	0.430 (0 367-0 504)	0.577 (0 492-0 676)	0.691 (0 586-0 807)	0.847 (0 715-0 987)	0.967 (0 813-1 13)	1.10 (0 914-1 28)	1.23 (1 02-1 43)	1.41 (1 16-1 64)	1.55 (1 27-1 81)
30-min	0.448 (0 384-0 524)	0.580 (0 494-0 679)	0.777 (0 662-0 910)	0.931 (0 789-1 09)	1.14 (0 963-1 33)	1.30 (1 10-1 52)	1.47 (1 23-1 72)	1.65 (1 37-1 93)	1.90 (1 56-2 21)	2.09 (1 71-2 44)
60-min	0.554 (0 475-0 649)	0.717 (0 612-0 841)	0.962 (0 819-1 13)	1.15 (0 976-1.34)	1.41 (1 19-1 64)	1.61 (1 36-1 88)	1.83 (1 52-2 13)	2.05 (1 70-2 38)	2.35 (1 93-2 74)	2.59 (2 11-3 02)
2-hr	0.642 (0 544-0 772)	0.823 (0 696-0 989)	1.09 (0 919-1 31)	1.30 (1 09-1 55)	1.60 (1 33-1 90)	1.84 (1.52-2 18)	2.09 (1 72-2 48)	2.35 (1 92-2 78)	2.72 (2 20-3 22)	3.02 (2 42-3 58)
3-hr	0.684 (0 583-0 816)	0.868 (0 738-1 04)	1.14 (0 969-1 36)	1.35 (1 14-1 60)	1.65 (1 39-1 96)	1.89 (1 58-2 24)	2.14 (1 78-2 53)	2.41 (1 99-2 86)	2.79 (2 27-3 29)	3.09 (2 50-3 66)
6-hr	0.796 (0 683-0 944)	1.00 (0 861-1 19)	1.29 (1 11-1 53)	1.52 (1.30-1 79)	1.83 (1.56-2 16)	2.08 (1 76-2 44)	2.34 (1.96-2 75)	2 60 (2 18-3 06)	2.97 (2 46 3 49)	3.27 (2 69- 3 85)
12-hr	0.877 (0 760-1 01)	1.11 (0 960-1 28)	1.40 (1 21-1 62)	1.63 (1 41-1 89)	1.95 (1 68-2 24)	2.19 (1 88-2 52)	2.44 (2 08-2 81)	2.70 (2 29-3 11)	3.06 (2 56-3 53)	3.35 (2 78-3 86)
24-hr	1.00 (0 878-1 15)	1.26 (1.10-1 44)	1.57 (1 37-1 80)	1.82 (1 59-2 08)	2.16 (1 88-2 47)	2.42 (2 10-2 76)	2.69 (2 33-3 06)	2.97 (2 55-3 37)	3.33 (2 85-3 79)	3.62 (3 08-4 12)
2-day	1.05 (0 922-1 19)	1.32 (1 16 -1 49)	1.64 (1 45-1 86)	1.90 (1 67-2 14)	2.25 (1 97 -2 53)	2.51 (2 19 -2 84)	2.79 (2 42-3 15)	3.07 (2 65-3 47)	3.44 (2 97-3 89)	3.73 (3 20-4.23)
3-day	1.14 (1 02-1 27)	1.42 (1 27-1 59)	1.76 (1 57-1 96)	2.03 (1 80-2 25)	2.39 (2 12-2 66)	2.66 (2 36-2.96)	2.94 (2 59-3 28)	3.23 (2 83-3 60)	3.60 (3 16-4 02)	3.89 (3 39 4 36)
4-day	1.23 (1 11-1 35)	1.53 (1 38-1 68)	1.88 (1 69-2 07)	2.15 (1 94-2 37)	2.52 (2 27 -2 78)	2.81 (2 52-3 09)	3.10 (2 77-3 41)	3.38 (3 02-3 73)	3.77 (3 35-4 15)	4.06 (3 59 -4 48)
7-day	1.40 (1 27-1 53)	1.74 (1 58-1 90)	2.12 (1 92-2.32)	2.42 (2 19-2 64)	2.81 (2 54-3 07)	3.10 (2 80-3 39)	3.40 (3 06-3 72)	3.68 (3 31-4 03)	4.06 (3 64-4 45)	4.33 (3 87-4 77)
10-day	1.55 (1 41-1 69)	1.92 (1.75-2 10)	2.36 (2 15-2.57)	2.69 (2 46-2 94)	3.15 (2 87-3 42)	3.49 (3 17-3 79)	3.83 (3 47-4.17)	4.17 (3 76-4 54)	4.60 (4 14-5 03)	4.93 (4 41-5 39)
20-day	1.94 (1 76-2 13)	2.40 (2 18-2 64)	2.92 (2 65-3 21)	3.31 (3 01-3 63)	3.81 (3 45-4 18)	4.17 (3 78 -4 58)	4.53 (4 09-4 96)	4.86 (4 38-5 32)	5.28 (4 75-5 79)	5.58 (5 00-6 13)
30-day	2.32 (2 11-2 53)	2.88 (2 62-3.14)	3.47 (3 15-3 78)	3.91 (3 55-4 25)	4.45 (4 04-4 84)	4.85 (4 39-5 26)	5.22 (4 72-5 67)	5.57 (5 03-6 06)	6.00 (5 40- 6 53)	6.30 (5 66-6 86)
45-day	2.84 (2 60-3 10)	3.52 (3 22-3 84)	4.20 (3 83-4 58)	4.68 (4 27-5 10)	5.28 (4 82-5 75)	5.69 (5 18-6 20)	6.06 (5 52-6 61)	6.40 (5 82-6 98)	6.78 (6 16-7 41)	7.03 (6 39-7 68)
60-day	3.27 (2 99-3 57)	4.04 (3 70-4 42)	4.82 (4 42-5.27)	5.38 (4 93-5 88)	6.06 (5 55 -6 61)	6.52 (5 97-7 12)	6.95 (6 36-7 60)	7.34 (6 71-8 03)	7.78 (7 12 -8 52)	8 06 (7 39-8 84)

[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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NEAR HEIGHTS FLOOD CONTROL
AHYMO SUMMARY OUTPUT
100-Yr, 6-Hr Design Storm

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(s16.67h8.5v0T&18D
   AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)                    - Ver. S4.01a, Rel: 01a      RUN DATE (MON/DAY/YR) =10/11/2012
   INPUT FILE = K:\PROJECTS\56036\PrjWk\Report\Drainage Report\NEAR HEIGHTS INPUT.dat      USER NO.= GannettFlSingleA41708419

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

   START                                                                                                    TIME=      0.00
   LOCATION                       ALBUQUERQUE
   *S
   *S NEAR HEIGHTS FLOOD CONTROL DEVELOPED CONDITIONS
   *S
   *S FN:NEAR HEIGHTS INPUT.DAT - HYMO PER JAN 1997 DPM REVISIONS
   *S
   RAINFALL  TYPE= 1 NOAA 14                                                                                RAIN6=     2.340
   *S---------------------------------------------------------------
   *S DEVELOPED SEDIMENT BULKING FACTOR = 5.0%
   SEDIMENT BULK                                                                                            PK BF =    1.05
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   *S NEAR HEIGHTS FLOOD CONTROL DEVELOPED CONDITIONS
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN A
   COMPUTE NM HYD             A   -    10       0.00357       9.39       0.332      1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN B
   COMPUTE NM HYD             B   -    15       0.00380      10.00       0.353      1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN C
   COMPUTE NM HYD             C   -    20       0.00392      10.31       0.365      1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN D
   COMPUTE NM HYD             D   -    25       0.00373       9.81       0.347      1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN E
   COMPUTE NM HYD             E   -    30       0.00798      20.97       0.742      1.74416    1.530    4.106 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN F
   COMPUTE NM HYD             F   -    35       0.00797      20.94       0.741      1.74416    1.530    4.106 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN G
   COMPUTE NM HYD             G   -    40       0.00507      13.33       0.472      1.74416    1.530    4.108 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN H
   COMPUTE NM HYD             H   -    45       0.01687      44.31       1.569      1.74416    1.530    4.104 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   FINISH
(s0p10h4099T&16D11
```

Near Heights Flood Control
City of Albuquerque Project 5498.91

Street Capacity and Inlet Calculations																		
					Inlet 1							Inlet 2						
Analysis Point	Q (cfs)	Q (Carry Over)	Q Total (cfs)	Road Slope	Depth (ft)	Velocity (ft/s)	Inlet Type	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Inlet Type	Depth (ft)	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Notes
1	9.39	0 0	9 39	0.019	0.40	3.5	None	0 0	0.0	0 0	9.39	None	0.0	0 0	0 0	0.0	0.0	Bypass to Basin C (AP-3)
2	10.00	0 0	10 00	0.019	0 41	3 5	None	0 0	0.0	0.0	10.00	None	0 0	0 0	0 0	0.0	0.0	Bypass to Basin D (AP-4) (Existing Inlet Not Neede
3	10.31	9 4	19.70	0.0213	0 49	4.9	Dbl C	0.0	9.5	9 5	10.20	None	0.0	0 0	0 0	0.0	0.0	Double C Inlet on Summer, Bypass to Basin E
4	8 42	10.0	18.42	0.0213	0.49	4.8	Dbl C	0 0	10 0	10.0	8.42	None	0.0	0.0	0.0	0.0	0.0	Double C Inlet on Summer, Bypass to Basin E
5	10 50	4 8	15 26	LP	0.80	NA	Dbl C	0 0	29.7	29.7	NA	None	0 0	0.0	0.0	0.0	0.0	Double C Inlets on Jefferson at Low Point
6	10.47	0.0	10 47	LP	0 80	NA	Dbl C	0 0	29 7	29.7	NA	None	0 0	0 0	0 0	0 0	0.0	Double C Inlets on Adams at Low Point
7	13.33	0.0	13.33	0.005	0.70	1.9	Dbl C	0.0	12.0	12.0	1.33	None	0.0	0.0	0 0	0.0	0 0	Double C Inlets on Washington, North of Mountain
8	22.16	0.0	22.16	0.029	0.49	5 5	Dbl C	0.0	9.5	9.5	12.66	Dbl C	0 3	0.0	4.0	4.0	8.7	Battery of Two Inlets on Mountain East of Washing

Street Flow Depths and Velocities taken from COA DPM Plate 22 3 D-1
Grate Capacities Taken from COA DPM Plates 22 3 D-5 & D-6
Capacity at Low Point Calculated using the Orifice Equation

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Option 1
Near Heights Flood Control
COA Proj No. 5498.91

						ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.	
BID ITEM #	ITEM ID NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	FINAL QUANTITY	UNIT PRICE	AMOUNT
1	4 010	CONSTRUCTION STAKING, COMPLETE	LS	1		$11,000 00	$11,000 00
2	6 010	CONSTRUCTION PROJECT SIGN, CIP	EA	2		$500 00	$1,000 00
3	19 010	CONSTRUCTION TRAFFIC CONTROL & BARRICADING, COMPLETE	LS	1		$14,000 00	$14,000 00
4	343 111	RESIDENTIAL PAVEMENT, EXISTING, REMOVE & REPLACE, INCL 2" EXTRA THICKNESS, CIP	SY	333		$24 00	$7,992 00
5	701 100	TRENCHING, BACKFILL & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPLETE	LF	500		$60 00	$30,000 00
6	910 005	18" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	150		$40 00	$6,000 00
7	910 017	36" REINFORCED CONRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	350		$80 00	$28,000 00
8	915 040	CATCH BASIN, TYPE "C", DOUBLE GRATE, CIP SD 2205	EA	10		$5,000 00	$50,000 00
9	915 070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPL, SD 2200	EA	6		$1,200 00	$7,200 00
10	920 140	MANHOLE, 6' DIA, TYPE C OR E, 6'-10' DEEP, CIP. SD 2101	EA	4		$4,500 00	$18,000 00
		ALLOWANCES					
11	621 4 1	MOBILIZATION, COMPLETE (5%)	LS	1		$8,659 60	$8,659 60
12	621 4 2	DEMOBILIZATION, COMPLETE (2%)	LS	1		$3,463 84	$3,463 84
13	450 XX	PROJECT SIGN SCREEN	EA	2		$500 00	$1,000 00
14	18 6 1	UTILITY RELOCATION	1	ALLOW		$10,000 00	$5,000 00
15	13 2 2	LAB TESTING	1	ALLOW		$20,000 00	$20,000 00
		Subtotal					$211,315 44
		CONTINGENCIES (30%)					$63,394 63
		SUBTOTAL					$274,710 07
		New Mexico Gross Receipts Tax (NMGRT) at 7 00%					$19,229 71
		TOTAL					$293,939.78

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Option 2
Near Heights Flood Control
COA Proj No. 5498.91

						ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.	
BID ITEM #	ITEM ID NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	FINAL QUANTITY	UNIT PRICE	AMOUNT
1	4 010	CONSTRUCTION STAKING, COMPLETE	LS	1		$11,000 00	$11,000 00
2	6 010	CONSTRUCTION PROJECT SIGN, CIP	EA	2		$500 00	$1,000 00
3	19 010	CONSTRUCTION TRAFFIC CONTROL & BARRICADING, COMPLETE	LS	1		$14,000 00	$14,000 00
4	343 111	RESIDENTIAL PAVEMENT, EXISTING, REMOVE & REPLACE, INCL 2" EXTRA THICKNESS, CIP	SY	2065		$24 00	$49,560 00
5	701 100	TRENCHING, BACKFILL & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPLETE	LF	3100		$60 00	$186,000 00
6	910 005	18" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	150		$40 00	$6,000 00
7	910 009	24" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	560		$50 00	$28,000 00
8	910 017	36" REINFORCED CONRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	1280		$80 00	$102,400 00
9	910 021	48" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	1060		$110 00	$116,600 00
10	910 103	DRAINLINE REMOVAL, 10" TO 24", EXCLUDING TRENCHING, COMPL	LF	2600		$10 00	$26,000 00
11	915 040	CATCH BASIN, TYPE "C", DOUBLE GRATE, CIP SD 2205	EA	10		$5,000 00	$50,000 00
12	915 070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPL, SD 2200	EA	6		$1,200 00	$7,200 00
13	920 140	MANHOLE, 6' DIA, TYPE C OR E, 6'-10' DEEP, CIP. SD 2101	EA	6		$4,500 00	$27,000 00
	\	ALLOWANCES					
14	621 4 1	MOBILIZATION, COMPLETE (5%)	LS	1		$31,238 00	$31,238 00
15	621 4 2	DEMOBILIZATION, COMPLETE (2%)	LS	1		$12,495 20	$12,495 20
16	450.XX	PROJECT SIGN SCREEN	EA	2		$500 00	$1,000 00
17	18 6 1	UTILITY RELOCATION	1	ALLOW		$10,000 00	$5,000 00
18	13 2 2	LAB TESTING	1	ALLOW		$20,000 00	$20,000 00
		Subtotal					**$694,493 20**
		CONTINGENCIES (30%)					**$208,347 96**
		SUBTOTAL					**$902,841 16**
		New Mexico Gross Receipts Tax (NMGRT) at 7 00%					**$63,198 88**
		TOTAL					**$966,040.04**

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SUBSURFACE UTILITY ENGINEERING

MH off Project. One block West

STRUCTURE # SDMH 1

Project Name: Near Hts. Flood Control
Project #: 1206 062 01
General Location: Av. Mañana, W. of Washngtn
SUE Crew / Equipment: KTG AF - Zoom Inpection

Date / Time: Mon. 10.29.12 - AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

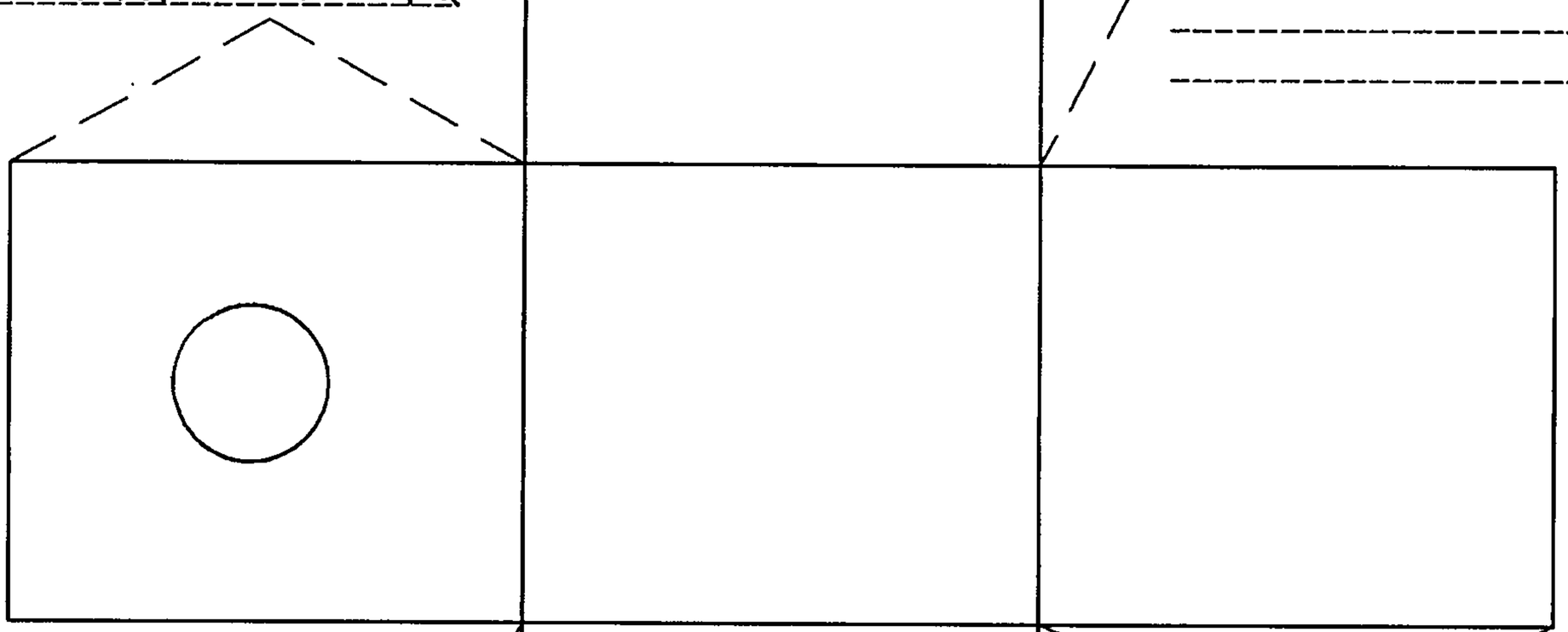
NORTH

Video & Data Collection:

Time Start: 10:15 Stop: 10:16
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
1A
OFF Project MH - Av Manana
24 inch RCP - SOUTH.AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____



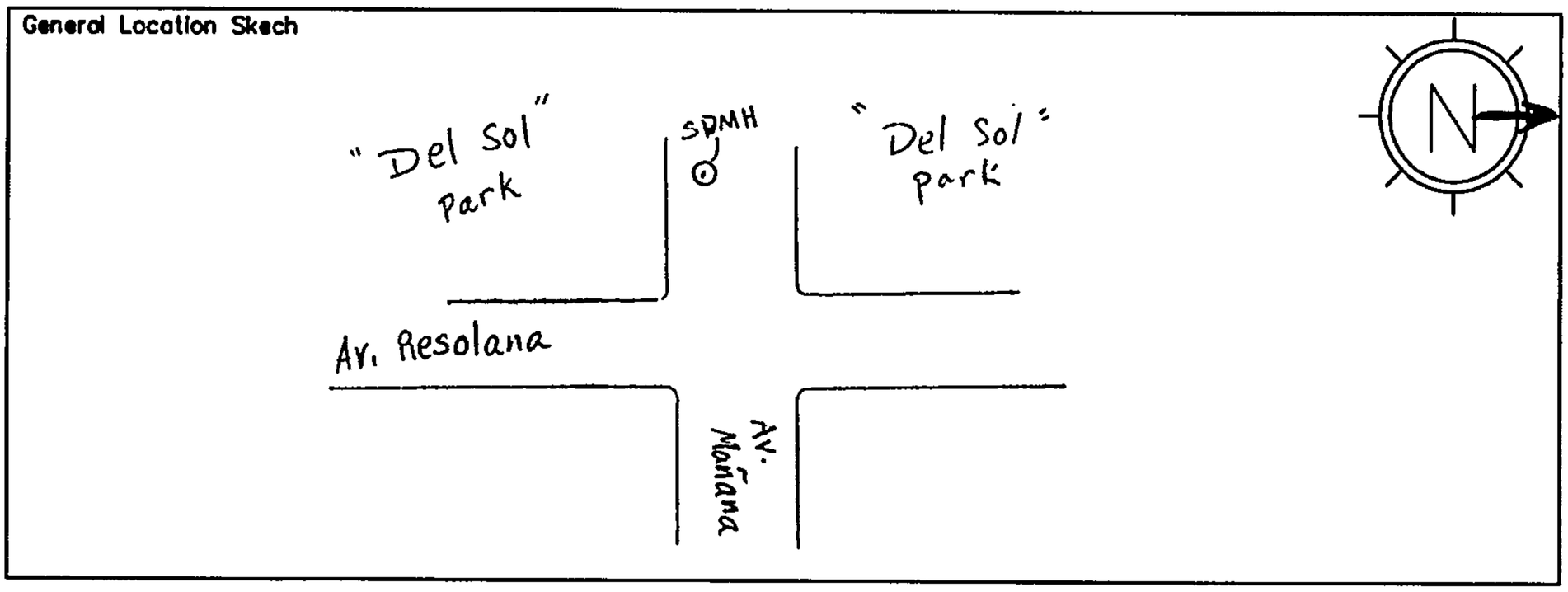
Video & Data Collection:

Time Start: 10:12 Stop: 10.13
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
1B
Off Project MH - Av Manana
24 inch RCP - NORTH.AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



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SUBSURFACE UTILITY ENGINEERING

MH #24

STRUCTURE # 2 SDMH

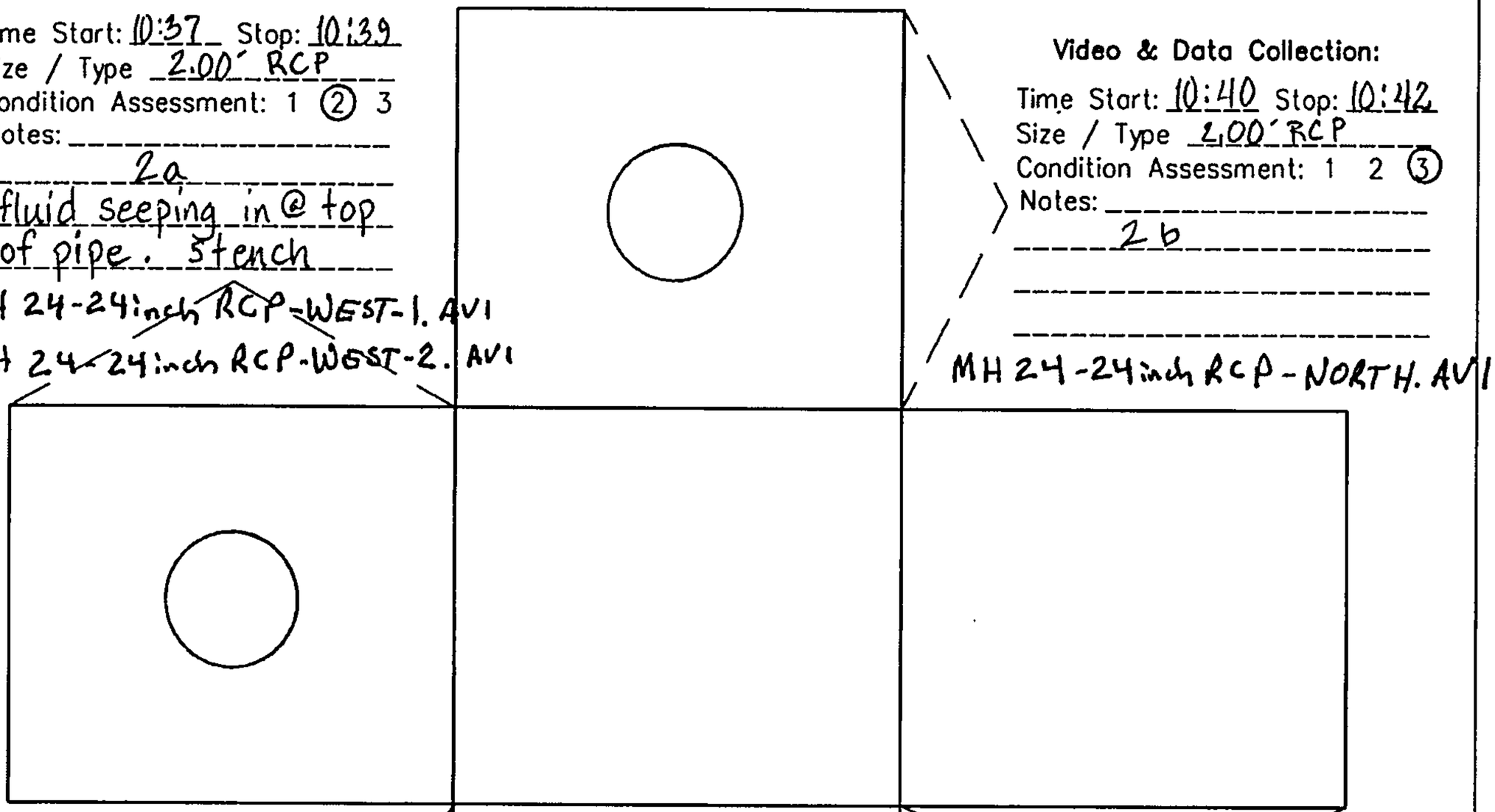
Project Name: N H F C
Project #: 1206 062 01
General Location: Av. Mañana @ Wshngtn.
SUE Crew / Equipment: AF KTG

Date / Time: Mon. Oct. 29, 2012 AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 10:37 Stop: 10:39
Size / Type 2.00' RCP
Condition Assessment: 1 (2) 3
Notes: 2a
fluid seeping in @ top of pipe. Stench

MH 24-24inch RCP-WEST-1.AVI
MH 24-24inch RCP-WEST-2.AVI



Video & Data Collection:

Time Start: 10:40 Stop: 10:42
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 2b

MH 24-24inch RCP-NORTH.AVI

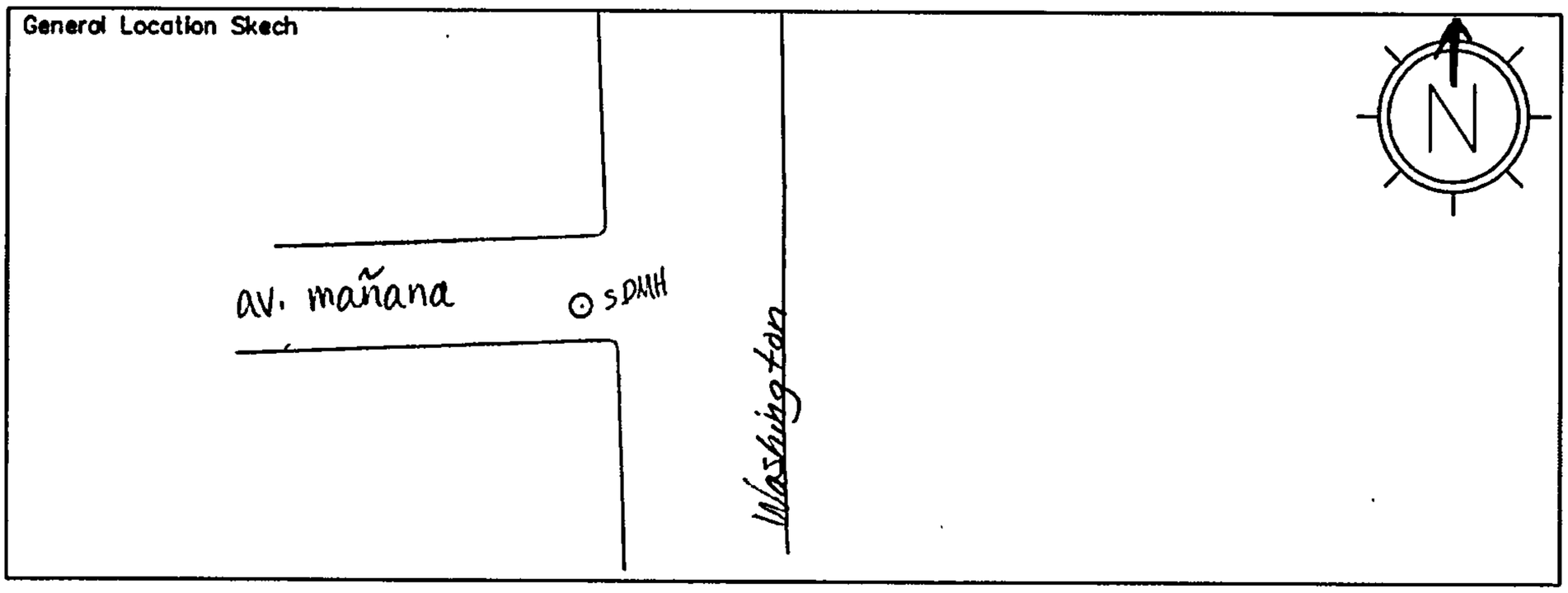
Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



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SUBSURFACE UTILITY ENGINEERING

MH # 22

STRUCTURE # 3 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Av. Estrellita @ Wshngtn.
SUE Crew / Equipment: KTG · AF

Date / Time: Mon. Oct. 29, 2012 AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

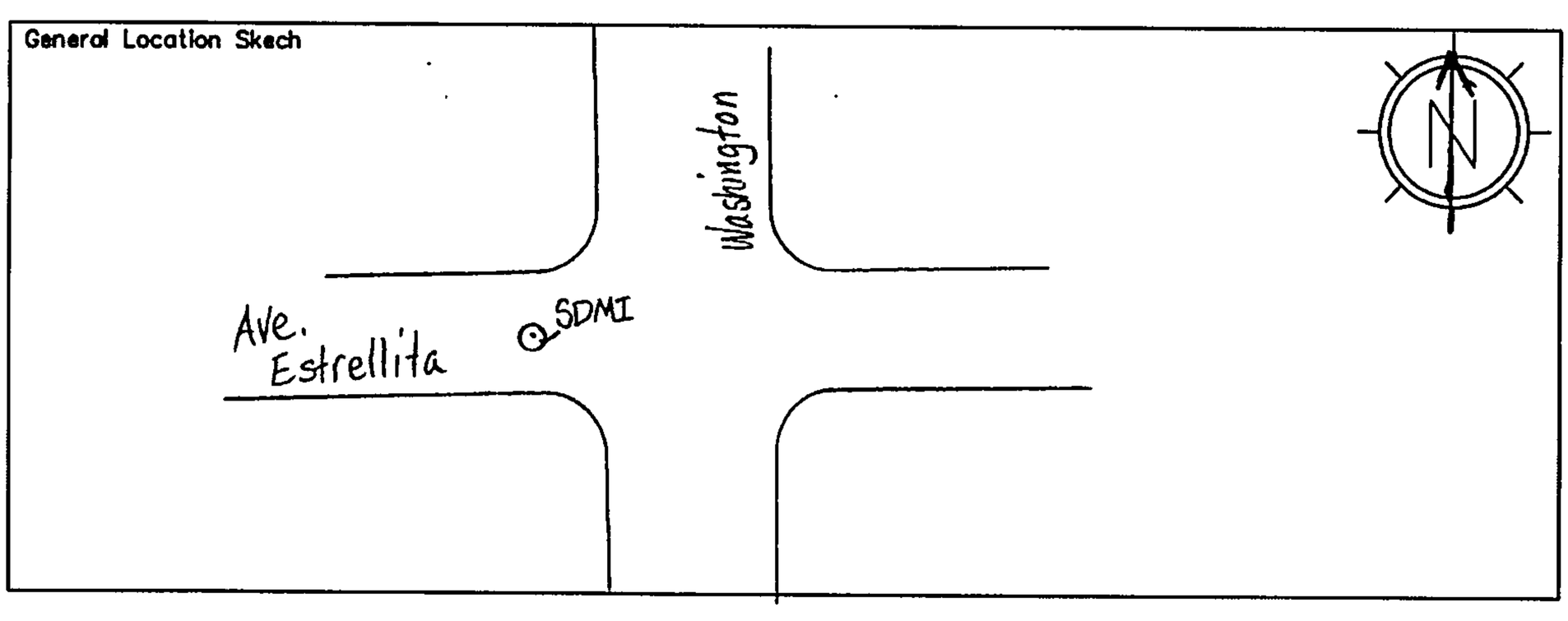
Video & Data Collection:

Time Start: 11:13 Stop: 11:14
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 3a
MH 22 - 24inch RCP - SOUTH. AVI

Video & Data Collection:

Time Start: 11:15 Stop: 11:17
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 3b
MH 22 - 24inch RCP - EAST. AVI

General Location Skech



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MH # 08

STRUCTURE # 4 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Adams
SUE Crew / Equipment: KTG SW AF

Date / Time: Mon. Oct 22, 2012 PM
Weather: 70°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 12:13 Stop: 12:15
Size / Type 1.50" RCP
Condition Assessment: 1 2 (3)
Notes: _____
4a
MH08-18inch RCP-WEST. AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

MH08-14inchRCP-SW to DI. AVI
12:34 - 12:35
1.17' RCP (3)
TO DI

MH08-14inch RCP-SE to DI. AVI
12:33 - 12:34
1.17' RCP (2)
TO DI

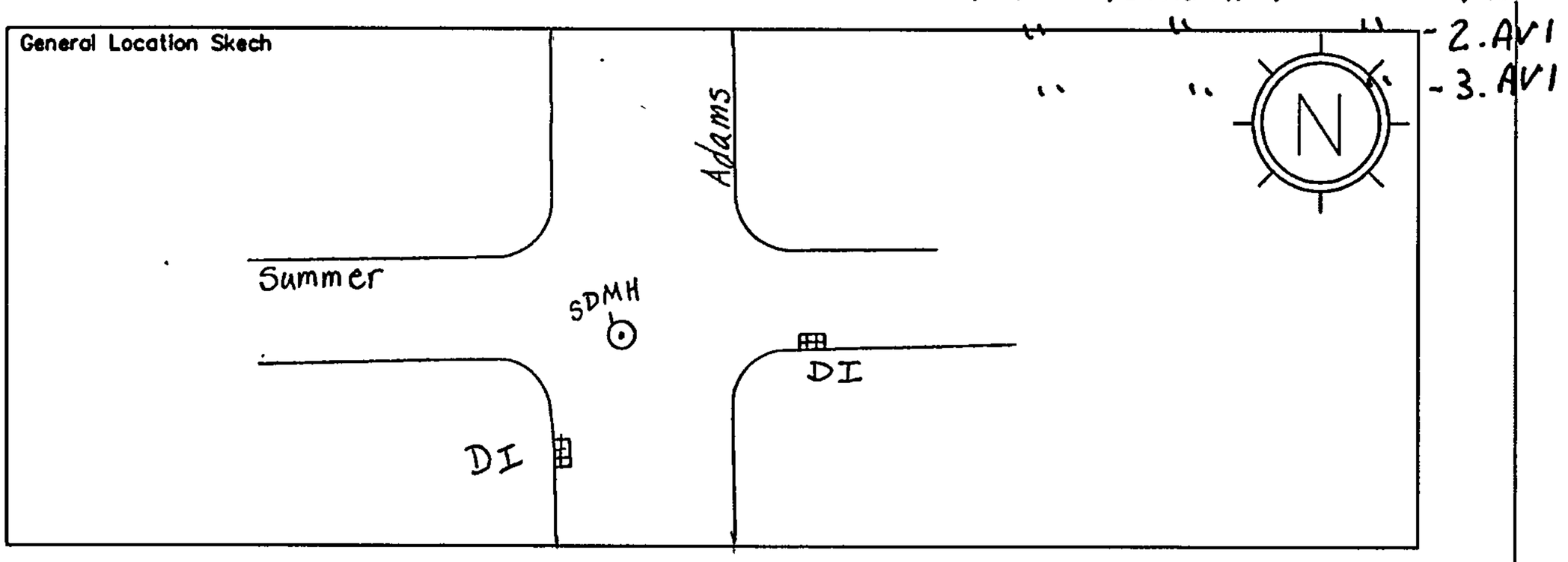
Video & Data Collection:

Time Start: 12:29 Stop: 12:31
Size / Type 1.50 RCP
Condition Assessment: 1 2 (3)
Notes: _____
4c
_____
MH08-18inch RCP-SOUTH. AVI

Video & Data Collection:

Time Start: 12:17 Stop: 12:24
Size / Type 1.50' RCP
Condition Assessment: 1 (2) 3
Notes: _____
4b
concrete? flow on bottom of pipe
MH08-18inch RCP-EAST-1.AVI
" " -2.AVI
" " -3.AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 06

STRUCTURE # 5 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Adams, S. of Summer
SUE Crew / Equipment: A F KTG

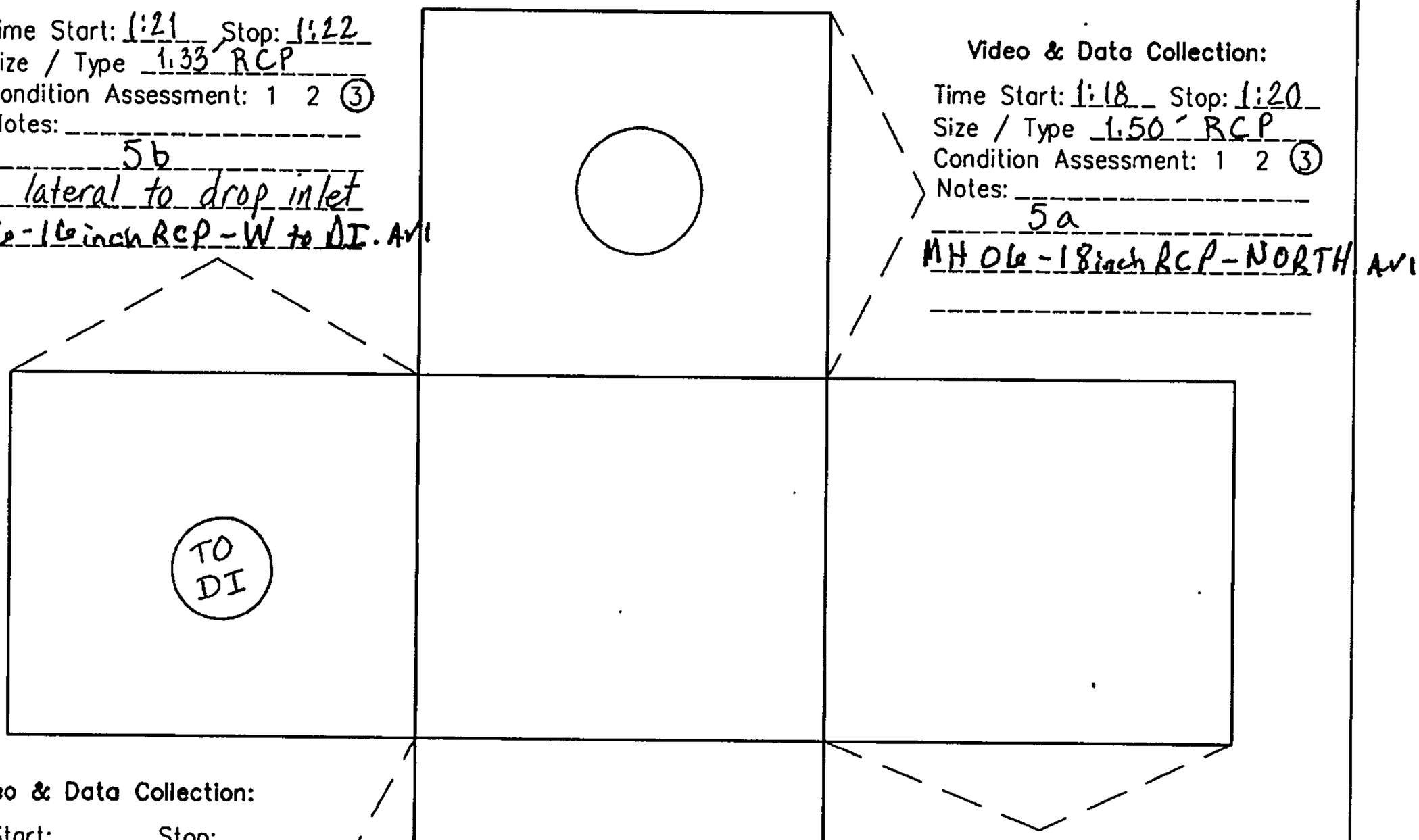
Date / Time: Mon. Oct. 22, 2012 pm
Weather: 70's, clear
Reviewed By: SW
Checked By:

Video & Data Collection:

Time Start: 1:21 Stop: 1:22
Size / Type 1.33' RCP
Condition Assessment: 1 2 (3)
Notes:
5b
lateral to drop inlet
MH 06-18inch RCP-W to DI.AVI

Video & Data Collection:

Time Start: 1:18 Stop: 1:20
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes:
5a
MH 06-18inch RCP-NORTH.AVI



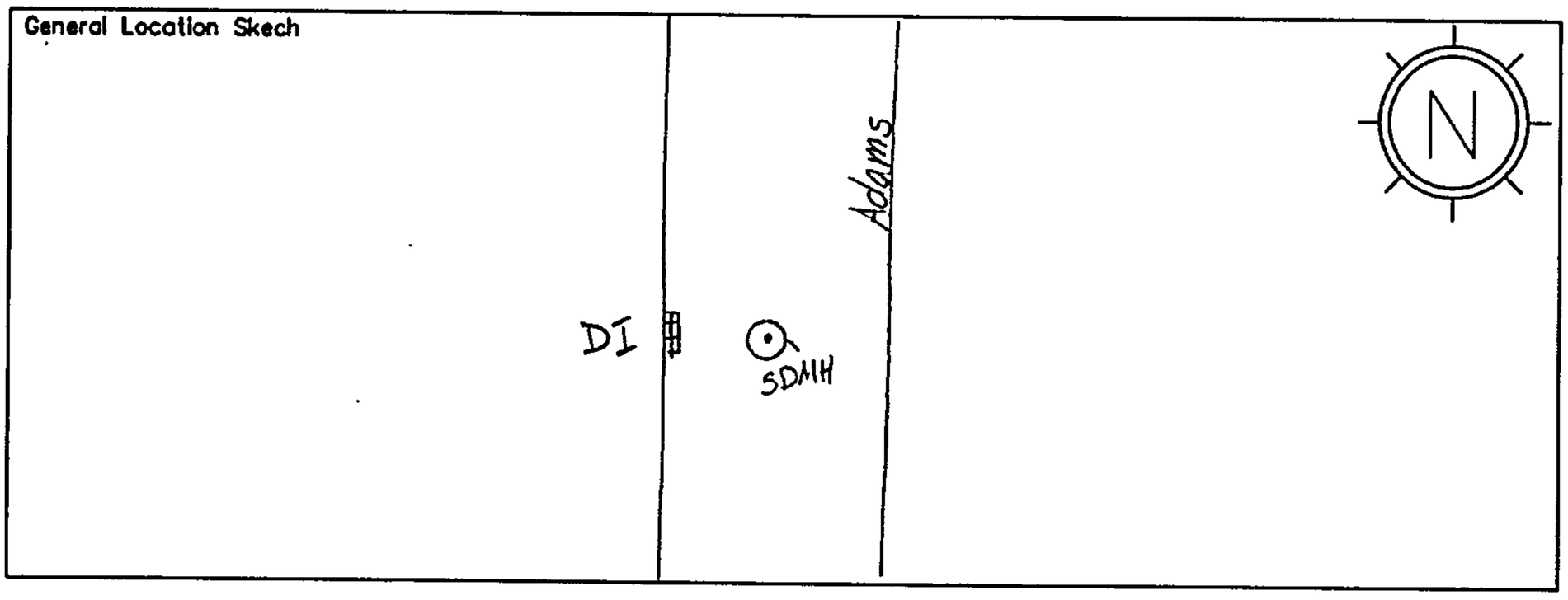
Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 11

STRUCTURE # 6 SDMH

Project Name: NHFC
Project #: 1206 062 01
General Location: Jefferson, S. of Smmr.
SUE Crew / Equipment: KTG AF - Zoom Insp.

Date / Time: Mon. Oct. 22, 2012 PM
Weather: 70's, clear
Reviewed By: SW
Checked By: _____

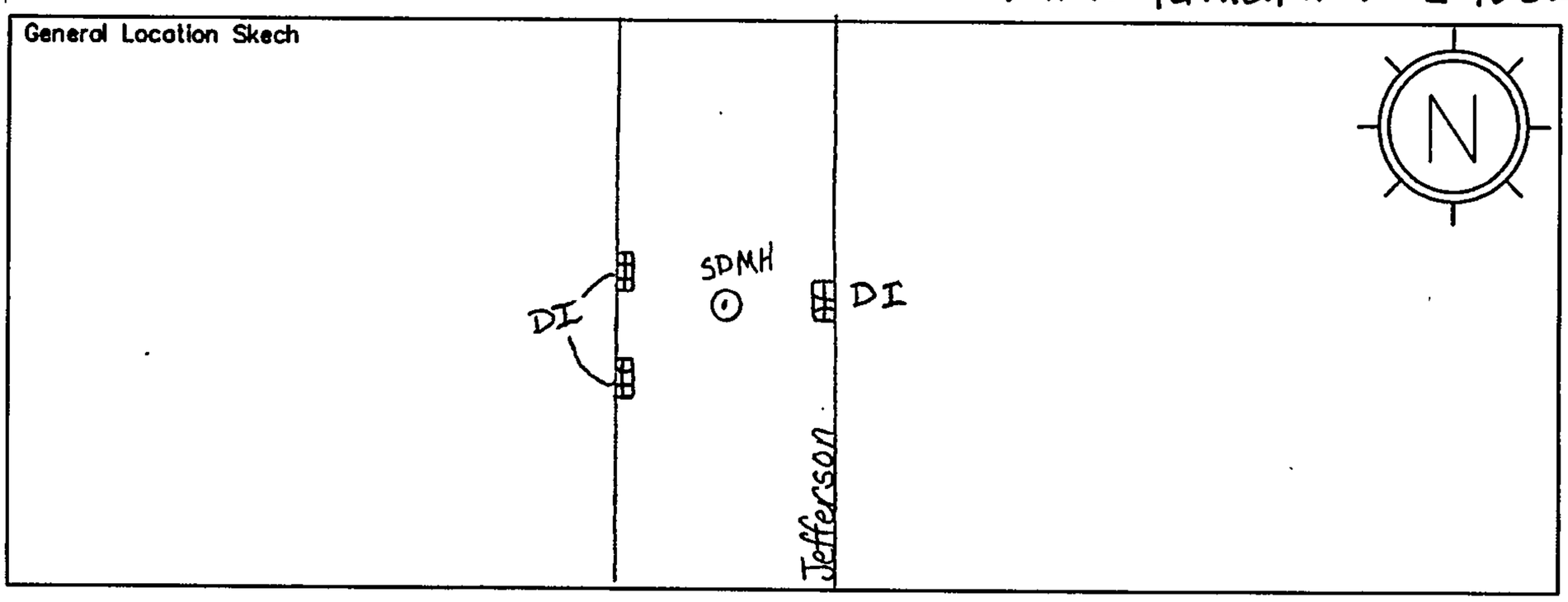
Video & Data Collection:
Time Start: 1:57 Stop: 1:58
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes: 6c
MH 11 - 18inch RCP - NW to DI. AVI

Video & Data Collection:
Time Start: 1:52 Stop: 1:54
Size / Type 1.50' RCP
Condition Assessment: 1 (2) 3
Notes: 6a
Concrete? on floor of pipe
MH 11 - 18inch RCP - NORTH

Video & Data Collection:
Time Start: 1:55 Stop: 1:56
Size / Type 1.25' RCP
Condition Assessment: 1 2 (3)
Notes: 6b
lateral to Drop inlet
MH 11 - 15inch RCP - SW to DI. AVI

Video & Data Collection:
Time Start: 1:59 Stop: 2:00
Size / Type 1.00' RCP
Condition Assessment: 1 (2) 3
Notes: lateral to DI
6d
Concrete? on floor of pipe
MH 11 - 12inch RCP - E to DI. AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 10

STRUCTURE # 7SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Jefferson
SUE Crew / Equipment: KTG AF

Date / Time: Mon. Oct. 22, 2012 pm
Weather: 70°s, clear
Reviewed By: SW
Checked By:

Video & Data Collection:
Time Start: 2:35 Stop: 2:36
Size / Type 2.00" RCP
Condition Assessment: 1 2 (3)
Notes:
7d
MH 10 - 24inch RCP - WEST. AVI

Video & Data Collection:
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes:

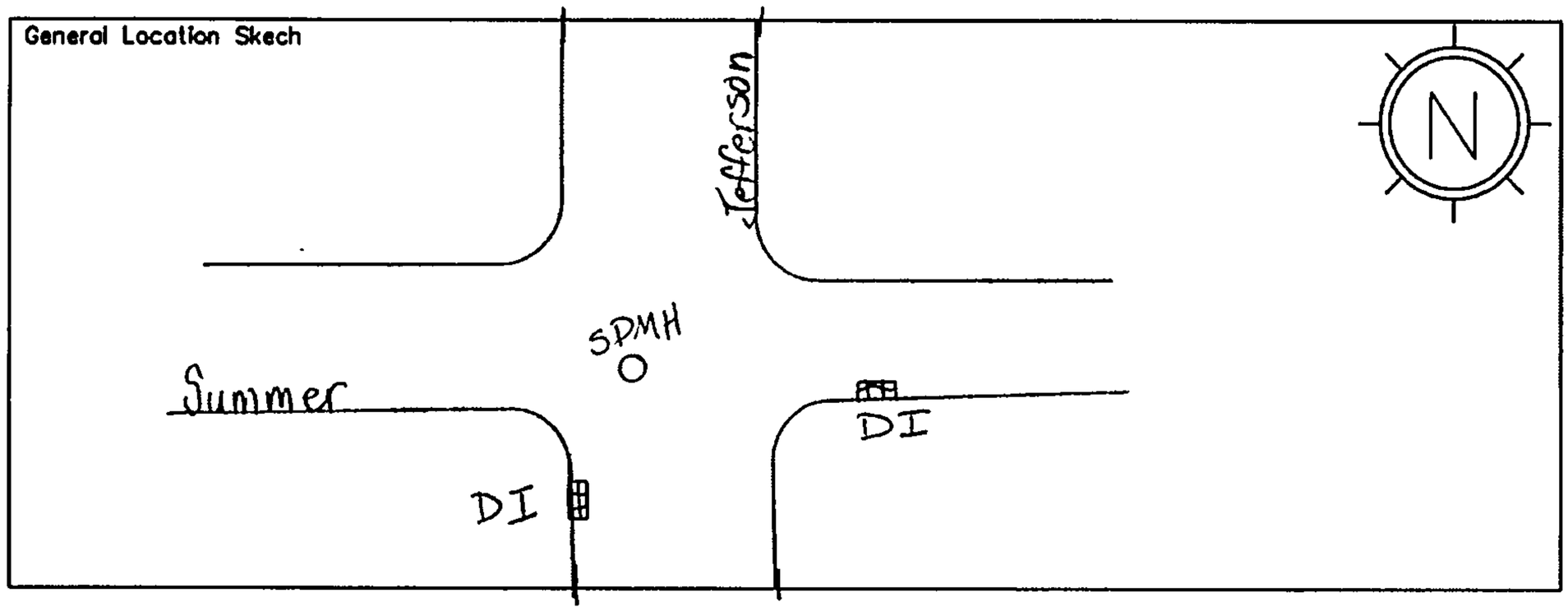
MH 10 - 12inch RCP - SE to D1. AVI
2:31 - 2:32
7b 1.00' RCP (3)
to DI

2:37 - 2:38
7e 1.60' RCP (3)
to DI

Video & Data Collection:
Time Start: 2:29 Stop: 2:30
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes:
7a
MH 10 - 18inch RCP - SOUTH. AVI

Video & Data Collection:
Time Start: 2:33 Stop: 2:34
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes:
7c
MH 10 - 24inch RCP - EAST. AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 15

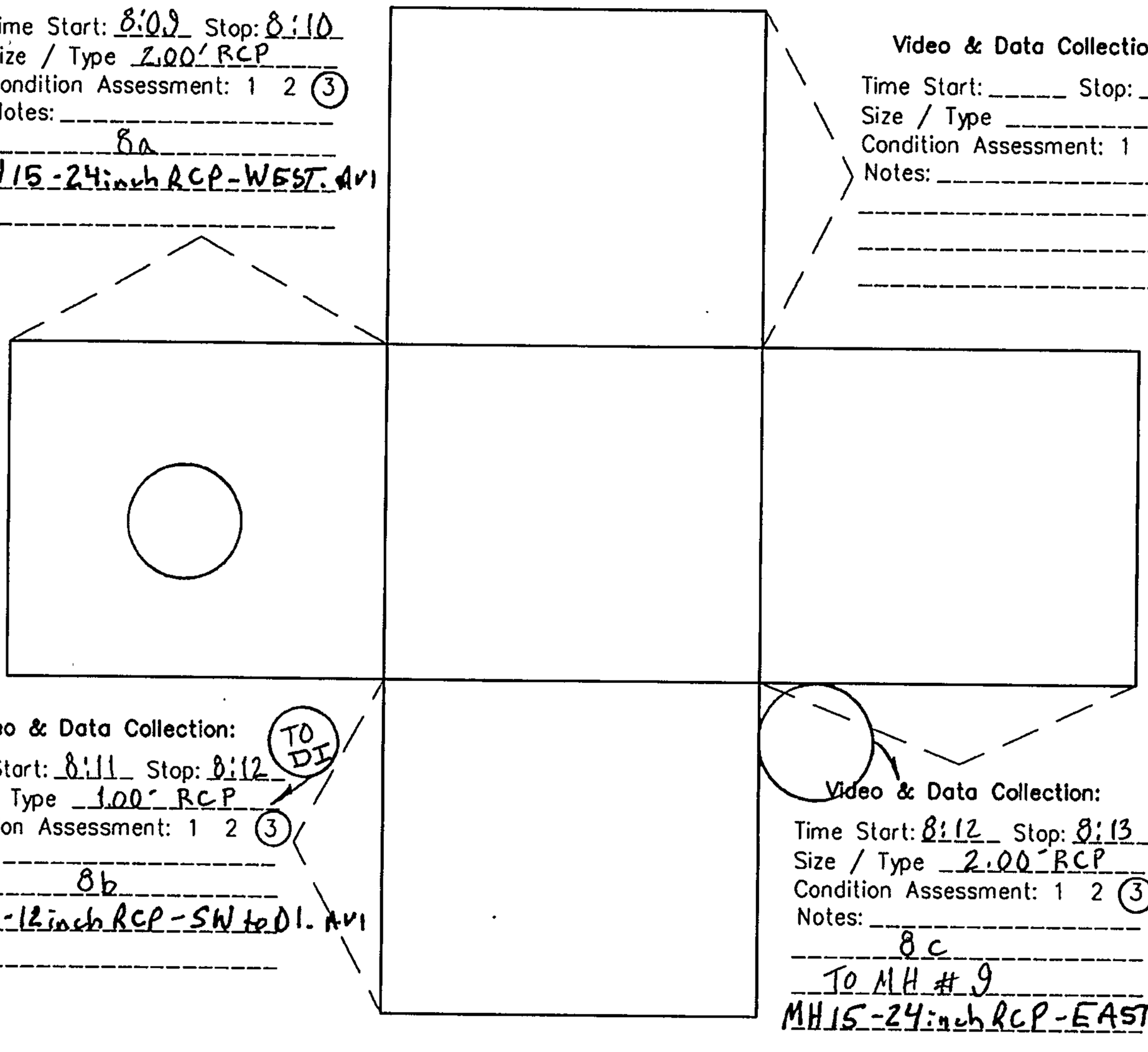
STRUCTURE # 8 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Madison
SUE Crew / Equipment: AF - ZOOM - KTG

Date / Time: Tue. Oct. 23, 2012 am
Weather: 50°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 8:09 Stop: 8:10
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8a
MH15-24inch RCP-WEST.AVI
_____



Video & Data Collection:

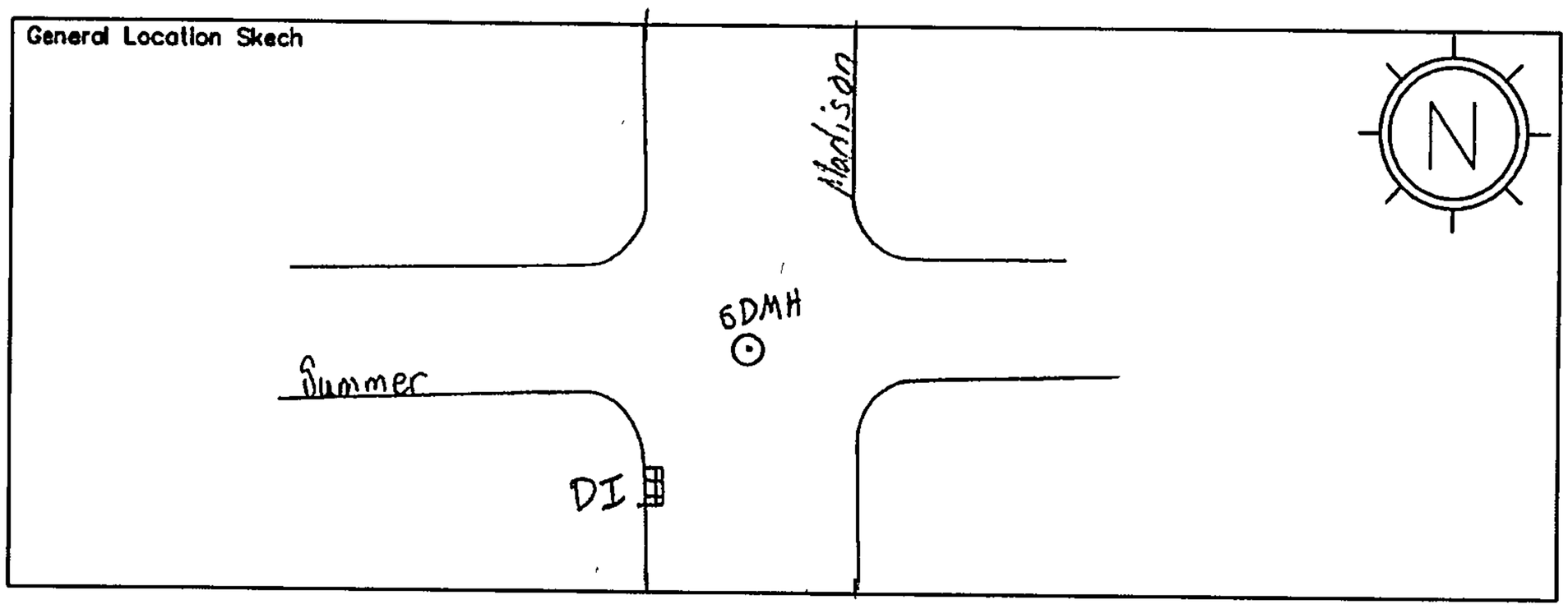
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

Video & Data Collection:

Time Start: 8:11 Stop: 8:12
Size / Type 1.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8b
MH15-12inch RCP-SW to DI.AVI
_____

Video & Data Collection:

Time Start: 8:12 Stop: 8:13
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8c
To MH # 9
MH15-24inch RCP-EAST.AVI



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH #17

STRUCTURE # 9SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Madison
SUE Crew / Equipment: AF - ZOOM - KTG

Date / Time: Tue. Oct. 23, 2012 am
Weather: 50°is, clear
Reviewed By: SW
Checked By:

Video & Data Collection:

Time Start: 8:29 Stop: 8:30
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes:
9a
MH17-24inchRCP-WEST.AVI
TO MH #8

Video & Data Collection:

Time Start: 8:33 Stop: 8:34
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes:
9c
(to DI) MH17-18inchRCP-NE to DI.AVI

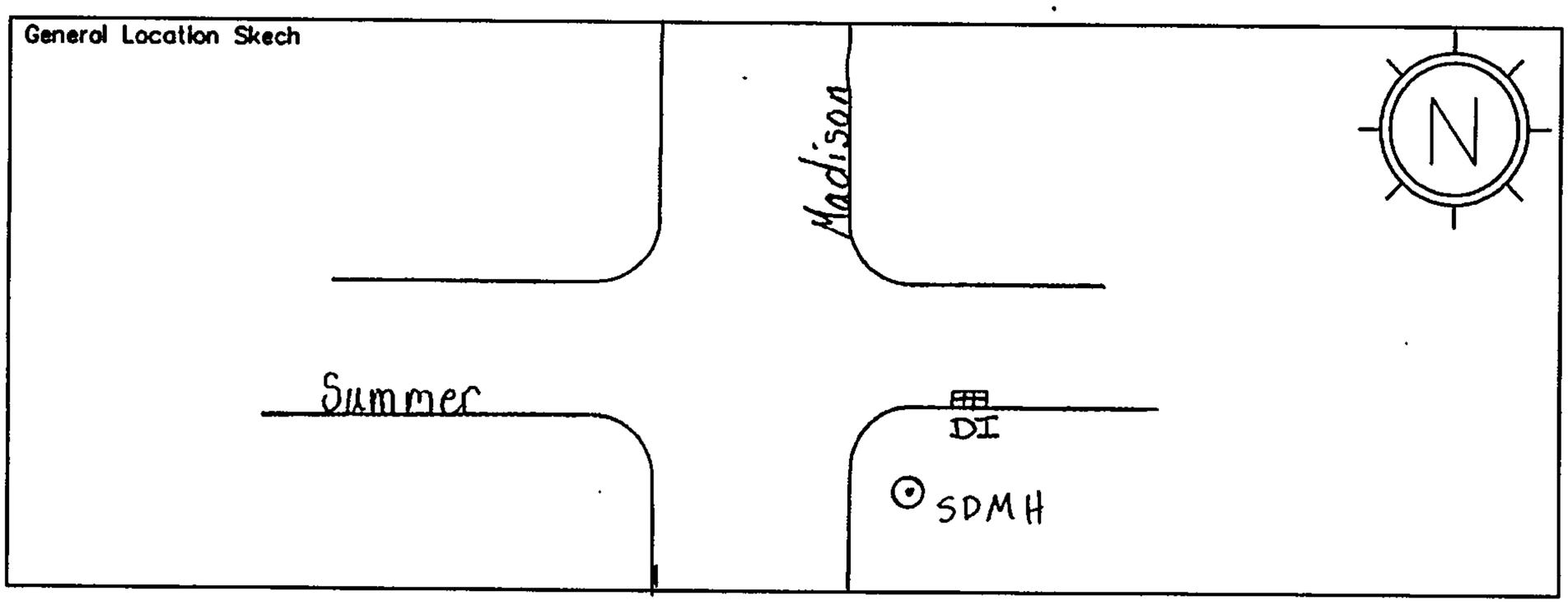
Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes:

Video & Data Collection:

Time Start: 8:31 Stop: 8:32
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes:
9b
MH17-24inchRCP-EAST.AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH #19

STRUCTURE # 10 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Monroe
SUE Crew / Equipment: AF - Zoom - KTG

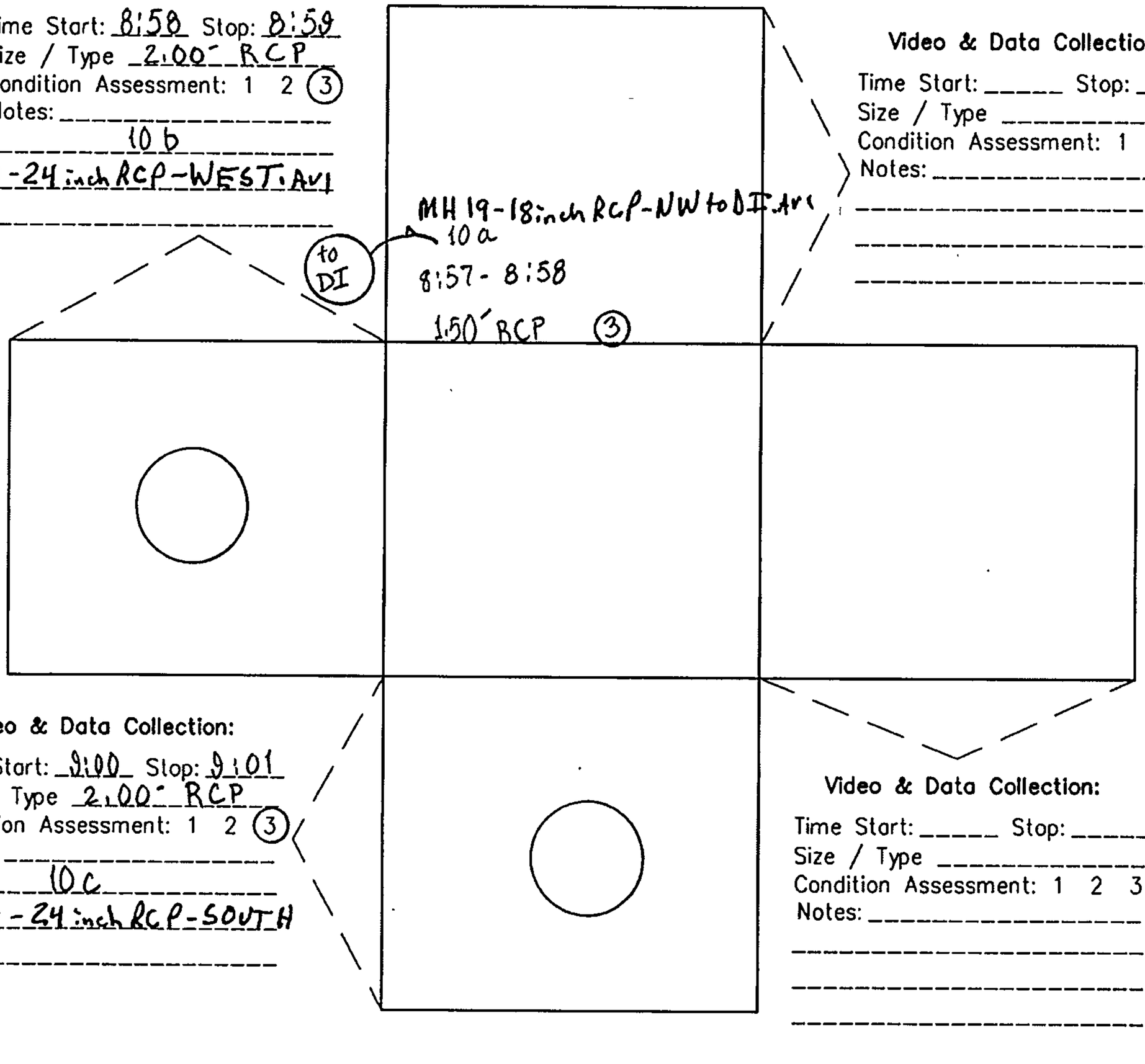
Date / Time: Tue. Oct. 23, 2012 am
Weather: 60's, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 8:58 Stop: 8:59
Size / Type 2.00" RCP
Condition Assessment: 1 2 (3)
Notes: _____
10 b
MH 19 - 24 inch RCP - WEST. Av1
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____



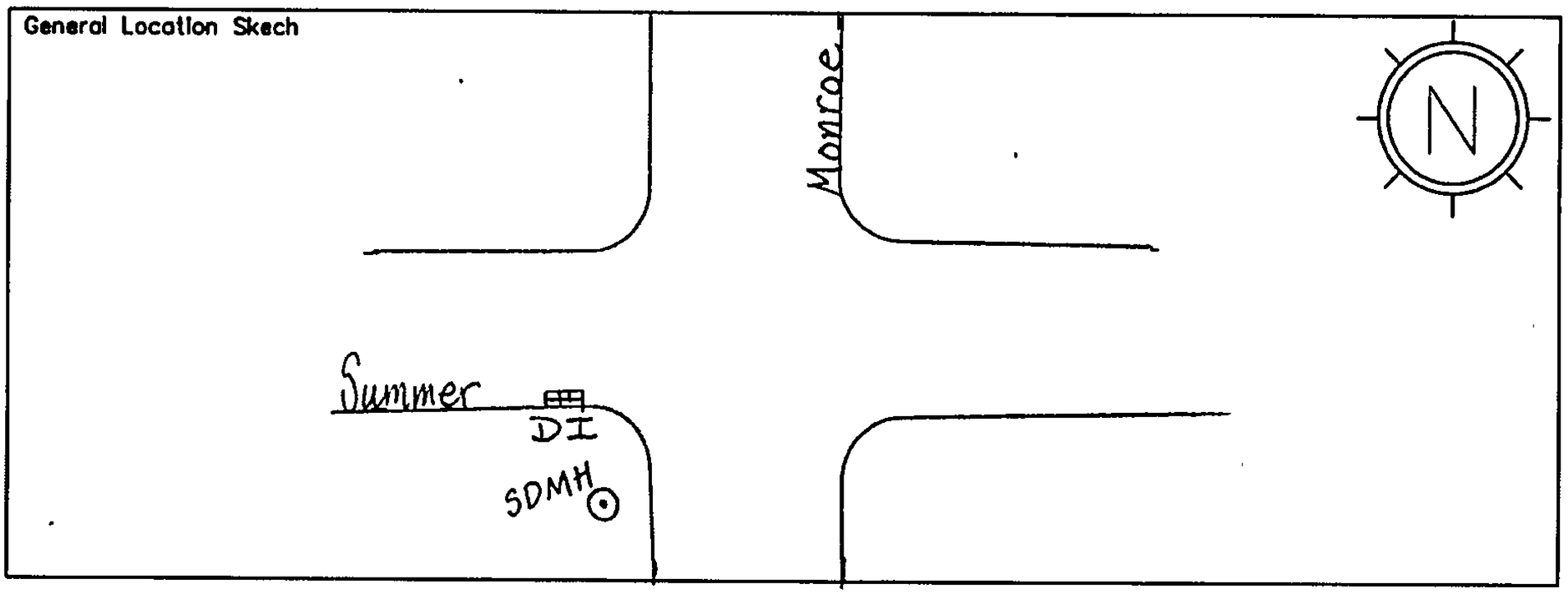
Video & Data Collection:

Time Start: 9:00 Stop: 9:01
Size / Type 2.00" RCP
Condition Assessment: 1 2 (3)
Notes: _____
10 c
MH 19 - 24 inch RCP - SOUTH
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH off Project. One Block East.

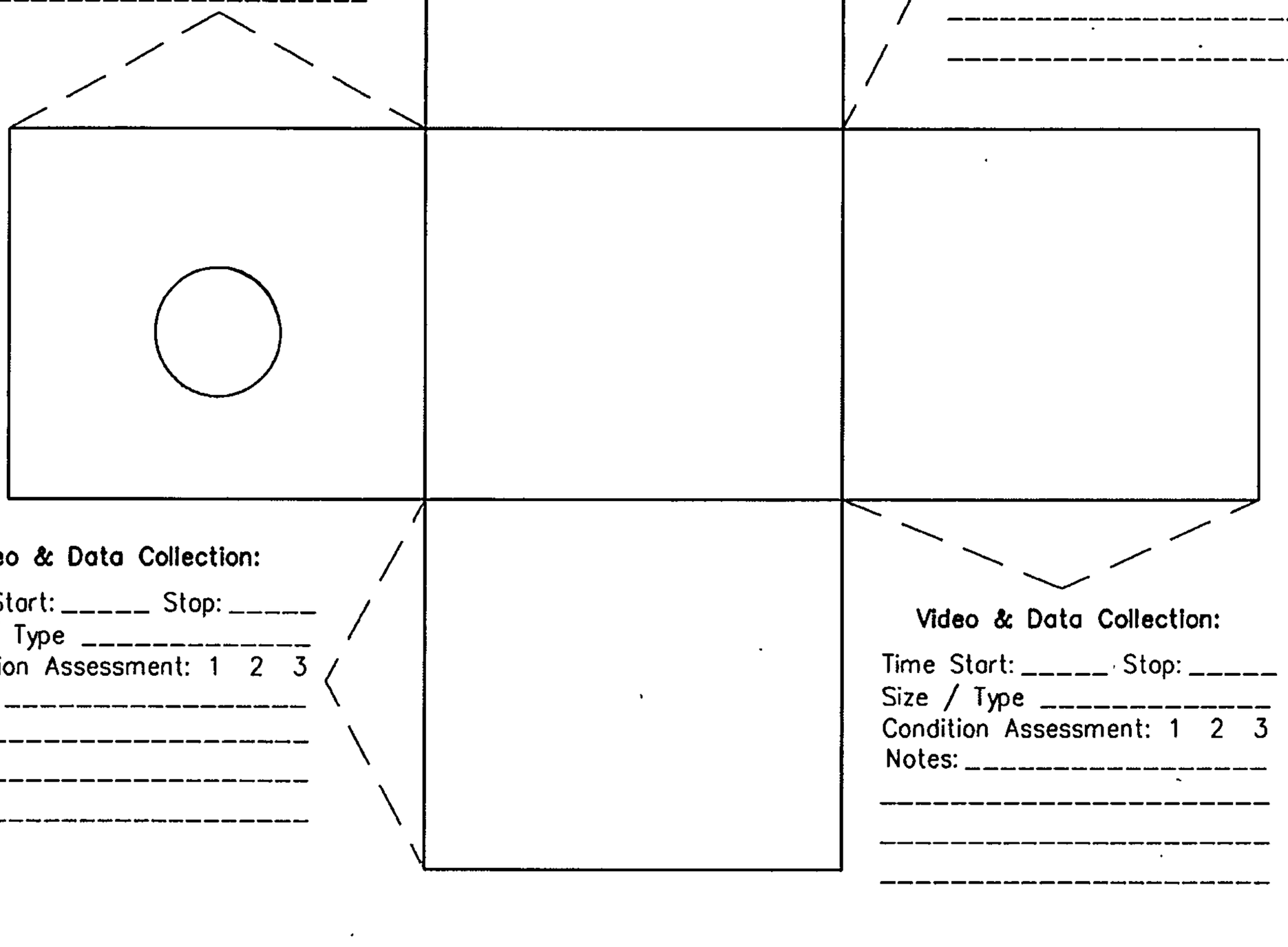
STRUCTURE # 11 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Quincy, S. of Summer
SUE Crew / Equipment: AF - ZOOM - KTG

Date / Time: Tue. Oct. 23, 2012 am
Weather: 60's, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 9:30 Stop: 9:32
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
10a
Off Project MH - Quincy - 24inch RCP - WEST. AV1
_____



Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

Video & Data Collection:

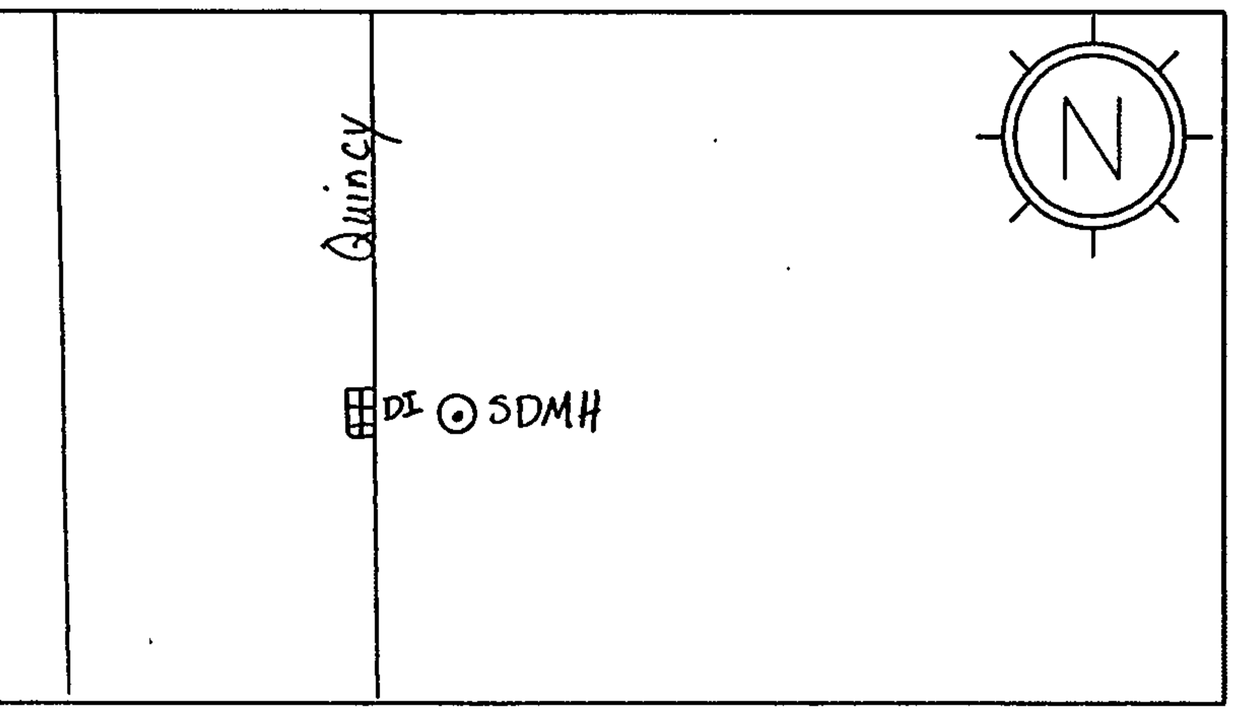
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

General Location Skech

No Manhole found in Alley between Quincy & Monroe.



J-17 D000

Shahab Biazar
924-3695

Gannett Fleming West, Inc.

Excellence Delivered ***As Promised***

April 5, 2013

Manh Tran, P.E., Project Manager
Department of Municipal Development
City of Albuquerque
1 Civic Plaza
P.O. Box 1293
Albuquerque, NM 87103

Re: Final Drainage Analysis (Amended April 5, 2013)
Near Heights Flood Control Project
COA Project #5498.91

Dear Mr. Tran,

This letter presents the final results of our drainage analysis for the Near Heights Flood Control project. In accordance with Exhibit I, Part B.1 of our contract scope of services, GFW has performed an analysis of the hydrology, street hydraulics and location of proposed inlets for the project area. This analysis was based on; our conceptual analysis, which was done for our proposal effort and the topographic survey, which was performed by our subconsultant Terra Survey, LLC.

Gannett Fleming West, Inc. submitted a preliminary drainage analysis, dated November 14, 2012. We received only editorial comments on that report and have finalized this report to include the results of a camera inspection of the existing storm drain. We have also modified our recommendations to account for grade differences that were discovered in the initial stages of the preliminary design.

This report was amended to clarify some existing utility conditions after new information was obtained.

Analysis Criteria

The analysis for this project was performed according to the requirements of the City of Albuquerque (COA) Development Process Manual (DPM). The design storm was the 100 year, 6 hour storm. The flow depth requirement for residential streets is 0.2 feet above the curb line (0.87 feet). However, we felt a more conservative approach is warranted. Therefore, we used a flow depth requirement for a collector street of 0.5 feet. In addition, the depth x velocity shall not exceed 6.5.

GFW used the following methods/programs for the analysis of the project. AHYMO_S4 was used to create a hydrologic model. An excel spreadsheet was used to analyze the street hydraulics and determine inlet placement. Bentley's StormCAD was used to create a hydraulic model of the existing storm drain.

Existing Conditions

The project consists of a four block area bounded by Mountain Road to the south, Summer Avenue to the north, Washington Street to the west and Monroe Street to the east. The area is generally north and east of the intersection of Lomas and Washington. The project area is fully developed with curb & gutter, sidewalk and an existing storm drain system. Prior to its development in the 1950's, the area was the site of an arroyo. The general path of the arroyo can still be seen in the topography of the area. **Figure 1** on the following page shows the project area.

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Rec 7/12/13
fs

A review of the City's information on the existing storm drain system and actual conditions has uncovered a considerable discrepancy. We made a comparison of the following sources; 'as-built' records, City GIS mapping, the Albuquerque Master Drainage Study, our own project survey and finally a visual inspection.

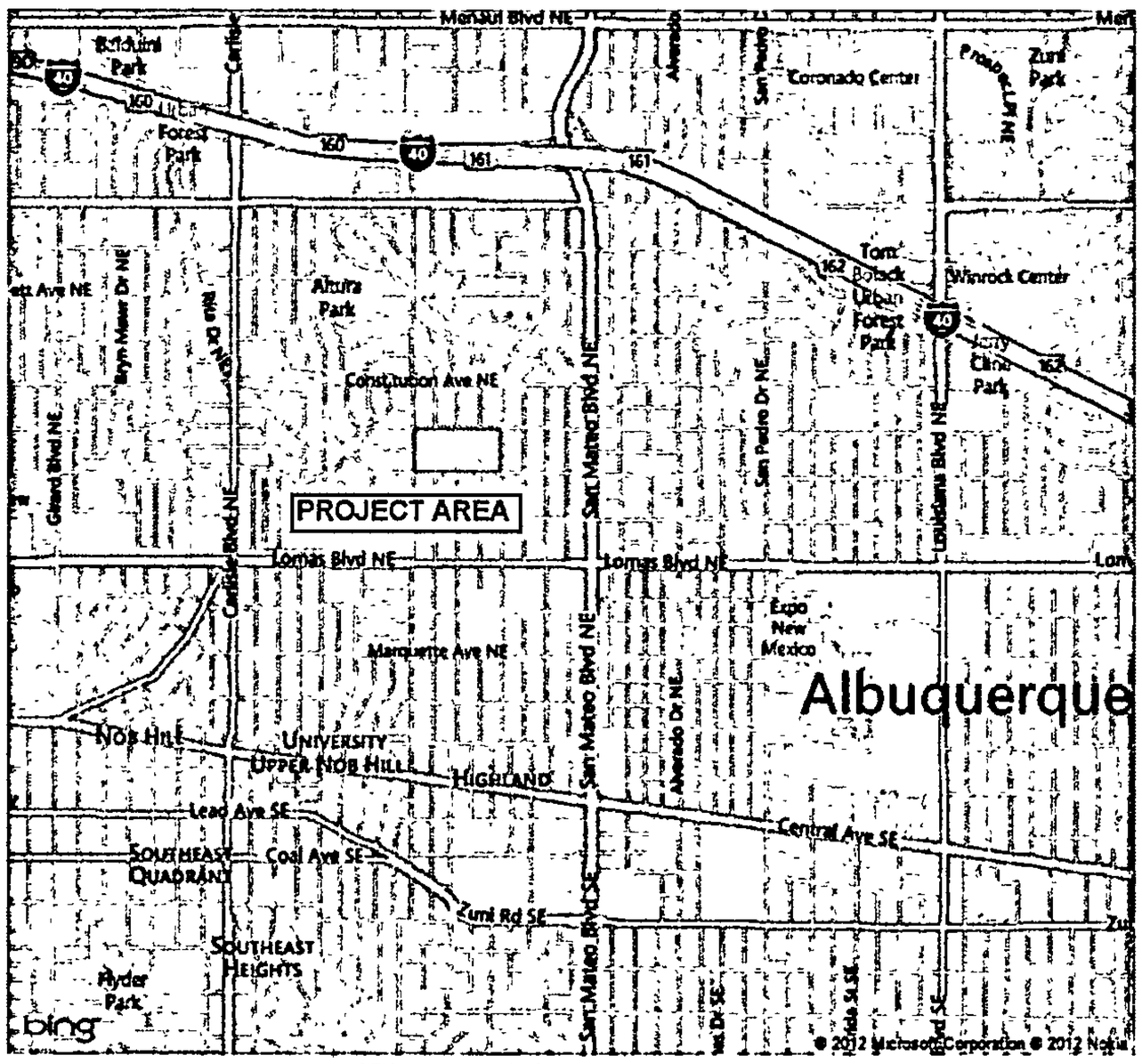


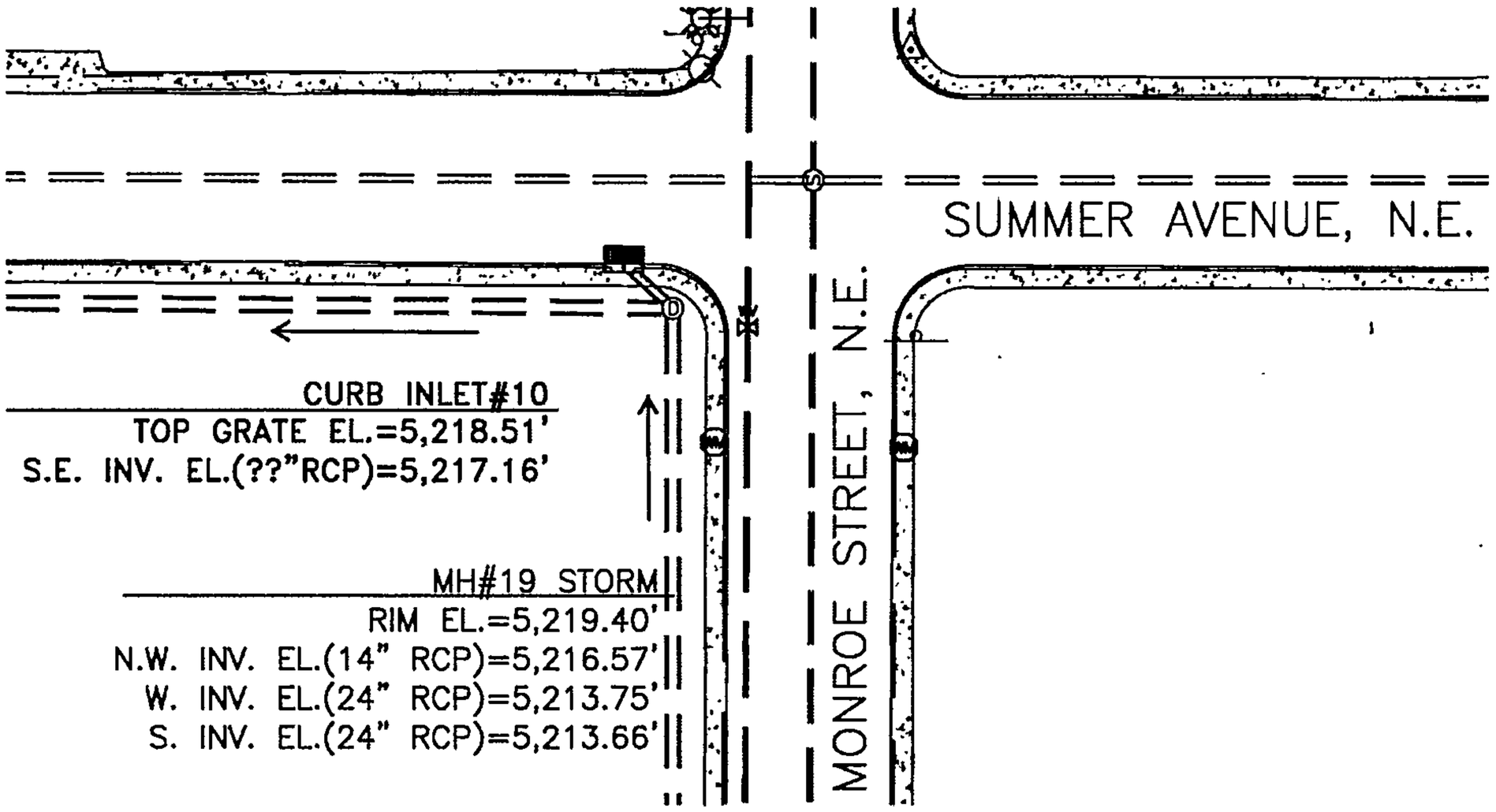
Figure 1-Project Area

All of the City's information on the storm drain alignment is consistent. However, the project survey and a visual inspection indicate that; from the intersection of Jefferson Street and Summer Avenue (MH S-663) to the intersection of Morning Side Drive and Avenida La Rosalano (MH S-632), the mainline storm drain takes a different alignment than shown in City records. In addition, many of the inlets shown in City records do not exist. Specifically, the inlets shown at the intersections of Mountain Road with Jefferson Street, Adams Street and Washington Street do not exist. **Figure 2** was taken from the Albuquerque Master Drainage Study and shows the recorded alignment and **Figure 3** shows the actual alignment based on survey information and visual inspection.

The Albuquerque Master Drainage Study (AMDS) was prepared by Bohannon Huston in January 1981. A review of the AMDS shows that Mountain Road and Washington Street was identified as a problem area and was included in their analysis. The study recommends that the existing 24" main line be supplemented with a parallel 30" main line from the intersection of Washington Street and Mountain Road to Morningside Drive. However, that study also appears to assume that the historical storm drain alignment shown was correct. Therefore, it appears that their recommendations stem from an assumption that the storm drain lacked capacity, not that there was no capture of runoff in this location.

The existing storm drain itself appears to have many serious hydraulic deficiencies. The existing inlets are a mix of very old types and most appear to be clogged. Three of the inlets along Summer Avenue are connected to the main line storm drain at angles far less than 90 degrees from the downstream alignment. In addition, it appears that several of the manholes in the project do not maintain positive grade through the manhole. An example that illustrates both conditions is shown below. The figure shows the intersection of Summer Avenue and Monroe Street, the red arrows show the direction of flow. The inlet is

connected to the main line with a 14" connector pipe that comes into the manhole at an angle of approximately 45 degrees from the downstream pipe. In addition the inverts in the manhole show that the 'upstream' invert is actually below the 'downstream' invert. To compound the problem, the mainline storm drain makes a 90 degree turn through the manhole.



Example of Hydraulic Deficiencies in Existing Storm Drain

Given the hydraulic issues with the existing storm drain system it may be possible that storm water could actually be discharging from the inlets on Summer Avenue rather than being collected. At the very least, the capture capacity of the inlets would be severely restricted.

As part of the scope of services for this project, GFW's subconsultant, Cobb Fendley performed a video inspection of the existing mainline storm drain system. The results of that inspection found that the main line is in relatively good condition within the extents of the project. However, there are three areas of concern. The 18" mainline in Jefferson Street and the 14" lateral at the intersection of Summer Avenue and Adams Street have concrete in the bottom of the pipes, which reduce their capacity. Also, it appears that there is sewage leaking into the 24" mainline in Avenida Manana, west of Washington Street. See **Figure 3** for the approximate locations of these issues. A copy of the inspection logs is included in the back of this report.

Hydrology

Figure 4 shows the project area, divided into drainage basins. These basins were developed from a combination of direct observation and the topographic survey. There are high points just to the north, east and south of the project area, which determine the limits of the contributing basins. Runoff in the project area generally flows from northeast to southwest. The drainage patterns and basins were evaluated without the impact of existing inlets, so that a determination of the need for inlet locations could be made. The drainage patterns and basins are more fully described as follows:

North of Summer Ave, Monroe Street (Basin A) drains south to Analysis Point 1, at the intersection of Monroe Street and Summer Avenue. South of Summer Avenue, Monroe Street (Basin B) drains north to Analysis Point 2 at the intersection of Monroe Street and Summer Avenue. Basins A and B drain west into Basins C and D. North of Summer Avenue, Madison Street (Basin C) drains south to Analysis Point 4 at the intersection of Madison Street and Summer Avenue. South of Summer Avenue, Madison Street

(Basin D) drains north to Analysis Point 4 at the intersection of Madison Street and Summer Avenue. Basins C and D drain west into Basin E. Basin E consists of Jefferson Street between Constitution and Mountain Road. This basin drains to a lowpoint (Analysis Point 5) on Jefferson Street, midway between Summer Avenue and Mountain Road. Basin F consists of Adams Street between Constitution and Mountain Road. This basin also drains to a lowpoint (Analysis Point 6) on Adams Street, midway between Summer Avenue and Mountain Road. Basin G consists of Washington Street from Constitution to Mountain Road. Basin G drains south to Analysis Point 7 at the intersection of Washington Street and Mountain Road. Basin H consists of portions of Adams Street, Jefferson Street, Madison Street and Monroe Street, all of which drain north to Mountain Road. It appears that Mountain Road drains west to Analysis Point 8. It does not appear that the flow on Mountain Road splits between going west and going north on any of the intersecting streets. However, the addition of valley gutters at each of the intersecting streets and inlets where appropriate will help ensure that flow stays on Mountain Road and continues west.

GFW prepared a hydrologic model using AHYMO_S4 to determine the 100 year design storm. Rainfall amounts were taken from the National Weather Service's Precipitation Frequency Data Server. A copy of the Point Precipitation Frequency Estimates is attached. Initially, land treatments were determined using the equation in Table A-5 of the DPM, for single family residential areas. However, observation of the area determined that the back half of each of the properties does not drain to the street. Therefore, a more direct computation of land treatments was done using a measurement of impervious area from the aerial mapping. The AHYMO Summary and Output files are also attached. The table on the following page summarizes the results of the hydrologic analysis.

What Kind of Land Treatment.

Hydrology for the 100-Year, 6-Hour Storm Event			
Basin	**Area (Sq-Mi)**	**Q (cfs)**	**Total Volume (Ac-Ft)**
A	0.00357	15.57	0.544
B	0.00380	1.16	0.046
C	0.00392	17.69	0.618
D	0.00373	16.84	0.589
E	0.00798	1.16	0.046
F	0.00797	17.22	0.602
G	0.00507	34.94	1.222
H	0.01687	35.11	1.228

Street Hydraulics

Using the hydrology shown above, GFW analyzed the street capacity at the analysis points shown in **Figure 4** for flow depth and velocity to determine the need for inlets. If an inlet was found to be necessary, we are proposing a conservative approach using only Type Double C inlets. The street hydraulics calculations spreadsheet is attached. The table on the following page summarizes the hydraulic analysis.

Hydraulic Analysis 100-Year, 6-Hour Storm Event						
Analysis Point	Q (cfs)	Depth (ft)	Depth* Velocity	New Inlet	Capacity (Grate + Throat)	Notes
1	9.39	0.40	1.40	None	0	Bypass to C
2	10.00	0.41	1.44	None	0	Bypass to D
3	19.70	0.49	2.40	Dbl C	16.4	Bypass to E
4	18.42	0.49	2.351	Dbl C	16.9	Bypass to E
5	15.26	0.80	NA	Dbl C	24.5	Low Point
6	10.47	0.80	NA	Dbl C	24.5	Low Point
7	13.33	0.70	1.33	Dbl C	23.8	No Bypass
8	22.16	0.49	2.70	Dbl C(x2)	24.1	No Bypass
Street Flow Depths and Velocities taken from COA DPM Plate 22.3 D-1						
Grate Capacities Taken from COA DPM Plates 22.3 D-5 & D-6						
Throat Capacities calculated using Wier Equation						
Inlet Capacities include throat and grate per discussions with City Hydrologist						

Storm Drain Hydraulics
The scope of services for this project was limited to an analysis of the street hydraulics, placement of new inlets and sizing of lateral connector pipes. An analysis of the mainline storm drain hydraulics was not included. However, given the extent of the deficiencies in the existing storm drain, GFW did create a hydraulic model of the existing storm drain using proposed inlet locations. This was done to verify the capacity of the existing system.

Our analysis has found that in addition to the geometric deficiencies, the existing storm drain appears undersized and does not have adequate capacity to handle the runoff for the project area. The existing main line storm drain is 24" in diameter and our analysis indicates that the system needs to be upsized to between 30" and 48" diameter pipes. However, upsizing the pipes in the project area creates another problem because the mainline system downstream is only 30" in diameter.

Rather than expanding the hydraulic analysis of this project to determine the point downstream where upsizing of the system would end, a feasible alternative would be to create a detention pond in the park area between Avenida del Sol and Avenida Manana.

Conclusions and Recommendations
The project survey has revealed that the existing storm drain was not constructed as it was designed or as it is shown in City records. The inlets proposed for the intersection of Washington Street and Mountain Road were never constructed. The Albuquerque Master Drainage Study, prepared in the early 80's assumed that the inlets did exist and recommended augmenting a storm drain line that was never built. A video inspection of the existing storm drain has found a potentially serious leak in the main line west of Washington Street.

Based on the findings of our analysis, it is apparent that the existing storm drain is deficient because of several factors, which are impeding the collection of runoff as well as the conveyance downstream.

- Existing curb inlets are a mix of very old and inefficient types. Their placement does not appear to be capturing runoff and a lack of maintenance has caused them to become clogged.

- Lateral connector pipes are a mix of sizes that are all less than 18". The geometry of many of the laterals is hydraulically deficient.

- The mainline storm drain is undersized for the proposed inlet placement and the vertical geometry is hydraulically deficient.

GFW has determined two options for this project. The first option would address only the inlet locations and the second option would address the mainline storm drain as well. **Figure 5** shows the recommended improvements and includes all of the elements for option 2.

The first option would be to construct new inlets and laterals to improve runoff collection in the project area. While the existing storm drain is undersized, new inlets would improve the capture of runoff and reduce the flooding experienced at low points. The undersized storm drain would mean conveyance of runoff would take longer but the roadways would still drain in time.

Option 1
- The addition of new Type Double C Inlets in the following locations:
    - 1 Inlet on each side of Summer Avenue, West of Madison
    - 1 Inlet on each side of Jefferson Street at the Low Point between Mountain Road and Summer Avenue

  - 1 Inlet on each side of Adams Street at the Low Point between Mountain Road and Summer Avenue
  - 1 Inlet on each side of Washington Street at Mountain Road
  - 2 Inlets on each side of Mountain Road West of Washington Street
- The construction of a 36" mainline storm drain connection, from the proposed inlets at the intersection of Mountain Road and Washington Street to the existing main line storm drain. This connection will have to go either west to the intersection of Avenida Del Sol and Avenida La Rosolano or south to the intersection of Verde Avenue and Washington Street. It was discovered that the grades prohibit a connection at Avenida Manana and Washington Street.
- All connector pipes should be a minimum of 18" in diameter.

The second option would be to construct new inlets and laterals as well as upsizing the existing storm drain. Rather than expand the scope of the project to chase the pipe size to the end of the main line, a detention pond could be constructed in the park area as shown.

Option 2-All improvements in Option 1 plus the following:

- Upsize the existing main line storm drain to the following
  - Summer Ave between Jefferson Street and Washington Street from 24" to 36".
  - Washington Street between Summer Ave and Avenida Manana from 24" to 36".
  - Jefferson Street from 18" to 24"
  - Adams Street from 18" to 24"
  - Avenida Manana between Washington Street and Avenida Roselano from 24" to 48"
- Construct a detention pond in the park area between Avenida Manana and Avenida Del Sol.

A spreadsheet is attached which shows the conceptual cost estimate for each option. The cost of a proposed detention pond was not included. The costs are summarized below and include tax.

Option 1 - $294,000
Option 2 - $966,000

After a review of this preliminary study GFW will finalize this analysis and begin on the design. Please let me know if there are any questions regarding this report and if you would like to meet to discuss comments from City personnel.

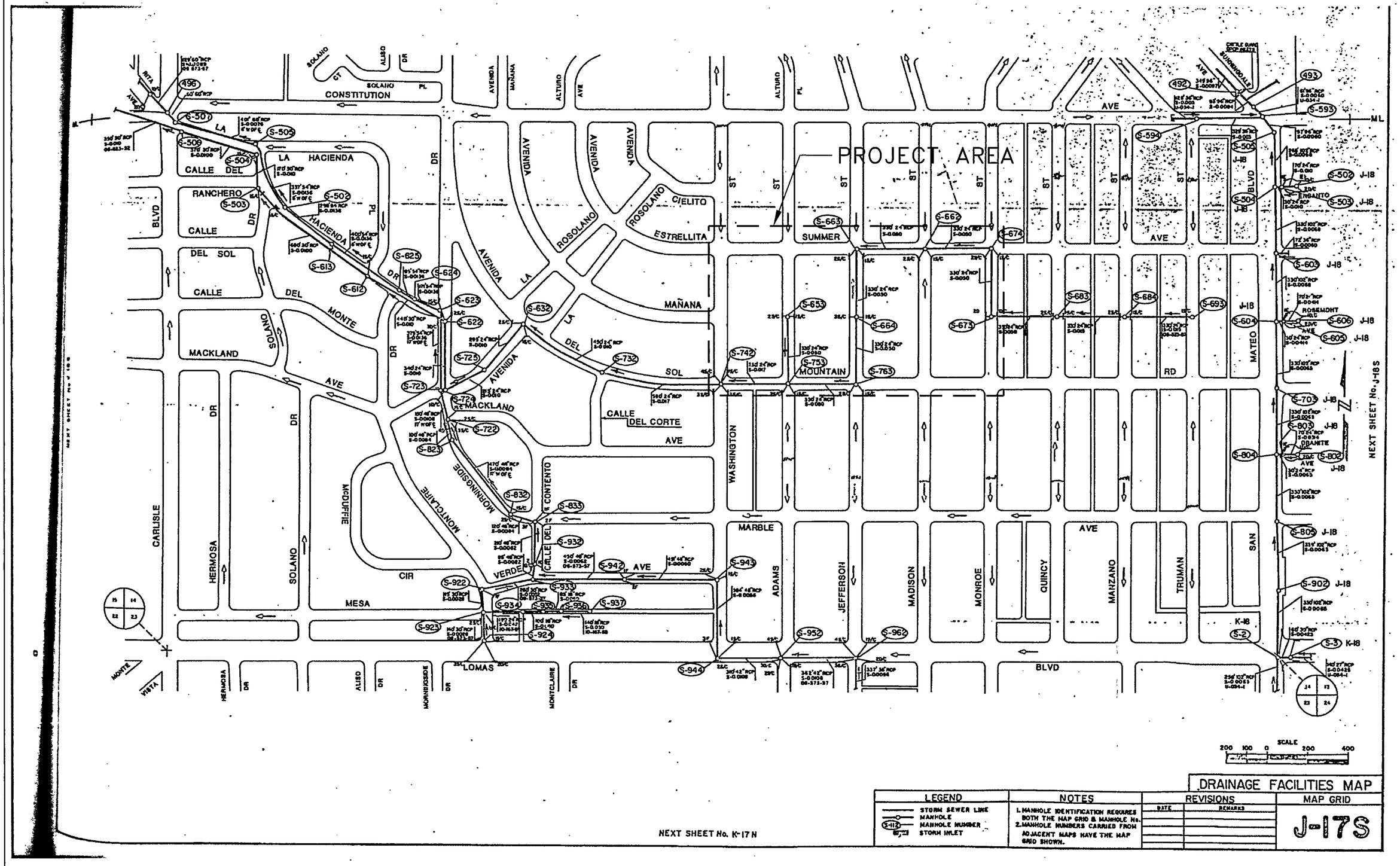
Sincerely,
Gannett Fleming West, Inc.

Raymond J. Smith, P.E.
Project Manager

Attachments: Figure 2- City of Albuquerque Drainage Facilities Map
Figure 3-Actual Alignment of Existing Storm Drain
Figure 4-Drainage Basin Map
Figure 5-Recommended Improvements
NOAA Atlas 14 Point Precipitation Frequency Estimates
AHYMO Summary Output
Street Hydraulics Spreadsheet

Cost Estimate Spreadsheets (2)
Cobb Fendley Video Inspection Logs

Cc: Project File 56036



DRAINAGE FACILITIES MAP

LEGEND	NOTES	REVISIONS		MAP GRID
STORM SEWER LINE MANHOLE S-112 MANHOLE NUMBER STORM INLET	1. MANHOLE IDENTIFICATION REQUIRES BOTH THE MAP GRID & MANHOLE No. 2. MANHOLE NUMBERS CARRIED FROM ADJACENT MAPS HAVE THE MAP GRID SHOWN.	DATE	REMARKS	J-17S

Gannett Fleming West, Inc.

NEAR HEIGHTS FLOOD CONTROL PROJECT—COA GIS MAPPING FIGURE 2

1. 24" RCP on Avenida Manana shows signs of sanitary sewer seeping into the pipe.
2. 14" RCP connector pipe has concrete in bottom of pipe.
3. 18" RCP main line pipe has concrete in bottom of pipe..

NOT TO SCALE

Gannett Fleming West, Inc.

NEAR HEIGHTS FLOOD CONROL PROJECT–EXISTING CONDITIONS FIGURE 3

SCALE:1"=100'

DRAINAGE
BASIN AREAS

BASIN	AREA (SQ MI)
A	0.00357
B	0.00380
C	0.00392
D	0.00373
E	0.00798
F	0.00797
G	0.00507
H	0.01687
TOTAL AREA	0.05291

LEGEND

- BASIN BOUNDARY
- SUB BASIN BOUNDARY
- EXISTING STORM DRAIN
- FLOW ARROW
- ANALYSIS POINT • 1

Gannett Fleming West, Inc.

NEAR HEIGHTS FLOOD CONTROL PROJECT—BASIN MAPPING

FIGURE 4

NOT TO SCALE

Gannett Fleming West, Inc.

NEAR HEIGHTS FLOOD CONTROL PROJECT–PROPOSED IMPROVEMENTS FIGURE 5

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, US*
Coordinates: 35.0899, -106.5920
Elevation: 5235ft*
* source Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica Sarah Dietz, Sarah Heim, Lillian Hiner Kazungu Maitaria Deborah Martin, Sandra Pavlovic Ishani Roy, Carl Trypaluk, Dale Unruh, Fengjin 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_&_aerials

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	0.176 (0 151-0 207)	0.228 (0 195-0 268)	0.306 (0 261-0 358)	0.366 (0 311-0 428)	0.449 (0 379-0 523)	0.513 (0 431-0 598)	0.580 (0 485-0 676)	0.651 (0 540-0 758)	0.747 (0 613-0 870)	0.823 (0 672 -0 959)
10-min	0.268 (0 230-0 314)	0.347 (0 296-0 407)	0.466 (0 396-0 545)	0.558 (0 473-0 651)	0.683 (0 577-0 796)	0.780 (0 656-0 910)	0.883 (0 737-1 03)	0.991 (0.822-1 15)	1.14 (0 933-1 33)	1.25 (1 02-1 46)
15-min	0.332 (0 285-0 389)	0.430 (0 367-0 504)	0.577 (0 492-0 676)	0.691 (0 586-0 807)	0.847 (0 715-0 987)	0.967 (0 813-1 13)	1.10 (0 914-1 28)	1.23 (1 02-1 43)	1.41 (1 16-1 64)	1.55 (1 27-1 81)
30-min	0.448 (0 384-0 524)	0.580 (0 494-0 679)	0.777 (0 662-0 910)	0.931 (0 789-1 09)	1.14 (0 963-1 33)	1.30 (1 10-1 52)	1.47 (1 23-1 72)	1.65 (1 37-1.93)	1.90 (1 56-2 21)	2.09 (1 71-2 44)
60-min	0.554 (0 475-0 649)	0.717 (0 612-0 841)	0.962 (0 819-1 13)	1.15 (0 976-1.34)	1.41 (1 19-1 64)	1.61 (1 36-1 88)	1.83 (1 52-2 13)	2.05 (1 70-2 38)	2.35 (1 93-2 74)	2.59 (2 11-3 02)
2-hr	0.642 (0 544-0 772)	0.823 (0 696-0 989)	1.09 (0.919-1 31)	1.30 (1 09-1 55)	1.60 (1 33-1 90)	1.84 (1.52-2 18)	2.09 (1.72-2 48)	2.35 (1 92-2 78)	2.72 (2 20-3 22)	3.02 (2 42-3 58)
3-hr	0.684 (0 583-0 816)	0.868 (0 738-1 04)	1.14 (0 969-1 36)	1.35 (1 14-1 60)	1.65 (1 39-1 96)	1.89 (1 58-2 24)	2.14 (1 78-2.53)	2.41 (1.99-2.86)	2.79 (2 27-3 29)	3.09 (2 50-3 66)
6-hr	0.796 (0 683-0 944)	1.00 (0 861-1 19)	1 29 (1 11-1 53)	1.52 (1 30-1 79)	1.83 (1 56-2 16)	2.08 (1 76-2 44)	2.34 (1 96-2 75)	2.60 (2.18-3 06)	2.97 (2 46- 3 49)	3.27 (2 69- 3 85)
12-hr	0.877 (0 760-1.01)	1.11 (0 960-1 28)	1.40 (1 21-1 62)	1.63 (1 41-1 89)	1.95 (1 68-2 24)	2.19 (1 88-2 52)	2.44 (2 08-2 81)	2.70 (2 29-3.11)	3.06 (2 56-3 53)	3.35 (2 78-3 86)
24-hr	1.00 (0 878-1 15)	1.26 (1.10-1 44)	1.57 (1 37-1 80)	1.82 (1 59-2 08)	2.16 (1 88-2 47)	2.42 (2.10-2 76)	2.69 (2 33-3 06)	2.97 (2 55-3.37)	3.33 (2 85-3 79)	3.62 (3 08-4 12)
2-day	1.05 (0 922-1 19)	1.32 (1 16-1 49)	1.64 (1 45-1 86)	1.90 (1 67-2 14)	2.25 (1 97 -2 53)	2.51 (2 19 -2 84)	2.79 (2.42-3 15)	3.07 (2 65-3 47)	3.44 (2 97-3 89)	3.73 (3 20-4 23)
3-day	1.14 (1 02-1 27)	1.42 (1 27-1 59)	1.76 (1 57-1 96)	2.03 (1 80-2 25)	2.39 (2 12-2 66)	2.66 (2 36-2.96)	2.94 (2 59-3 28)	3.23 (2 83-3 60)	3.60 (3 16-4 02)	3.89 (3 39 4 36)
4-day	1.23 (1 11-1 35)	1.53 (1 38-1 68)	1.88 (1 69-2 07)	2.15 (1 94-2 37)	2.52 (2 27 -2.78)	2.81 (2 52-3 09)	3.10 (2 77-3 41)	3.38 (3 02-3 73)	3.77 (3 35-4 15)	4.06 (3 59-4 48)
7-day	1.40 (1 27-1 53)	1.74 (1 58-1 90)	2.12 (1 92-2 32)	2.42 (2 19-2 64)	2.81 (2 54-3 07)	3.10 (2 80-3 39)	3.40 (3 06-3 72)	3.68 (3 31-4 03)	4.06 (3 64-4 45)	4.33 (3 87-4 77)
10-day	1.55 (1 41-1 69)	1.92 (1.75-2 10)	2.36 (2 15-2.57)	2.69 (2 46-2 94)	3.15 (2 87-3 42)	3.49 (3 17-3 79)	3.83 (3 47-4 17)	4.17 (3 76-4 54)	4.60 (4 14-5 03)	4.93 (4 41-5 39)
20-day	1.94 (1 76-2 13)	2.40 (2.18-2 64)	2.92 (2 65-3 21)	3.31 (3 01-3 63)	3.81 (3 45-4 18)	4.17 (3 78-4 58)	4.53 (4 09-4 96)	4.86 (4 38-5 32)	5.28 (4 75-5 79)	5.58 (5 00-6 13)
30-day	2.32 (2.11-2 53)	2.88 (2 62-3.14)	3.47 (3 15-3 78)	3.91 (3 55-4 25)	4.45 (4.04-4 84)	4.85 (4 39-5 26)	5.22 (4 72-5 67)	5.57 (5 03-6 06)	6.00 (5 40-6 53)	6.30 (5 66-6 86)
45-day	2.84 (2 60-3 10)	3.52 (3 22-3 84)	4.20 (3 83-4 58)	4.68 (4 27-5 10)	5.28 (4 82-5 75)	5.69 (5 18-6 20)	6.06 (5 52-6 61)	6.40 (5 82-6.98)	6.78 (6 16-7 41)	7.03 (6 39-7 68)
60-day	3.27 (2 99-3 57)	4.04 (3 70-4 42)	4.82 (4 42-5 27)	5.38 (4 93-5 88)	6.06 (5 55-6 61)	6 52 (5 97-7 12)	6.95 (6 36-7 60)	7.34 (6 71-8 03)	7.78 (7 12-8 52)	8.06 (7 39-8 84)

[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

Back to Top

NEAR HEIGHTS FLOOD CONTROL
AHYMO SUMMARY OUTPUT
100-Yr, 6-Hr Design Storm

```
(s16.67h8.5v0T&18D
   AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4)                    - Ver. S4.01a, Rel: 01a      RUN DATE (MON/DAY/YR) =10/11/2012
   INPUT FILE = K:\PROJECTS\56036\PrjWk\Report\Drainage Report\NEAR HEIGHTS INPUT.dat      USER NO.= GannettFlSingleA41708419

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

   START                                                                                                  TIME=      0.00
   LOCATION                        ALBUQUERQUE
   *S
   *S NEAR HEIGHTS FLOOD CONTROL DEVELOPED CONDITIONS
   *S
   *S FN:NEAR HEIGHTS INPUT.DAT - HYMO PER JAN 1997 DPM REVISIONS
   *S
   RAINFALL  TYPE= 1 NOAA 14                                                                              RAIN6=     2.340
   *S---------------------------------------------------------------
   *S DEVELOPED SEDIMENT BULKING FACTOR = 5.0%
   SEDIMENT BULK                                                                                          PK BF =    1.05
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   *S NEAR HEIGHTS FLOOD CONTROL DEVELOPED CONDITIONS
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN A
   COMPUTE NM HYD             A   -    10       0.00357      9.39      0.332     1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN B
   COMPUTE NM HYD             B   -    15       0.00380     10.00      0.353     1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN C
   COMPUTE NM HYD             C   -    20       0.00392     10.31      0.365     1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN D
   COMPUTE NM HYD             D   -    25       0.00373      9.81      0.347     1.74416    1.530    4.110 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN E
   COMPUTE NM HYD             E   -    30       0.00798     20.97      0.742     1.74416    1.530    4.106 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN F
   COMPUTE NM HYD             F   -    35       0.00797     20.94      0.741     1.74416    1.530    4.106 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN G
   COMPUTE NM HYD             G   -    40       0.00507     13.33      0.472     1.74416    1.530    4.108 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S COMPUTE DEVELOPED BASIN H
   COMPUTE NM HYD             H   -    45       0.01687     44.31      1.569     1.74416    1.530    4.104 PER IMP=  58.00
   *S---------------------------------------------------------------
   *S---------------------------------------------------------------
   FINISH
(s0p10h4099T&16D11
```

Near Heights Flood Control
City of Albuquerque Project 5498.91

Street Capacity and Inlet Calculations																			
					Inlet 1								Inlet 2						
Analysis Point	Q (cfs)	Q (Carry Over)	Q Total (cfs)	Road Slope	Depth (ft)	Velocity (ft/s)	D*V	Inlet Type	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Inlet Type	Depth (ft)	Throat Capacity (cfs)	Grate Capacity (cfs)	Total Capacity (cfs)	Bypass (cfs)	Notes
1	9.39	0.0	9.39	0.019	0.40	3.5	1.40	None	0.0	0.0	0.0	9.39	None	0.0	0.0	0.0	0.0	0.0	Bypass to Basin C (AP-3)
2	10.00	0.0	10.00	0.019	0.41	3.5	1.44	None	0.0	0.0	0.0	10.00	None	0.0	0.0	0.0	0.0	0.0	Bypass to Basin D (AP-4) (Existing Inlet Not Needed)
3	10.31	9.4	19.70	0.0213	0.49	4.9	2.40	Dbl C	6.9	9.5	16.4	3.27	None	0.0	0.0	0.0	0.0	0.0	Double C Inlet on Summer, Bypass to Basin E
4	8.42	10.0	18.42	0.0213	0.49	4.8	2.35	Dbl C	6.9	10.0	16.9	1.49	None	0.0	0.0	0.0	0.0	0.0	Double C Inlet on Summer, Bypass to Basin E
5	10.50	4.8	15.26	LP	0.80	NA	NA	Dbl C	14.5	10.0	24.5	NA	None	0.0	0.0	0.0	0.0	0.0	Double C Inlets on Jefferson at Low Point
6	10.47	0.0	10.47	LP	0.80	NA	NA	Dbl C	14.5	10.0	24.5	NA	None	0.0	0.0	0.0	0.0	0.0	Double C Inlets on Adams at Low Point
7	13.33	0.0	13.33	0.005	0.70	1.9	1.33	Dbl C	11.8	12.0	23.8	-10.50	None	0.0	0.0	0.0	0.0	0.0	Double C Inlets on Washington, North of Mountain
8	22.16	0.0	22.16	0.029	0.49	5.5	2.70	Dbl C	6.9	9.5	16.4	5.73	Dbl C	0.3	3.7	4.0	7.7	-1.9	Battery of Two Inlets on Mountain East of Washington

Street Flow Depths and Velocities taken from COA DPM Plate 22.3 D-1
Grate Capacities Taken from COA DPM Plates 22.3 D-5 & D-6
Throat Capacities calculated using Wier Equation
Inlet Capacities include throat and grate per discussions with City Hydrologist

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Option 1
Near Heights Flood Control
COA Proj No. 5498.91

						ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.	
BID ITEM #	ITEM ID NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	FINAL QUANTITY	UNIT PRICE	AMOUNT
1	4 010	CONSTRUCTION STAKING, COMPLETE	LS	1		$11,000 00	$11,000 00
2	6 010	CONSTRUCTION PROJECT SIGN, CIP	EA	2		$500 00	$1,000 00
3	19 010	CONSTRUCTION TRAFFIC CONTROL & BARRICADING, COMPLETE	LS	1		$14,000 00	$14,000 00
4	343 111	RESIDENTIAL PAVEMENT, EXISTING, REMOVE & REPLACE, INCL 2" EXTRA THICKNESS, CIP	SY	333		$24 00	$7,992 00
5	701 100	TRENCHING, BACKFILL & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPLETE	LF	500		$60 00	$30,000 00
6	910 005	18" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	150		$40 00	$6,000 00
7	910 017	36" REINFORCED CONRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	350		$80 00	$28,000 00
8	915 040	CATCH BASIN, TYPE "C", DOUBLE GRATE, CIP. SD 2205	EA	10		$5,000 00	$50,000 00
9	915 070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPL, SD 2200	EA	6		$1,200 00	$7,200 00
10	920 140	MANHOLE, 6' DIA, TYPE C OR E, 6'-10' DEEP, CIP SD 2101	EA	4		$4,500 00	$18,000 00
		ALLOWANCES					
11	621 4 1	MOBILIZATION, COMPLETE (5%)	LS	1		$8,659 60	$8,659 60
12	621 4 2	DEMOBILIZATION, COMPLETE (2%)	LS	1		$3,463 84	$3,463 84
13	450 XX	PROJECT SIGN SCREEN	EA	2		$500 00	$1,000 00
14	18 6 1	UTILITY RELOCATION	1	ALLOW		$10,000 00	$5,000 00
15	13 2.2	LAB TESTING	1	ALLOW		$20,000 00	$20,000 00
		Subtotal					$211,315 44
		CONTINGENCIES (30%)					$63,394 63
		SUBTOTAL					$274,710 07
		New Mexico Gross Receipts Tax (NMGRT) at 7 00%					$19,229 71
		TOTAL					$293,939.78

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST
CITY OF ALBUQUERQUE
Project Name:
Option 2
Near Heights Flood Control
COA Proj No. 5498.91

						ENGINEERS ESTIMATE GANNETT FLEMING WEST, INC.		
BID ITEM #	ITEM ID NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	FINAL QUANTITY	UNIT PRICE		AMOUNT
1	4 010	CONSTRUCTION STAKING, COMPLETE	LS	1		$11,000 00		$11,000 00
2	6 010	CONSTRUCTION PROJECT SIGN, CIP	EA	2		$500 00		$1,000 00
3	19 010	CONSTRUCTION TRAFFIC CONTROL & BARRICADING, COMPLETE	LS	1		$14,000 00		$14,000 00
4	343 111	RESIDENTIAL PAVEMENT, EXISTING, REMOVE & REPLACE, INCL 2" EXTRA THICKNESS, CIP	SY	2065		$24 00		$49,560 00
5	701 100	TRENCHING, BACKFILL & COMPACTION FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCLUDED, COMPLETE	LF	3100		$60 00		$186,000 00
6	910 005	18" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	150		$40 00		$6,000 00
7	910 009	24" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	560		$50 00		$28,000 00
8	910 017	36" REINFORCED CONRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	1280		$80 00		$102,400 00
9	910 021	48" REINFORCED CONCRETE PIPE, CLASS III, FURNISH AND PLACE IN OPEN TRENCH, CIP	LF	1060		$110 00		$116,600 00
10	910 103	DRAINLINE REMOVAL, 10" TO 24", EXCLUDING TRENCHING, COMPL	LF	2600		$10 00		$26,000 00
11	915 040	CATCH BASIN, TYPE "C", DOUBLE GRATE, CIP SD 2205	EA	10		$5,000 00		$50,000 00
12	915 070	CATCH BASIN, EXISTING, REMOVE & DISPOSE, ANY TYPE, INCL CLEANUP, COMPL, SD 2200	EA	6		$1,200 00		$7,200 00
13	920 140	MANHOLE, 6' DIA, TYPE C OR E, 6'-10' DEEP, CIP. SD 2101	EA	6		$4,500 00		$27,000 00
		ALLOWANCES						\
14	621 4 1	MOBILIZATION, COMPLETE (5%)	LS	1		$31,238 00		$31,238 00
15	621 4 2	DEMOBILIZATION, COMPLETE (2%)	LS	1		$12,495 20		$12,495 20
16	450 XX	PROJECT SIGN SCREEN	EA	2		$500 00		$1,000 00
17	18 6 1	UTILITY RELOCATION	1	ALLOW		$10,000 00		$5,000 00
18	13 2 2	LAB TESTING	1	ALLOW		$20,000 00		$20,000 00
		Subtotal						$694,493 20
		CONTINGENCIES (30%)						$208,347 96
		SUBTOTAL						$902,841 16
		New Mexico Gross Receipts Tax (NMGRT) at 7 00%						$63,198 88
		TOTAL						$966,040.04

CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH off Project, One block West

STRUCTURE # SDMH 1

Project Name: Near Hts. Flood Control
Project #: 1206 062 01
General Location: Av. Mañana, W. of Washingtn
SUE Crew / Equipment: KTG AF - Zoom Inpection

Date / Time: Mon. 10.29.12 - AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

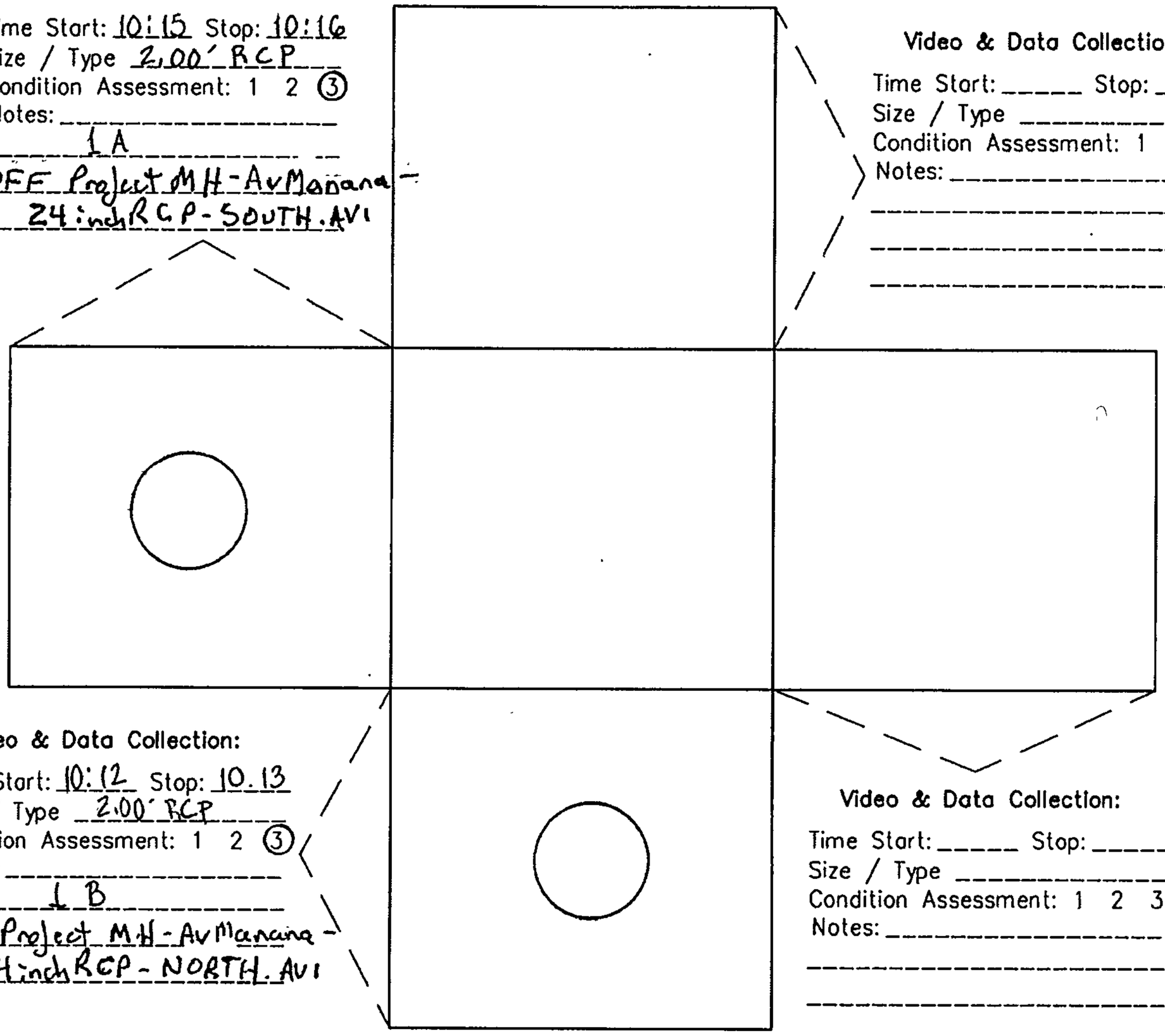
NORTH

Video & Data Collection:

Time Start: 10:15 Stop: 10:16
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
1A
OFF Project MH - Av Manana -
24 inch RCP - SOUTH.AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____



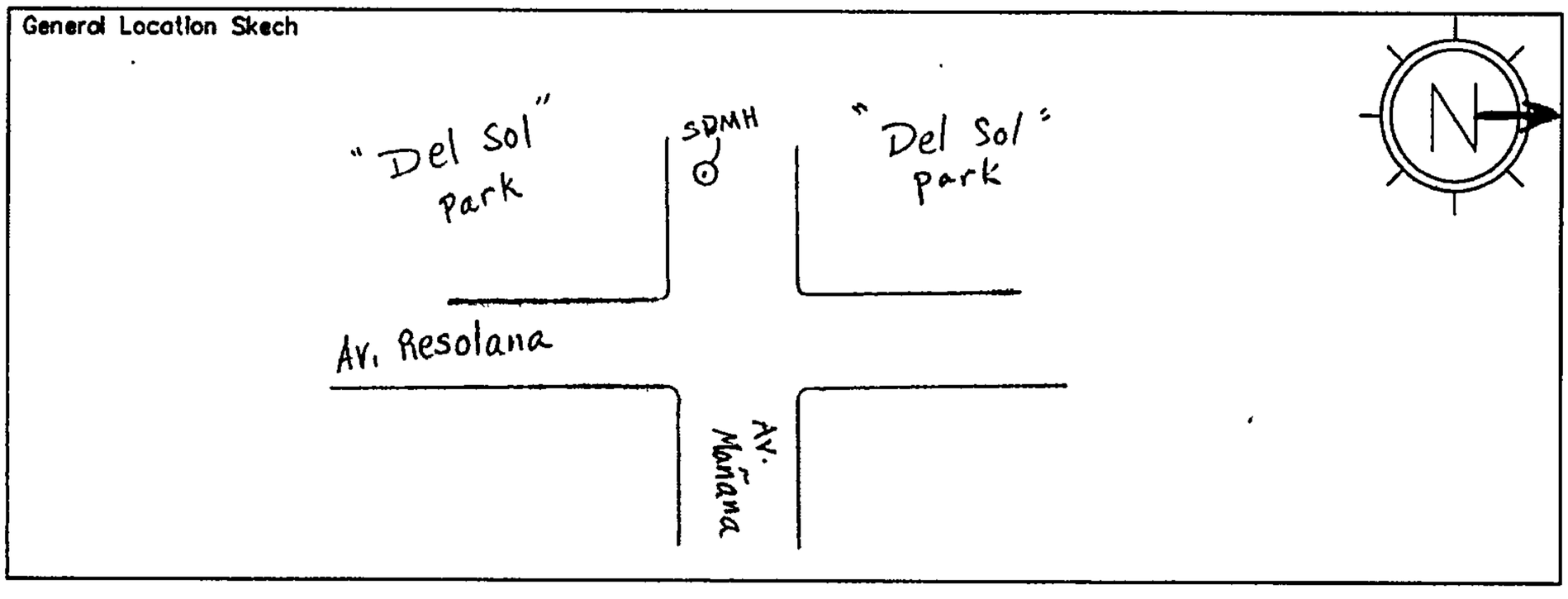
Video & Data Collection:

Time Start: 10:12 Stop: 10.13
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
1B
Off Project MH - Av Manana -
24 inch RCP - NORTH.AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH #24

STRUCTURE # 2 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Av. Mañana @ Wshngtn.
SUE Crew / Equipment: AF KTG

Date / Time: Mon. Oct. 29, 2012 AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:
Time Start: 10:37 Stop: 10:39
Size / Type 2.00' RCP
Condition Assessment: 1 (2) 3
Notes: 2a
fluid seeping in @ top of pipe. Stench

MH 24-24inch RCP-WEST-1.AVI
MH 24-24inch RCP-WEST-2.AVI

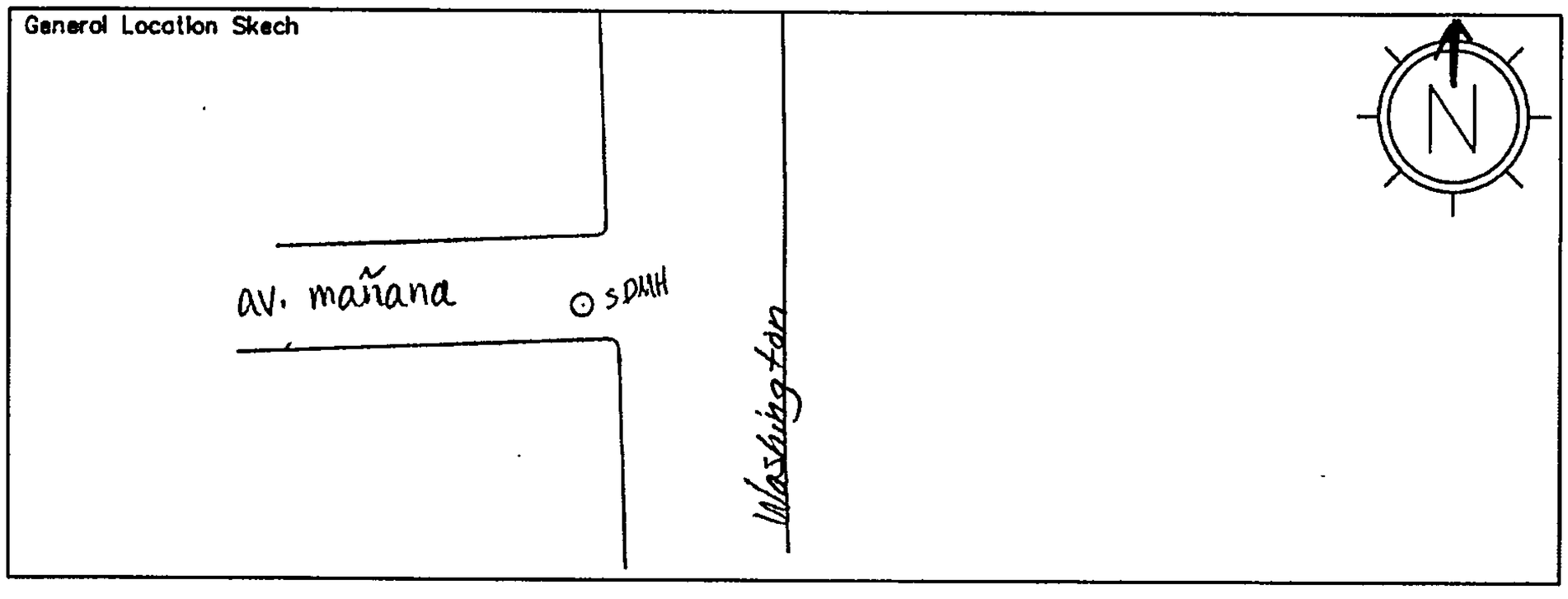
Video & Data Collection:
Time Start: 10:40 Stop: 10:42
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 2b

MH 24-24inch RCP-NORTH.AVI

Video & Data Collection:
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 22

STRUCTURE # 3 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Av. Estrellita @ Wshngtn.
SUE Crew / Equipment: KTG AF

Date / Time: Mon. Oct. 29, 2012 AM
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

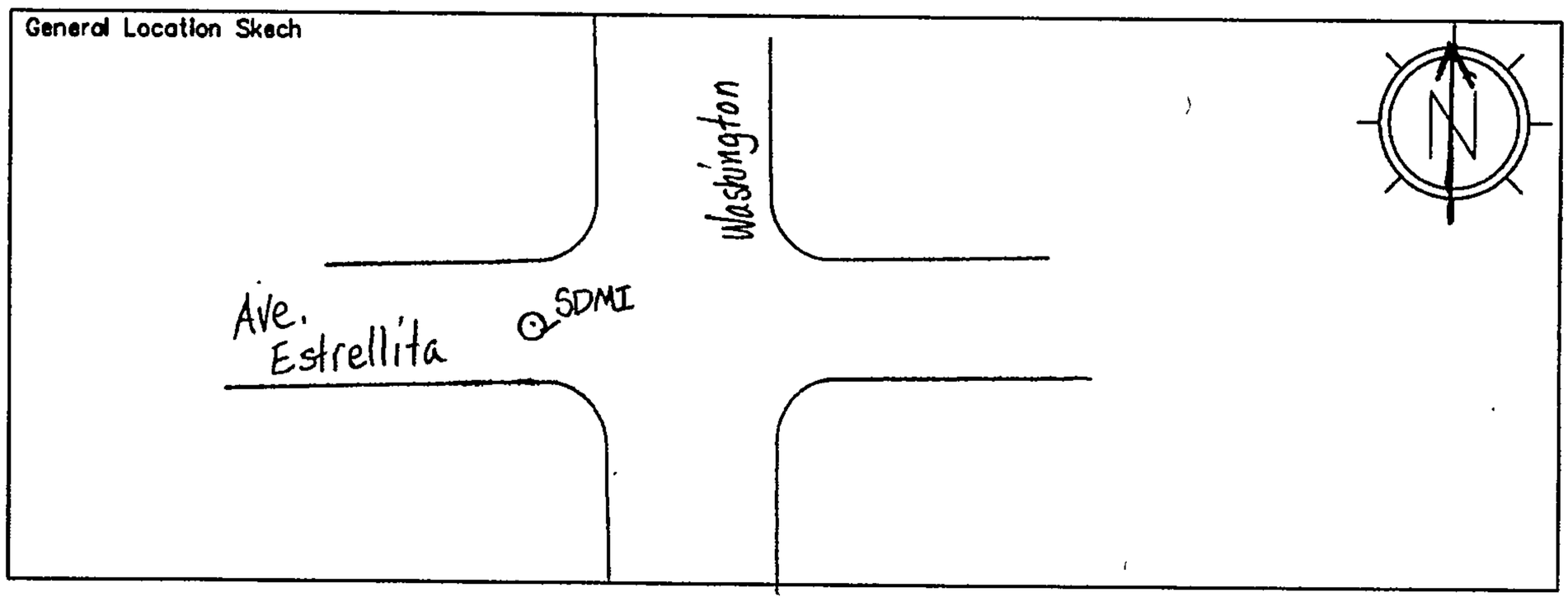
Video & Data Collection:

Time Start: 11:13 Stop: 11:14
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 3a
MH 22 - 24inch RCP - SOUTH.AVI

Video & Data Collection:

Time Start: 11:15 Stop: 11:17
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: 3b
MH 22 - 24inch RCP - EAST.AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 08

STRUCTURE # 4 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Adams
SUE Crew / Equipment: KTG SW AF

Date / Time: Mon. Oct 22, 2012 PM
Weather: 70°'s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 12:13 Stop: 12:15
Size / Type 1.50" RCP
Condition Assessment: 1 2 (3)
Notes: _____
4a
MH08-18inch RCP-WEST.AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

MH08-14inch RCP-SW to DI.AVI
12:34 - 12:35
1.17' RCP (3)
TO DI

MH08-14inch RCP-SE to DI.AVI
12:33 - 12:34
1.17' RCP (2)
TO DI

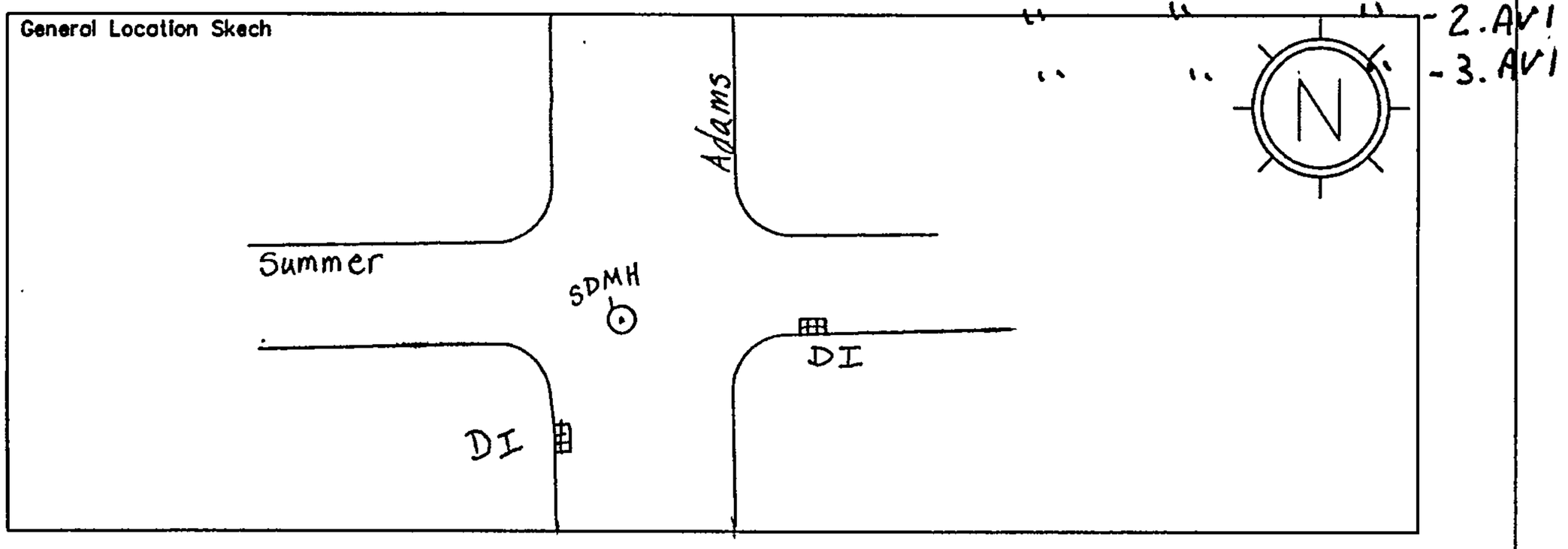
Video & Data Collection:

Time Start: 12:29 Stop: 12:31
Size / Type 1.50 RCP
Condition Assessment: 1 2 (3)
Notes: _____
4c
MH08-18inch RCP-SOUTH.AVI

Video & Data Collection:

Time Start: 12:17 Stop: 12:24
Size / Type 1.50' RCP
Condition Assessment: 1 (2) 3
Notes: _____
4b
concrete? flow on bottom of pipe
MH08-18inch RCP-EAST-1.AVI
" " -2.AVI
" " -3.AVI

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 06

STRUCTURE # 5 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Adams, S. of Summer
SUE Crew / Equipment: A F KTG

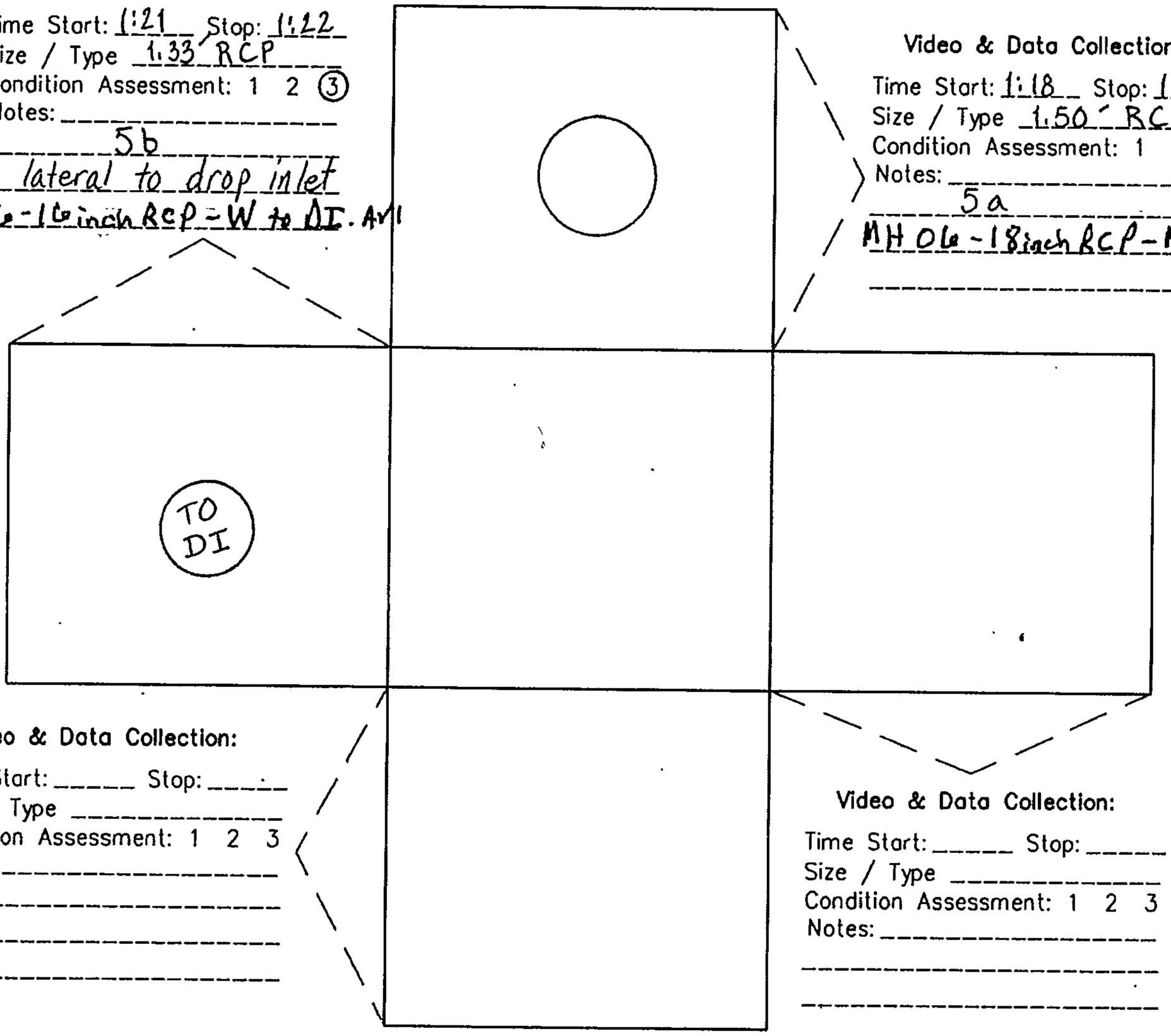
Date / Time: Mon. Oct. 22, 2012 pm
Weather: 70's, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 1:21 Stop: 1:22
Size / Type 1.33' RCP
Condition Assessment: 1 2 (3)
Notes: _____
5b
lateral to drop inlet
MH 06-18inch RCP=W to DI. AVI

Video & Data Collection:

Time Start: 1:18 Stop: 1:20
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes: _____
5a
MH 06-18inch RCP-NORTH. AVI



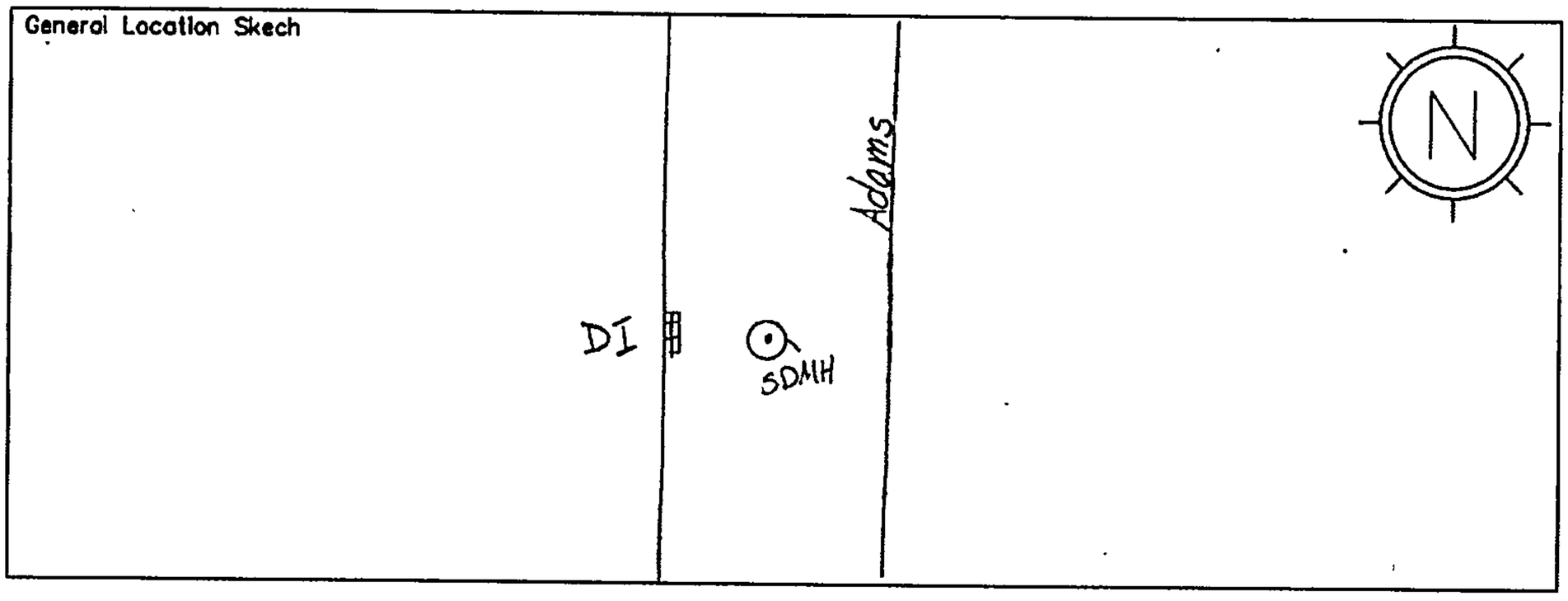
Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____

General Location Skech



CobbFendley
SUBSURFACE UTILITY ENGINEERING

MH # 11

STRUCTURE # 6 SDMH

Project Name: NHFC
Project #: 1206 062 01
General Location: Jefferson, S. of Smmr.
SUE Crew / Equipment: KTG AF - Zoom Insp.

Date / Time: Mon. Oct. 22, 2012 PM
Weather: 70's, clear
Reviewed By: SW
Checked By: _____

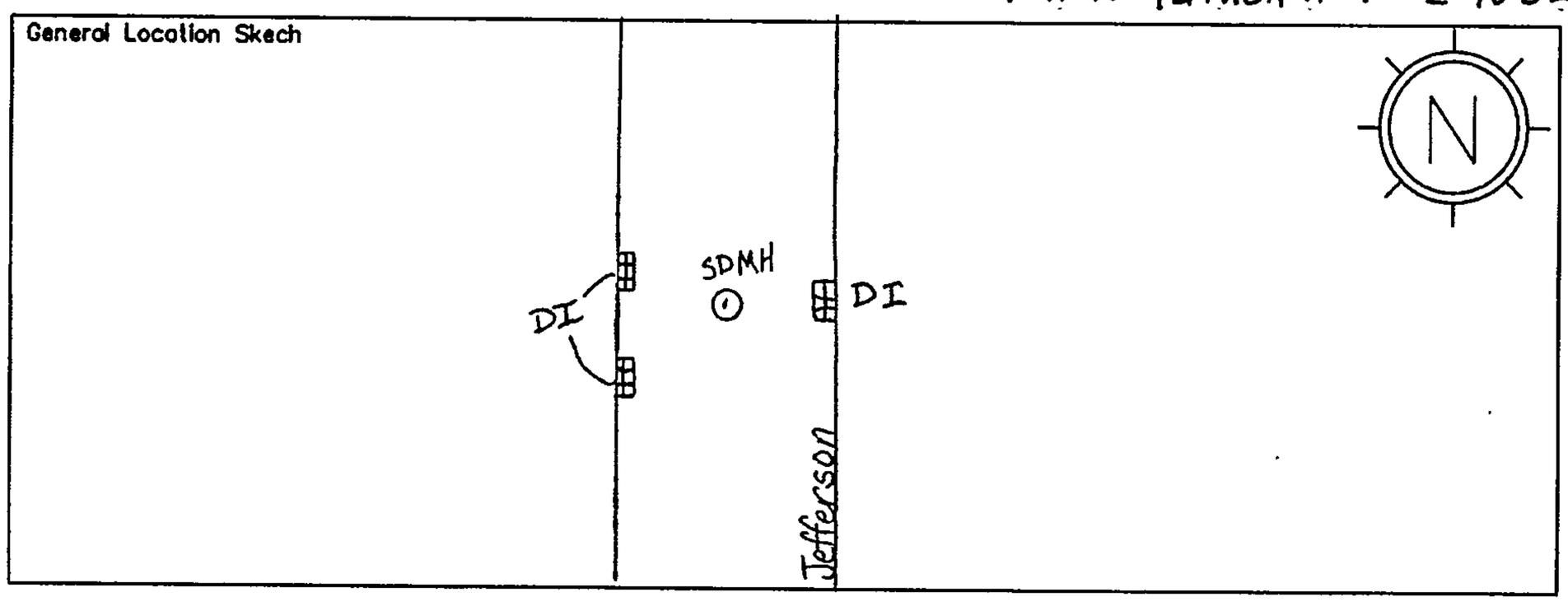
Video & Data Collection:
Time Start: 1:57 Stop: 1:58
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes:
6c
MH 11 - 18 inch RCP - NW to DI. AVI

Video & Data Collection:
Time Start: 1:52 Stop: 1:54
Size / Type 1.50' RCP
Condition Assessment: 1 (2) 3
Notes:
6a
Concrete? on floor of pipe
MH 11 - 18 inch RCP - NORTH

Video & Data Collection:
Time Start: 155 Stop: 1:56
Size / Type 1.25' RCP
Condition Assessment: 1 2 (3)
Notes:
6b
lateral to Drop inlet
MH 11 - 15 inch RCP - SW to DI. AVI

Video & Data Collection:
Time Start: 1:59 Stop: 2:00
Size / Type 1.00' RCP
Condition Assessment: 1 (2) 3
Notes: lateral to DI
6d
Concrete? on floor of pipe
MH 11 - 12 inch RCP - E to DI. AVI

General Location Skech



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MH # 10

STRUCTURE # 7SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Jefferson
SUE Crew / Equipment: KTG AF

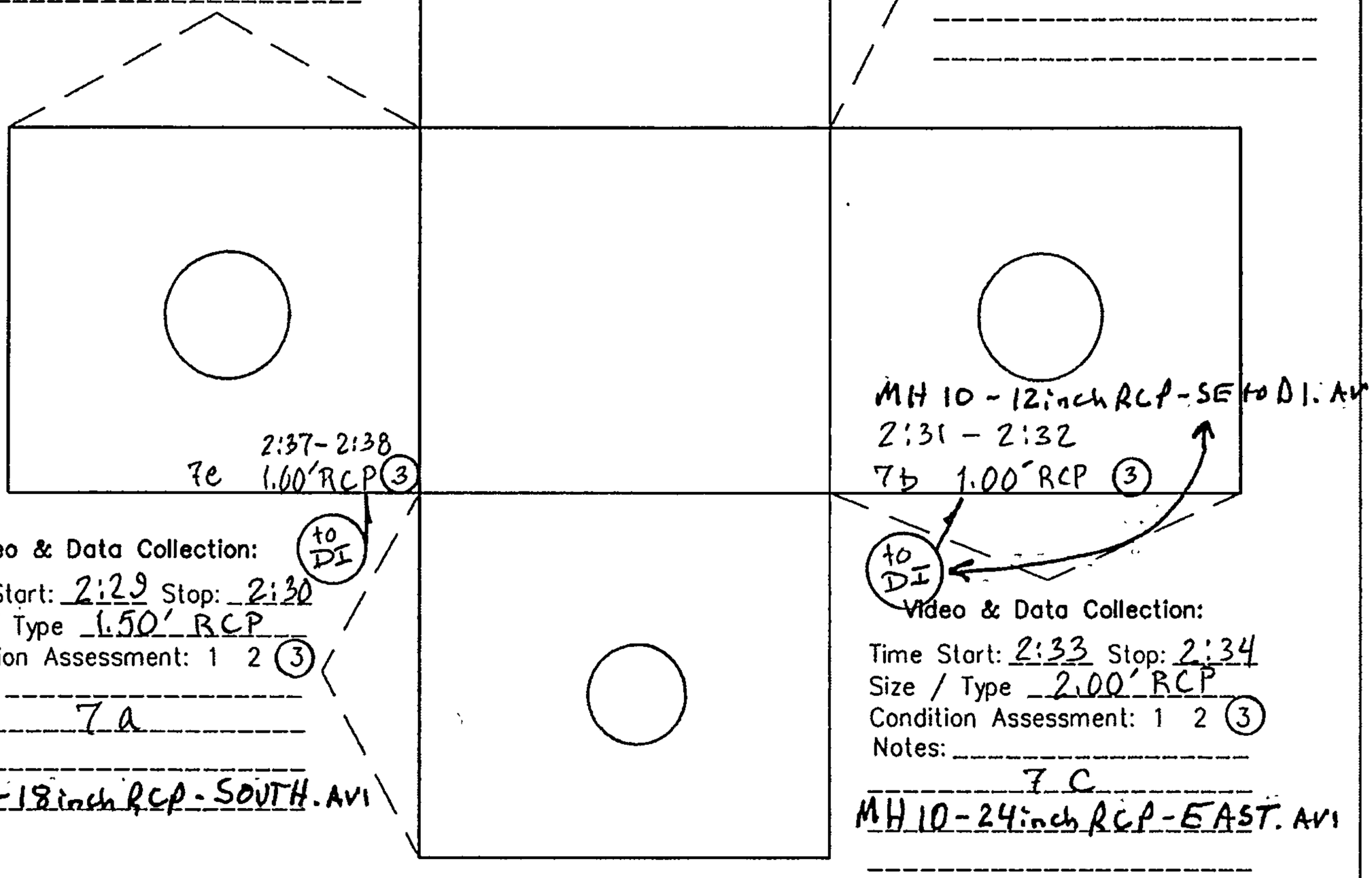
Date / Time: Mon. Oct. 22, 2012 pm
Weather: 70°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 2:35 Stop: 2:36
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
7d
MH 10 - 24inch RCP - WEST. AVI

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____



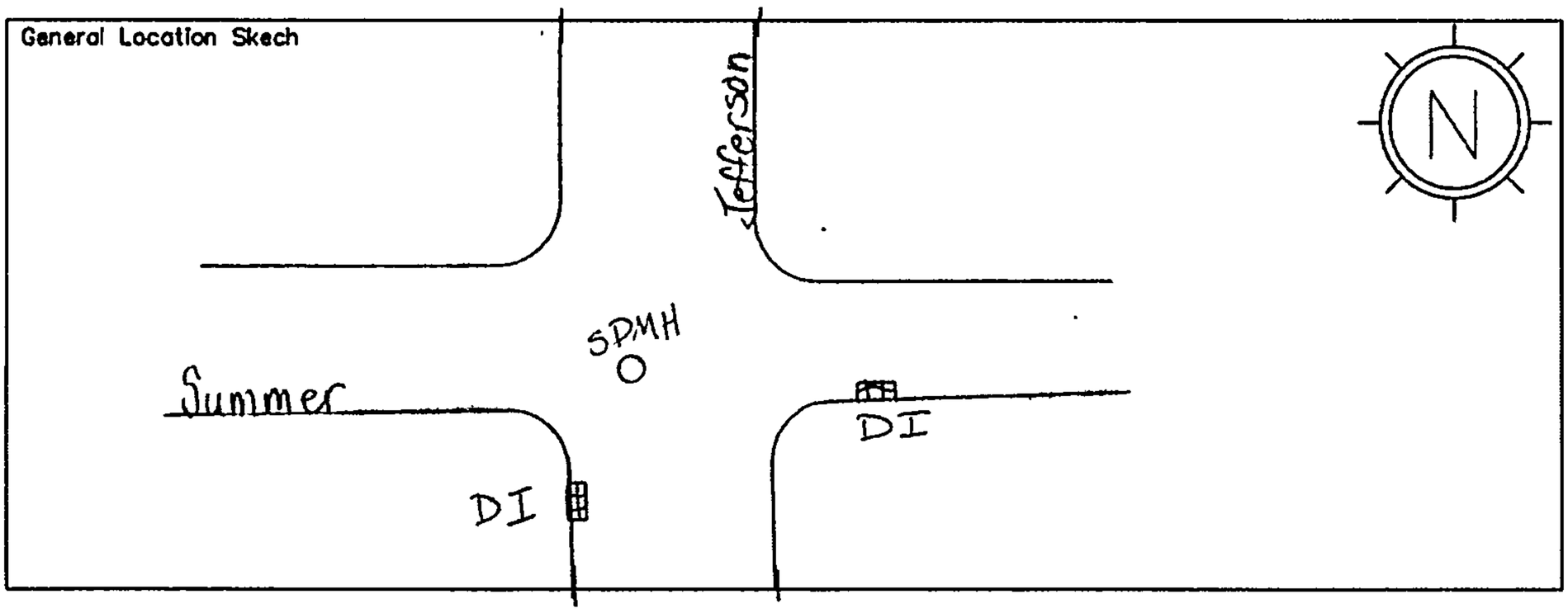
Video & Data Collection:

Time Start: 2:29 Stop: 2:30
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes: _____
7a
MH 10 - 18inch RCP - SOUTH. AVI

Video & Data Collection:

Time Start: 2:33 Stop: 2:34
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
7c
MH 10 - 24inch RCP - EAST. AVI

General Location Skech



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MH # 15

STRUCTURE # 8 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Madison
SUE Crew / Equipment: AF - ZOOM - KTG

Date / Time: Tue, Oct. 23, 2012 am
Weather: 50°'s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 8:09 Stop: 8:10
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8a
MH15-24inch RCP-WEST.AVI
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

Video & Data Collection:

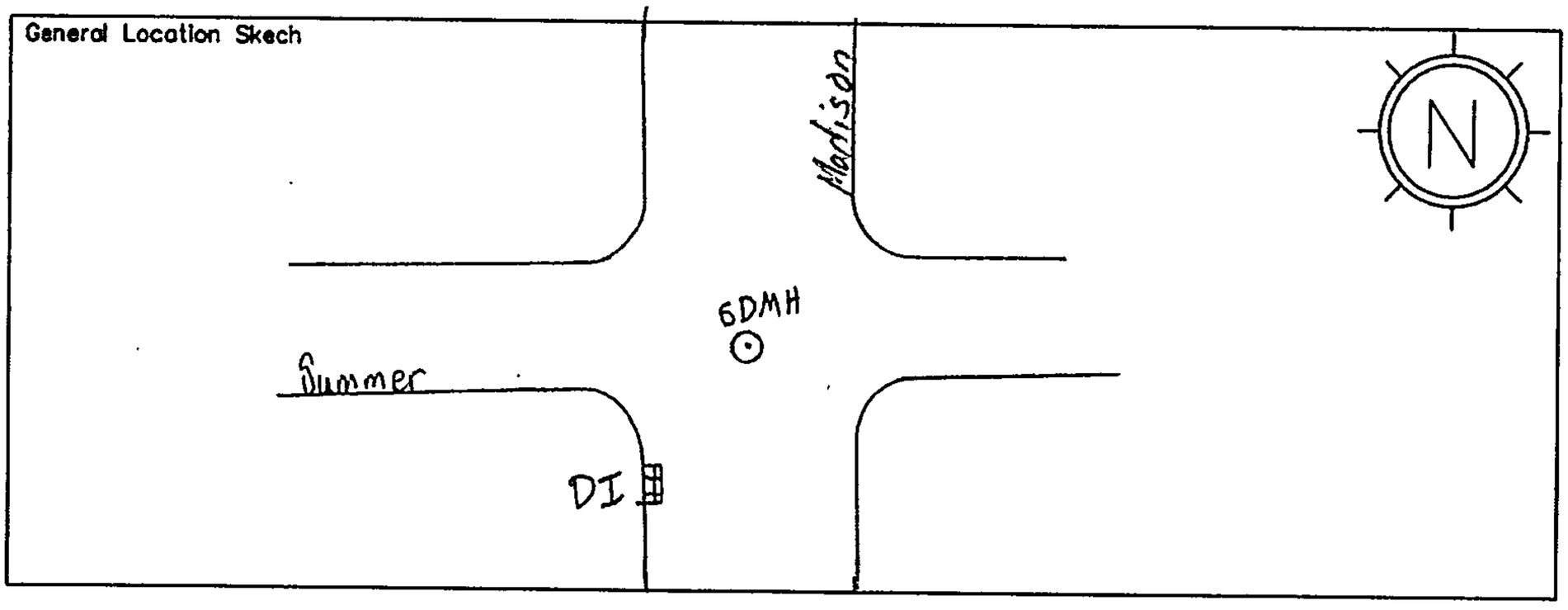
Time Start: 8:11 Stop: 8:12
Size / Type 1.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8b
MH15-12inch RCP-SW to DI.AVI
_____

TO DI

Video & Data Collection:

Time Start: 8:12 Stop: 8:13
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
8c
TO MH # 9
MH15-24inch RCP-EAST.AVI

General Location Skech



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MH #17

STRUCTURE # 9 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Madison
SUE Crew / Equipment: AF - ZOOM - KTG

Date / Time: Tue. Oct. 23, 2012 am
Weather: 50°ls, clear
Reviewed By: SW
Checked By: _____

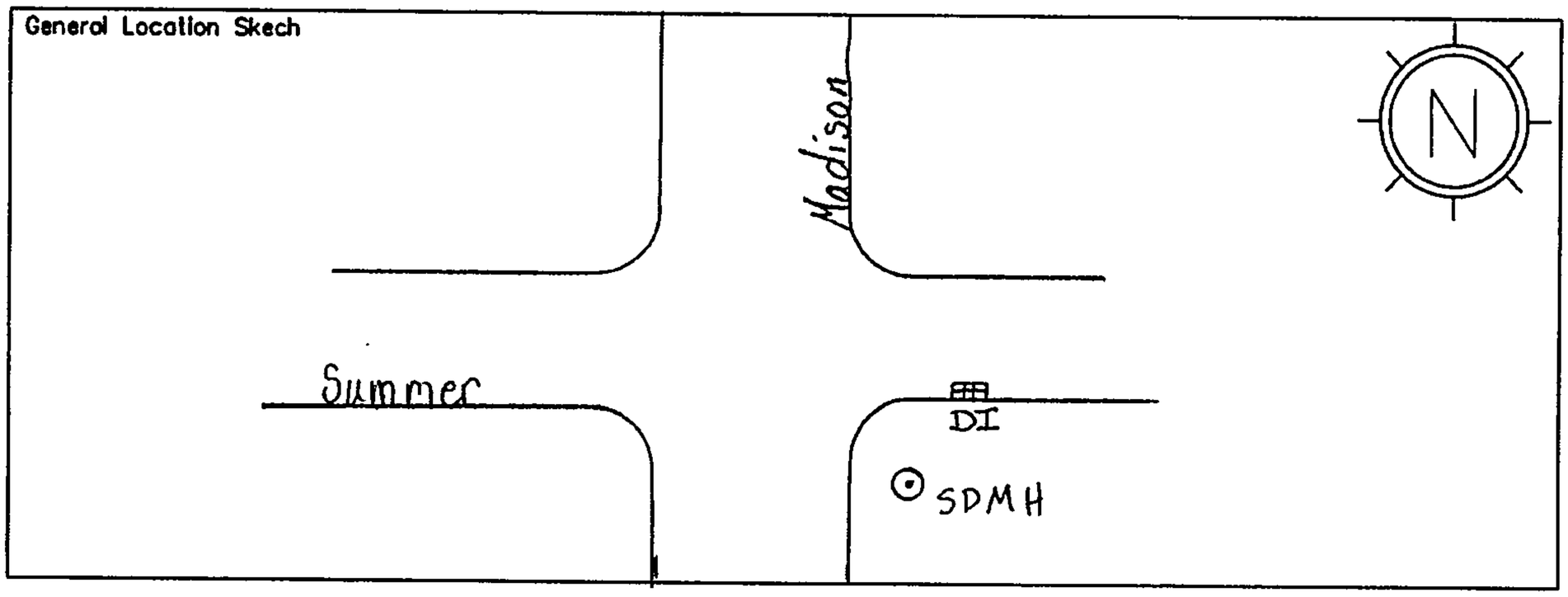
Video & Data Collection:
Time Start: 8:29 Stop: 8:30
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes:
9a
MH17-24inchRCP-WEST.AVI
TO MH #8

Video & Data Collection:
Time Start: 8:33 Stop: 8:34
Size / Type 1.50' RCP
Condition Assessment: 1 2 (3)
Notes:
9c
(to DI) MH17-18inchRcp-NE to DI.AVI

Video & Data Collection:
Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes:

Video & Data Collection:
Time Start: 8:31 Stop: 8:32
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes:
9b
MH12-24inchRCP-EAST.AVI

General Location Skech



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MH #19

STRUCTURE # 10 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Summer @ Monroe
SUE Crew / Equipment: AF - Zoom - KTG

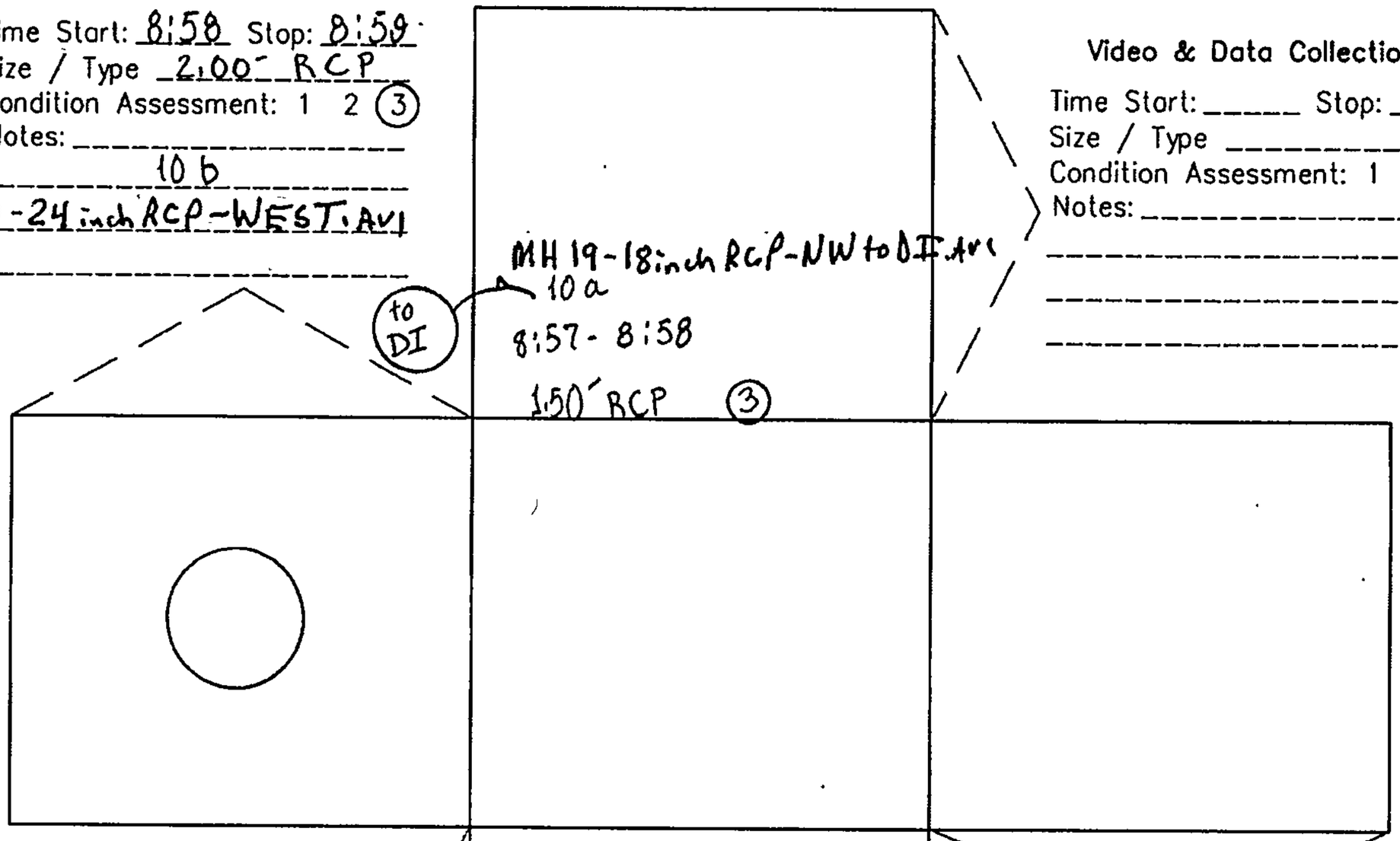
Date / Time: Tue. Oct. 23, 2012 am
Weather: 60's, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 8:58 Stop: 8:59
Size / Type 2.00" RCP
Condition Assessment: 1 2 (3)
Notes: _____
10 b
MH 19 - 24 inch RCP - WEST.AVI
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____



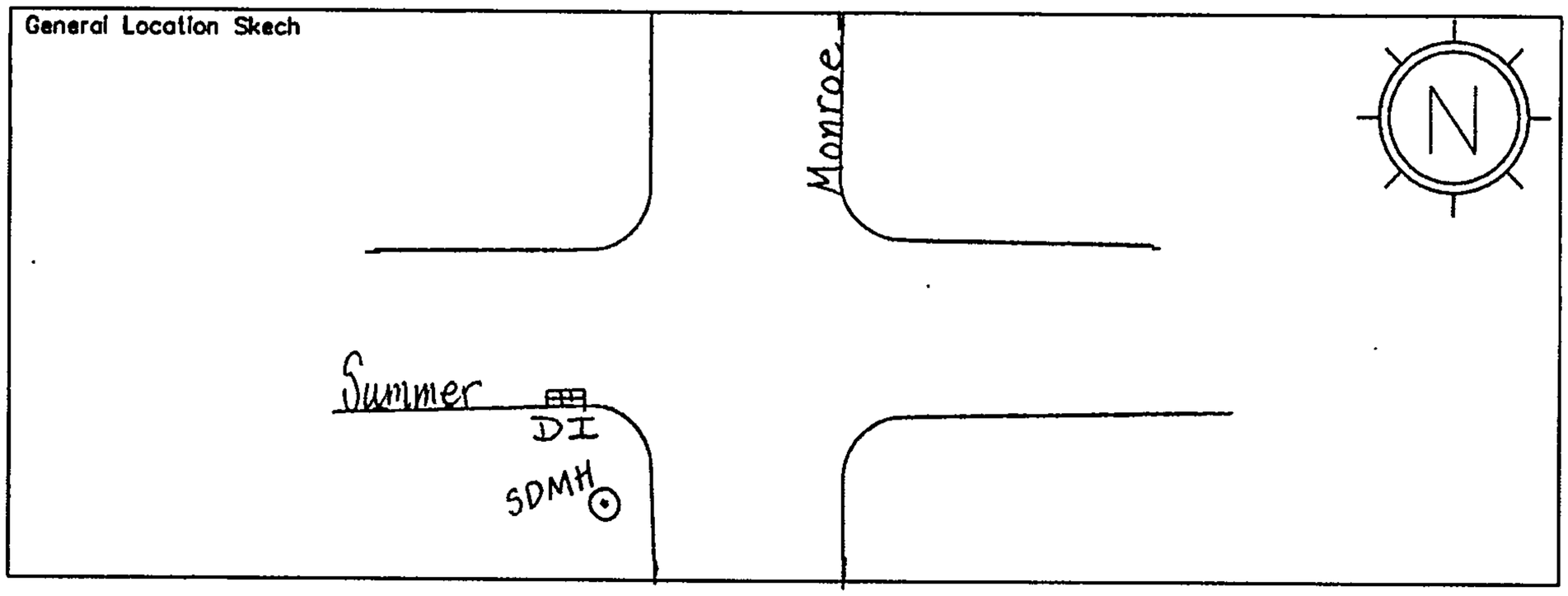
Video & Data Collection:

Time Start: 9:00 Stop: 9:01
Size / Type 2.00" RCP
Condition Assessment: 1 2 (3)
Notes: _____
10 c
MH 19 - 24 inch RCP - SOUTH
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

General Location Skech



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MH off Project. One Block East.

STRUCTURE # 11 SDMH

Project Name: N H F C
Project #: 1206 062 01
General Location: Quincy, S. of Summer
SUE Crew / Equipment: AF - ZOOM - KTG

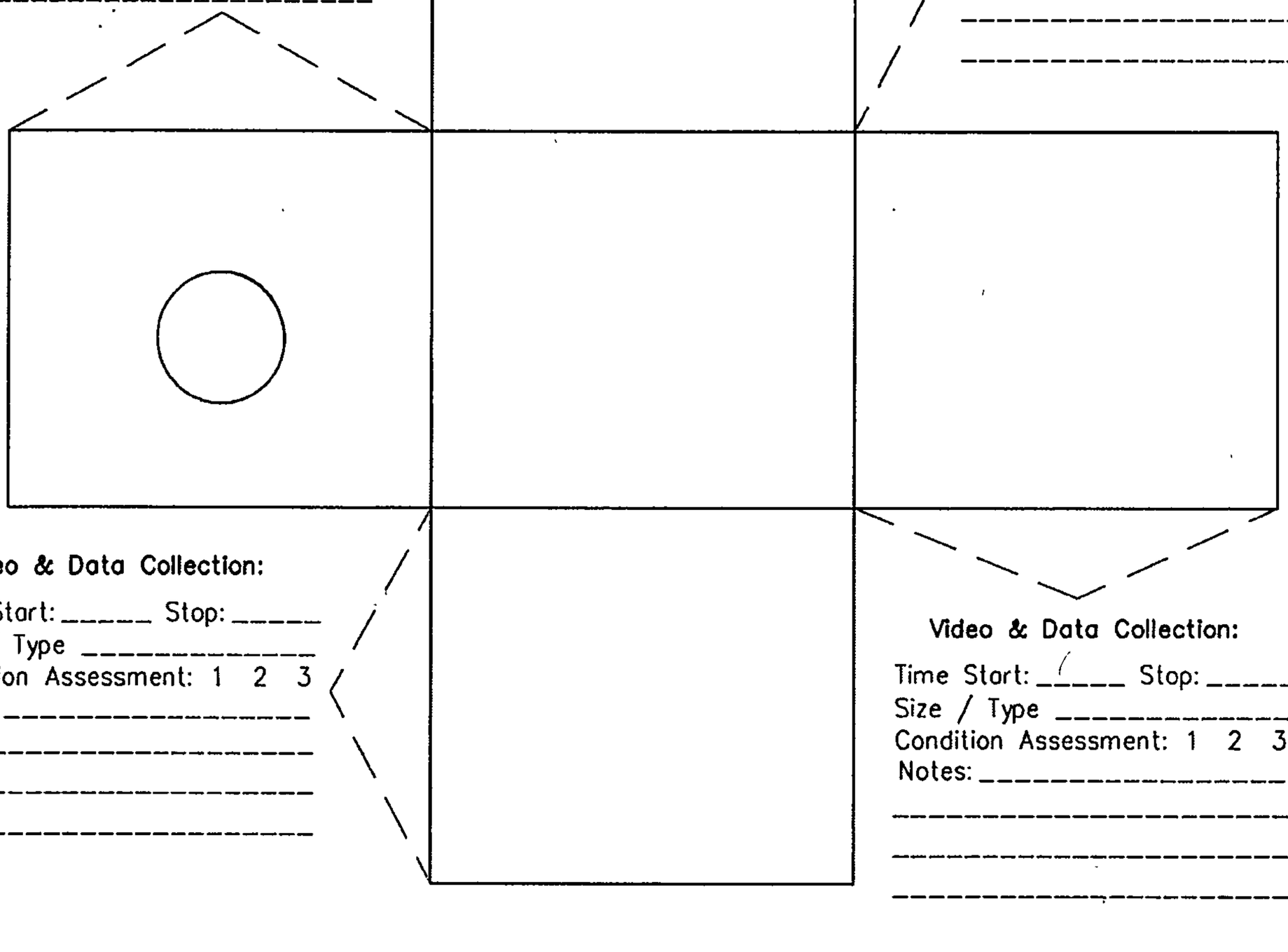
Date / Time: Tue. Oct. 23, 2012 am
Weather: 60°s, clear
Reviewed By: SW
Checked By: _____

Video & Data Collection:

Time Start: 9:30 Stop: 9:32
Size / Type 2.00' RCP
Condition Assessment: 1 2 (3)
Notes: _____
10a
Off Project MH - Quincy - 24inch RCP - WEST. AV1
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____



Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

Video & Data Collection:

Time Start: _____ Stop: _____
Size / Type _____
Condition Assessment: 1 2 3
Notes: _____
_____
_____
_____

General Location Skech

No Manhole found in Alley between Quincy & Monroe.