CITY OF ALBUQUERQUE

July 18, 2017

Mike Balaskovits
Bohannan Huston, Inc.
7500 Jefferson St NE
Albuquerque, NM 87109

RE: **The Highlands**
Drainage Master Plan
Engineer's Stamp Date 6/28/17
Hydrology File: K15D034

Dear Mr. Balaskovits:

Based on the information provided in the submittal received on 6/28/17 the above-referenced Drainage Master Plan cannot be approved for Site Plan for Building Permit until the following comments are addressed:

1. The hydrology analysis is incomplete. Upstream offsite basins from the UNM campus are missing from the hydrology, and additional basins along Central should also be considered in the determination of the peak flow in the existing downstream storm drain in Cedar.

2. A more detailed analysis of the Cedar storm drain HGL may find that the existing storm drain has adequate capacity for the increased flows from this development. However if the analysis shows the Cedar storm drain does not have adequate downstream capacity, then on-site (privately maintained) detention ponds will be necessary to limit post-development 100-year peak flow rates to those of pre-development. Increased flows to over-capacity systems cannot be authorized by the City Engineer in accordance with § 14-5-2-12 (G) of the Albuquerque Code of Ordinances.

3. HGL calculations will be required for all new storm drain connections to the existing lines and should start with a reasonable approximation of the HGL in the existing storm drains. Where the existing storm drains are over capacity the HGL may be a little above the existing surface as long as MH lids are bolted. Place new inlets where they are higher than the HGL of the Pipe that they are connecting to. Inlets connecting to the Cedar Pipe should be higher than the surface elevation in the intersection of Cedar/Copper.

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4. Analysis of downstream capacity needs to continue to a reasonable point of analysis. For the Cedar storm drain, this must incorporate the 72" storm drain under Central and continue south of Central.

5. Downstream capacity and historic flow rates must be analyzed at each proposed discharge location; this includes each discharge location along the western edge of the site.

6. Proposed flows must be provided for each analysis point departing your site, not just the change in flow.

7. For exhibit B, include AHYMO input and output files and provide detailed methodology and assumptions.

8. In exhibits A and B, what happens to subbasins V-2 and V-3? These both route into Basin V-1 and need to be included in the analysis.

9. Analysis of existing developed conditions needs to be based on Table A-5, Ch 22.2 (A) of the DPM for determining percent impervious.

If you have any questions, please contact me at 924-3986 or jhughes@cabq.gov.

Sincerely,

James D. Hughes
Principal Engineer, Planning Dept.
Development Review Services

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Orig: Drainage File

Bohannan Huston

Engineering
Spatial Data
Advanced Technologies

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CLIENT/COURIER TRANSMITTAL

To: James D. Hughes
City of Albuquerque
600 2nd St. NW
Albuquerque, NM 87102

Phone: (505) 924-3880
Job No.: 20160155

Requested by: Michael Balaskovits

Date: June 28, 2017

Time Due:
- ☐ **This A.M.**
- ☒ **This P.M.**
- ☐ **Rush** _____
- ☐ **By Tomorrow**

Job Name: The Highlands

DELIVERY VIA

☒ **Courier** ☐ **Federal Express**
☐ **Mail** ☐ **UPS**
☐ **Other**

PICK UP

Item: _____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Drainage Info Sheet
2	1	Comment Response Letter
3	1	Highlands Existing Conditions Plan
4	1	Highlands Proposed Grading & Drainage Plan
5	1	Exhibit A
6	1	Exhibit B
7	1	Exhibit C

COMMENTS / INSTRUCTIONS

James,

Please find attached the conceptual Grading & Drainage Plan for The Highlands. We are requesting Hydrology approval in support of Site Plan for Building Permit Approval.
Let me if you have any questions.

Thanks,
Mike

REC'D BY:_____ **DATE:**_____ **TIME:**_____

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: The Highlands Building Permit #: _____ City Drainage #: D15D034

DRB#: 1010879 EPC#: _____ Work Order#: _____

Legal Description: BLOCKS 3, 4, 5, 6, & 21 BROWNWELL & LAIL'S HIGHLAND ADDITION

City Address: N/A

Engineering Firm: BOHANNAN HUSTON, INC. Contact: MIKE BALASKOVITS

Address: 7500 JEFFERSON ST NE ALBUQUERQUE, NM 87109

Phone#: 505-823-1000 Fax#: 505-798-7988 E-mail: MBALASKOVITS@BHINC.COM

Owner: TITAN DEVELOPMENT CENTER LAND, LLC Contact: BRIAN PATTERSON

Address: 6300 RIVERSIDE PLAZA LANE NW #200

Phone#: 505-998-0163 Fax#: _____ E-mail: BPATTERSON@TITAN-DEVELOPMENT.COM

Architect: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Other Contact: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Check all that Apply:

DEPARTMENT:

X HYDROLOGY/ DRAINAGE

_____ TRAFFIC/ TRANSPORTATION

_____ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:

_____ ENGINEER/ ARCHITECT CERTIFICATION

_____ CONCEPTUAL G & D PLAN

_____ GRADING PLAN

X DRAINAGE MASTER PLAN

_____ DRAINAGE REPORT

_____ CLOMR/LOMR

_____ TRAFFIC CIRCULATION LAYOUT (TCL)

_____ TRAFFIC IMPACT STUDY (TIS)

_____ EROSION & SEDIMENT CONTROL PLAN (ESC)

_____ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: X Yes _____ No

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

_____ BUILDING PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY

_____ PRELIMINARY PLAT APPROVAL

_____ SITE PLAN FOR SUB'D APPROVAL

X SITE PLAN FOR BLDG. PERMIT APPROVAL

_____ FINAL PLAT APPROVAL

_____ SIA/ RELEASE OF FINANCIAL GUARANTEE

_____ FOUNDATION PERMIT APPROVAL

_____ GRADING PERMIT APPROVAL

_____ SO-19 APPROVAL

_____ PAVING PERMIT APPROVAL

_____ GRADING/ PAD CERTIFICATION

_____ WORK ORDER APPROVAL

_____ CLOMR/LOMR

_____ PRE-DESIGN MEETING

_____ OTHER (SPECIFY) _____

DATE SUBMITTED: 06/28/2017 By: Mike Balaskovits

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: ___

Bohannan Huston

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June 28, 2017

Mr. James D. Hughes, P.E.
City of Albuquerque
Planning Department
600 2nd Street NW
Albuquerque, NM 87103

Re: The Highlands / Hydrology File D15D034

Dear Mr. Hughes:

Enclosed for your review and comment is a re-submittal of The Highlands Overall Grading & Drainage Plan. Please see the responses to your comments dated 05/04/17 below:

1. Upstream offsite drainage basins need to be identified and analyzed for each location that offsite flows enter the site and for each downstream location where hydraulic capacity needs to be checked. The following two reports are available from AMAFCA and may be useful in analysis of the upstream offsite drainage basins.
   a. *Lower Tijeras Arroyo Flow Capacities* by RTI Inc. (Doc ID 375.03.01).
   b. *The South Diversion Channel Capacity Analysis Report* by Easterling Consultants, Inc. (Doc ID 363.01.12.08).
   Response: We have reviewed "The South Diversion Channel Capacity Analysis Report" by Easterling Consultants, Inc. and established the upstream offsite basin contributing to our site. We have used the report to model the specific basin contributing to our site which lies within Basin V-1 & W-1 as outlined in the Existing Conditions Plan to determine the appropriate existing flow.

2. Hydraulic capacity needs to be checked at each location where drainage exits this site. Hydraulic capacity of each storm drain should extend downstream to a reasonable control point and include flows from offsite basins that contribute to that downstream control point.
   Response: A comparison table of existing verses proposed conditions has been provided on the proposed grading and drainage plan for storm drain pipe capacities. Basins 1-3 all show a reduction in the Q contributing to these systems while comparing to existing conditions. The existing 60" storm drain pipe is the only pipe that will have an increase.

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3. Storm water management ponds or downstream improvements will be required as necessary to provide capacity in all downstream public infrastructures in accordance with the DPM,

   Response: It is understood that improvements will be required if necessary with the caveat that this is an infill project and the exiting land treatments are similar to existing conditions. In addition, it's worth noting that because of these improvements, we have reduced the existing flows heading to the west which is a known issue and placing additional flows into the existing 60" RCP, which has been requested in the past by the Department of Municipal Development.

4. The required Storm Water Quality should be estimated in the Report and Master Grading Plan and the required volume should be finalized prior to approval of the Site Plan(s) for Building Permit. Calculation of the actual SWQ volume to be constructed on each site determination of the amount of the Fee in Lieu of Construction will be required prior to hydrology approval of the Grading Plan for Building Permit.

   Response: The Storm Water Quality will be calculated as each site comes on line. Sites vary in size and we are proposing that they are assessed at the building permit level for approval. The entire development will require a SWQ volume of 12,849CF as it relates to the first flush requirements.

5. Any Public Drainage Infrastructure must be identified on an infrastructure list prior to hydrology approval of Site Plan(s) for Building Permit so the Master Grading plan and Drainage Report must include drainage analysis of all onsite and adjacent public infrastructure.

   Response: Noted. The major public improvements identified with this study include a relocation of a 24" storm drain along Copper and minor inlet improvements and connections to address new curb associated with onstreet parking around each development. These items can be added to the various infrastructure lists as the site plans for building permit sites as requested by city hydrology department.

6. The Master Grading Plan should include onsite floor elevations and flow arrows to indicate onsite private drainage basins and all points of discharge into public drainage infrastructure.

   Response: Please see the Proposed Grading & Drainage Plan.

Bohannan Huston

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We are requesting Hydrology Approval in support of Site Plan for Building Permit approval. Please feel free to contact me at 823-1000 with questions or comments.

Sincerely,

Mike Balaskovits, PE
Vice President
Community Development and Planning

MJB/egn
Enclosure

CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

May 4, 2017

Mike Balaskovits
Bohannan Huston, Inc.
7500 Jefferson St NE
Albuquerque, NM 87109

RE: **The Highlands**
Conceptual Grading and Drainage Report
Plan Date: 4/25/17
Hydrology File: K15D034

Dear Mr. Balaskovits:

Based on the information provided in the submittal received on 4/25/17 the above-referenced Conceptual Grading and Drainage Plan cannot be approved for Final Plat, nor is it required for Final Plat. Hydrology can approve the Final Plat as long as we have Public Drainage and Access Easements signed by the current owner(s) delivered into our hands before we approve the Final Plat. Please provide a deed to prove ownership with the paper easements.

Prior to any further Site Plan approvals, an approved Drainage Report and Master Grading Plan will be required. Then more detailed Grading Plans will be required prior to building permit approval for each separate site. Depending on the results of the engineering design and analysis, cross lot drainage easements and maintenance agreements may also be required prior approval of Building Permits.

The Drainage Report and Master Grading Plan should address the following in accordance with the DPM:

1. Upstream offsite drainage basins need to be identified and analyzed for each location that offsite flows enter the site and for each downstream location where hydraulic capacity needs to be checked. The following two reports are available from AMAFCA and may be useful in analysis of the upstream offsite drainage basins.
    a. *Lower Tijeras Arroyo Flow Capacities* prepared by RTI Inc. (Doc ID 375.03.01).
    b. *The South Diversion Channel Capacity Analysis Report* by Easterling Consultants, Inc. (Doc ID 363.01.12.08).

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Orig: Drainage File

2. Hydraulic capacity needs to be checked at each location where drainage exits this site. Hydraulic capacity of each storm drain should extend downstream to a reasonable control point and include flows from offsite basins that contribute to that downstream control point.
3. Storm water management ponds or downstream improvements will be required as necessary to provide capacity in all downstream public drainage infrastructures in accordance with the DPM.
4. The required Storm Water Quality should be estimated in the Report and Master Grading Plan and the required volume should be finalized prior to approval of the Site Plan(s) for Building Permit. Calculation of the actual SWQ volume to be constructed on each site and determination of the amount of the Fee in Lieu of Construction will be required prior to hydrology approval of the Grading Plan for Building Permit.
5. Any Public Drainage Infrastructure must be identified on an infrastructure list prior to hydrology approval of Site Plan(s) for Building Permit so the Master Grading plan and Drainage Report must include drainage analysis of all onsite and adjacent public infrastructure.
6. The Master Grading Plan should include onsite floor elevations and flow arrows to indicate onsite private drainage basins and all points of discharge into public drainage infrastructure.

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If you have any questions, please contact me at 924-3986 or jhughes@cabq.gov.

Sincerely,

James D. Hughes
Principal Engineer, Planning Dept.
Development Review Services

Orig: Drainage File

ANALYSIS POINT ID

1. FLOW ENTERING EXISTING 36" SD IN TIJERAS AVE
2. FLOW ENTERING EXISTING 24" SD IN COPPER AVE
3. FLOW ENTERING EXISTING 21" SD IN ALLEY BETWEEN OAK ST & MULBERRY ST
4. FLOW ENTERING EXISTING 60" SD IN CEDAR ST

STORM DRAIN ID

- A — EXISTING 12" SD IN TIJERAS AVE
- B — EXISTING 18" SD IN COPPER AVE
- C — EXISTING 18" SD IN COPPER AVE
- D — EXISTING 21" SD IN MULBERRY ST
- E — EXISTING 60" SD IN CEDAR AVE
- F — EXISTING 21" SD IN BASIN U3

EXISTING DRAINAGE NARRATIVE

EXISTING CONDITIONS:

THE SITE IS APPROXIMATELY 11.6 ACRES (INCLUSIVE OF RECENTLY VACATED ALLEYS AND RIGHT OF WAYS), SITUATED WITHIN FIVE (5) CITY BLOCKS BOUNDED BY CENTRAL, COPPER, I-25 (OAK STREET) AND SYCAMORE. THE DEVELOPMENT WAS RECNTLY SUBDIVIDED INTO 6 NEW TRACTS FROM 56 RESIDENTIAL LOTS WHICH AT SOME POINT WERE ALL FULLY DEVELOPED. THE SITE SLOPES GENERALLY FROM EAST TO WEST INTO EXISTING STORM DRAIN INFRASTRUCTURE.

THE SITE IS DIVIDED INTO FOUR ONSITE BASINS THAT DRAIN TO FOUR DIFFERENT STORM DRAIN NETWORKS. BASINS U1, U2A, U2B AND U3 ALL DRAIN TO AN EXISTING STORM DRAIN SYSTEM THAT ULTIMATELY DISCHARGES WEST OF I-25. EXISTING BASIN U1 DRAINS INTO AN EXISTING 36" RCP LINE VIA CURB INLETS LOCATED AT THE INTERSECTION OF TIJERAS AVE. AND MULBERRY ST. BASIN U2A & U2B DRAIN INTO EXISTING INLETS LOCATED ALONG OAK ST. BASIN U3 DRAINS INTO AN EXISTING 21" RCP LINE THAT RUNS THROUGH THE ALLEY LOCATED BETWEEN OAK ST & MULBERRY ST. AS NOTED ABOVE, THESE STORM DRAIN SYSTEMS ULTIMATELY DISCHARGE TO THE WEST OF I-25 TOWARD BROADWAY BLVD.

BASIN U4 DRAINS INTO THE EXISTING 60" STORM DRAIN LINE WITHIN CEDAR ST WHICH ULTIMATELY DISCHARGES INTO THE SOUTH DIVERSION CHANNEL.

"THE SOUTH DIVERSION CHANNEL CAPACITY ANALYSIS REPORT" BY EASTERLING CONSULTANTS, INC. (DOC ID 363.01.12.08) (HEREON KNOWN AS "THE REPORT") WAS REVIEWED AND USED TO MODEL THE FLOW THAT AFFECTS THE SITE AND ADJACENT INFRASTRUCTURE (SEE EXHIBIT A FOR THE BASIN DELINEATION FROM THE REPORT). IT WAS ESTABLISHED THAT THE CONTRIBUTING BASINS THAT ADDRESS THE SITE ARE V-1 & W-1.

BASED ON THE COA STORM DRAIN SYSTEM MAPS (HEREON KNOWN AS "THE SYSTEM MAP"), A REFINED BASIN BOUNDARY OF V-1 AND W-1 WAS OUTLINED (SEE EXHIBIT B) WHICH DIRECTLY RELATES TO THE SITE. ALTHOUGH THE REPORT NOTES THAT V-1 & W-1 CONTRIBUTES TO THE SOUTH DIVERSION CHANNEL, IT CAN BE SEEN FROM THE SYSTEM MAP (SEE EXHIBIT C) THAT A PORTION OF THOSE BASINS CONTRIBUTE TO THE STORM DRAIN IN BROADWAY BLVD.

USING THIS REFINED BASIN BOUNDARIES, THE TOTAL DEVELOPED FLOW EXPECTED UNDER EXISTING CONDITIONS TO CONTRIBUTE TO THE EXISTING 60" STORM DRAIN WAS DETERMINED USING THE LAND TREATMENTS AS WELL AS TIME OF CONCENTRATION FROM THE REPORT AND THEN RUNNING THE ANALYSIS IN AHYMO. THE TOTAL EXISTING Q CALCULATED TO THE 60" SD IN CEDAR ST ADJACENT TO THE SITE IS APPROXIMATELY 259.5 CFS.

THE TOTAL ONSITE EXISTING FLOW RATE FROM THE DEVELOPMENT IS APPROXIMATELY 50.4 CFS. BASED ON DEVELOPED LAND TREATMENTS AS THIS DEVELOPMENT HAS BEEN PREVIOUSLY DEVELOPED IN THE PAST. THIS WAS CONFIRMED WITH IMAGES FROM 1961, WHERE THIS AREA WAS HEAVILY POPULATED WITH RESIDENTIAL AS WELL AS COMMERCIAL DEVELOPMENT. THIS WAS TAKEN INTO CONSIDERATION FOR LAND TREATMENTS FOR THE ONSITE EXISTING CONDITIONS.

GIVEN THIS INFORMATION, IT WAS DETERMINDED THAT 9.74 CFS CONTRIBUTES TO THE EXISTING STORM DRAIN WITHIN CEDAR ST AND THE REMAINING 40.68 CFS CONTRIBUTING TO THE STORM DRAIN WEST OF I-25. SEE EXISTING CONDITIONS BASIN DATA TABLE. ANALYSIS POINTS ARE SHOWN TO COMPARE TO PROPOSED CONDITIONS. SEE OVERALL GRADNG AND DRAINAGE PLAN PROPOSED CONDITIONS.

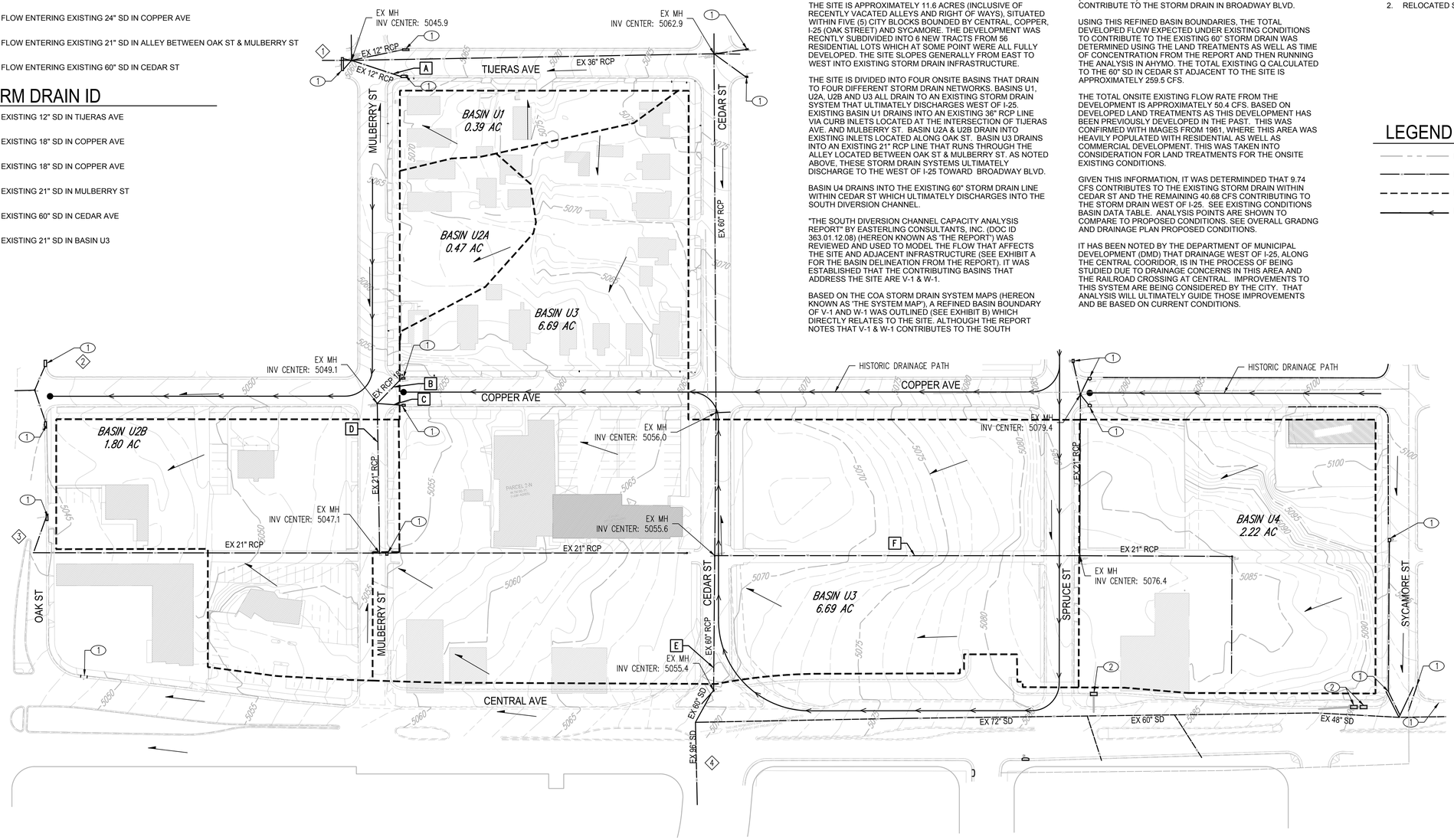
IT HAS BEEN NOTED BY THE DEPARTMENT OF MUNICIPAL DEVELOPMENT (DMD) THAT DRAINAGE WEST OF I-25, ALONG THE CENTRAL COORIDOR, IS IN THE PROCESS OF BEING STUDIED DUE TO DRAINAGE CONCERNS IN THIS AREA AND THE RAILROAD CROSSING AT CENTRAL. IMPROVEMENTS TO THIS SYSTEM ARE BEING CONSIDERED BY THE CITY. THAT ANALYSIS WILL ULTIMATELY GUIDE THOSE IMPROVEMENTS AND BE BASED ON CURRENT CONDITIONS.

KEYNOTES

1. EXISTING STORM DRAIN INLET
2. RELOCATED STORM DRAIN INLETS BY ART PROJECT

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- EXISTING BASIN BOUNDARY
- EXISTING FLOW PATH



Highlands Development

Existing Developed Conditions Basin Data Table

This table is based on the DPM Section 22.2, Zone: 2

Basin ID	Area (SQ. FT)	Area (AC.)	Land Treatment Percentages A	B	C	D	Q(100yr) (cfs/ac.)	Q(100yr) (CFS)	V(100yr) (inches)	$V_{(100yr\text{-}6hr)}$ (CF)	$V_{(100yr\text{-}24hr)}$ (CF)	Q(2yr) (cfs/ac.)	Q(2yr) (CFS)	WT E (inches)	$V_{(2yr\text{-}6hr)}$ (CF)	$V_{(2yr\text{-}24hr)}$ (CF)
CURRENT ONSITE BASINS																
U1	16847	0.39	0.0%	0.0%	30.0%	70.0%	4.23	*1.64*	*1.82*	*2559*	*2952*	1.48	*0.57*	*0.60*	*840*	*1010*
U2A	20544	0.47	0.0%	0.0%	30.0%	70.0%	4.23	*2.00*	*1.82*	*3121*	*3600*	1.48	*0.70*	*0.60*	*1024*	*1232*
U2B	78451	1.80	0.0%	0.0%	20.0%	80.0%	4.39	*7.90*	*1.92*	*12565*	*14657*	1.61	*2.90*	*0.66*	*4328*	*5236*
U3	291388	6.69	0.0%	0.0%	22.0%	78.0%	4.36	*29.14*	*1.90*	*46190*	*53766*	1.58	*10.59*	*0.65*	*15764*	*19052*
U4	96664	2.22	0.0%	0.0%	20.0%	80.0%	4.39	*9.74*	*1.92*	*15482*	*18060*	1.61	*3.57*	*0.66*	*5333*	*6451*
TOTAL	**503894**	**11.57**	**-**	**-**	**-**	**-**	**-**	***50.42***	**-**	***79918***	***93036***	**-**	***18.32***	**-**	***27288***	***32981***

60 30 0 60
1"=60'

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTION BY — DATE
FIELD VERIFICATION BY — DATE
DRAWING CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO. — DATE

BENCH MARKS

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
MICHAEL BALASKOVICH
NEW MEXICO
18187
12-23-17
LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REMARKS	BY
		REVISIONS	
	06/17	DESIGN	MJB
	06/17	DESIGNED BY	EGN
	06/17	DRAWN BY	MJB
		CHECKED BY	

Bohannan Huston
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CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT

HIGHLAND DEVELOPMENT OVERALL GRADING & DRAINAGE PLAN EXISTING CONDITIONS

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR.	MO./DAY/YR.

CITY PROJECT NO. | ZONE MAP NO. | SHEET 1 OF 2

P:\20160155\CDP\Plans\General\20160155_DMP01_Ex_Overall.dwg
Wed, 28-Jun-2017 - 3:54:pm, Plotted by: ENEWMAN

ANALYSIS POINT COMPARISON

AP ID	Difference from Onsite Existing Conditions to Proposed Conditions Q(100yr) (CFS)
1	-0.15
2	-1.40
3	-14.13
4	+17.82

NOTE: '+' indicates an increase in Q from existing to proposed. '-' indicates a decrease in Q from existing to proposed.

STREET CAPACITY

SECTION ID	R/W WIDTH	FL-FL WIDTH	SLOPE	STREET CAPACITY Q(100yr) (CFS)
A-A	60'	32'	4.30%	35.30

PROPOSED DRAINAGE NARRATIVE

PROPOSED CONDITIONS:

THE HIGHLAND DEVELOPMENT WILL INCLUDE TWO NEW MULTIFAMILY COMPLEXES, A HOTEL, AND TWO NEW RETAIL/RESTAURANT DEVELOPMENTS TO COMPLEMENT THE CENTRAL FRONTAGE. GIVEN THE THAT THIS AREA HAS BEEN FULLY DEVELOPED IN THE PAST AND CONSIDERED INFILL, THE DEVELOPED LAND TREATMENTS WILL BE VERY CLOSE TO THE EXISTING CONDITIONS. THE IMPERVIOUS AREA OF THE SITE WILL INCREASE TO 90% D AND 10% C FOR DEVELOPED FLOWS. FUTURE SITE AND PUBLIC WORK ORDER SPECIFIC DRAINAGE MANAGEMENT PLANS WILL BE SUBMITTED IN SUPPORT OF BUILDING PERMIT APPROVAL AND PUBLIC WORK ORDER APPROVAL AND VARIOUS SITES COME ONLINE. THIS ANALYSIS IS SPECIFIC TO OBTAINING CONCEPTUAL APPROVAL FOR SITE PLAN FOR BUILDING PERMIT APPROVAL THROUGH THE DRB PROCESS AND INFRASTRUCTURE LINE APPROVAL AS NECESSARY.

DEVELOPED BASINS

THE DEVELOPED BASINS WILL GENERALLY ADHERE TO THE HISTORIC FLOW WITH A FEW EXPECTIONS. THE FOLLOWING IS A DESCRIPTION OF HOW EACH BASIN WILL DRAIN. PLEASE REFER TO THE "ULTIMATE DEVELOPED CONDITIONS BASIN DATA TABLE", THE ANALYSIS POINT COMPARISON AND THE STORM DRAIN PIPE CAPCITY AS NECESSARY.

BASIN D1 AREA HAS BEEN REDUCED AND WILL CONTINUE TO DISCHARGE INTO THE EXISTING STORM DRAIN WITHIN TIJERAS AVE. STORM DRAIN CONNECTIONS TO THE BACK OF THE INLET LOCATED AT THE SOUTH END OF THE TIJERAS WILL BE CONSIDERED TO DISCHARE FUTURE ROOF DRAINS FROM THE DEVELOPMENT. THE REMAINDER OF THIS SITE WILL DRAIN VIA SURFACE FLOW INTO THE ROADWAY AND INTO THE EXSITING INLETS AS IT HISTORICALLY HAS. THE TOTAL REDUCTION OF THIS FLOW IS APPROXIMATELY 0.15CFS.

BASIN D2A IS A SMALL BASIN ALONG THE FACE OF THE NEW BUILDING AND WILL DRAIN VIA SURFACE FLOW INTO MULBERY UNTIL IT REACHES INLETS LOCATED AT THE INTERSECTION OF COPPER AND OAK. THIS BASIN AREA WAS REDUCED TO BASED ON THE REVISED GRADING FOR THIS BLOCK.

BASIN D2B WILL CONTINUE TO DRAIN TO THE EXISTING STORM DRAIN AND INLETS LOCATED WITHIN OAK ST. PLAN FOR THIS DEVELOPMENT ARE PENDING ACQUIRING THE CROSSROADS HOTEL AND FUTURE DRAINAGE MANAGEMENT PLAN WILL BE PREPARED TO ADDRESS THESE DEVELOPED FLOWS IN THE FUTURE.

BASIN D3A WILL ULTIMATELY DRAIN INTO THE EXISTING 21" RCP LINE THAT RUNS IN THE EXISTING ALLEY. FLOW FROM THIS BASIN CAN ENTER THE STORM DRAIN VIA THE INLETS AT COPPER AVE AND MULBERRY ST. OR AT THE EXISTING INLET LOCATED AT THE INTERSECTION OF MULBERRY AND THE EXISTING ALLEY WAY.

BASIN D3B IS THE EXISTING VACATED CEDAR RIGHT OF WAY WHICH WILL CONTINUE TO SURFACE DRAIN NORTH IN CEDAR AND THEN WEST INTO COPPER UNTIL IT GETS TO THE INLETS AS IT HISTORICALLY HAS. THE TOTAL Q FROM BASIN D3 IN COMPARSION TO U3 WAS REDUCED BY 14.13 CFS DUE TO DIVERTING FLOWS INTO THE EXISTING 60" RCP.

BASIN D4A WILL BE DIVERTED TO DRAIN TO THE EXISTING 60" RCP WITH IN CEDAR AVE VIA SURFACE FLOW AND A NEW STORM DRAIN CONNECTION INTO THE EXISTING MANHOLE LOCATED AT THE INTERSECTION OF CEDAR AVE. AND THE EXISTING ALLEY WAY.

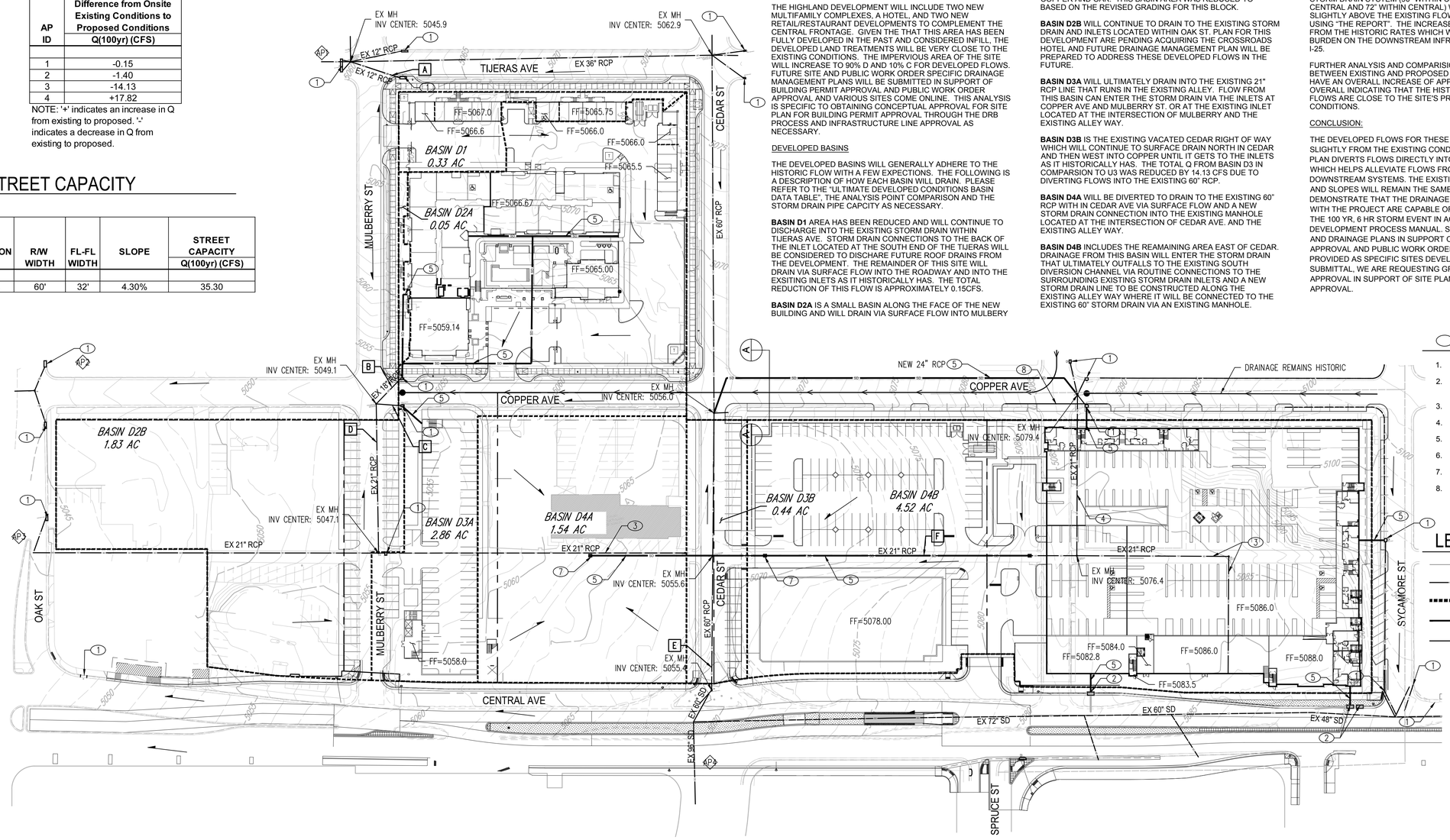
BASIN D4B INCLUDES THE REAMAINING AREA EAST OF CEDAR. DRAINAGE FROM THIS BASIN WILL ENTER THE STORM DRAIN THAT ULTIMATELY OUTFALLS TO THE EXISTING SOUTH DIVERSION CHANNEL VIA ROUTINE CONNECTIONS TO THE SURROUNDING EXISTING STORM DRAIN INLETS AND A NEW STORM DRAIN LINE TO BE CONSTRUCTED ALONG THE EXISTING ALLEY WAY WHERE IT WILL BE CONNECTED TO THE EXISTING 60" STORM DRAIN VIA AN EXISTING MANHOLE.

DRAINAGE TO THE EXISTING 60" AND ULTIMATE LARGER STORM DRAIN SYSTEM (96" WITHIN CEDAR SOUTH OF CENTRAL AND 72" WITHIN CENTRAL) WILL BE INCREASED SLIGHTLY ABOVE THE EXISTING FLOW THAT WAS DETERMINED USING "THE REPORT". THE INCREASE IN Q WILL BE 17.62 CFS FROM THE HISTORIC RATES WHICH WILL REDUCE THE BURDEN ON THE DOWNSTREAM INFRASTRUCTURE WEST OF I-25.

FURTHER ANALYSIS AND COMPARISION OF THE FLOW BETWEEN EXISTING AND PROPOSED CONDITIONS WAS FOUND HAVE AN OVERALL INCREASE OF APPROXIMATELY 2.2 CFS OVERALL INDICATING THAT THE HISTORICAL DEVELOPED FLOWS ARE CLOSE TO THE SITE'S PROPOSED DEVELOPED CONDITIONS.

CONCLUSION:

THE DEVELOPED FLOWS FOR THESE 5 BLOCKS DEVIATE SLIGHTLY FROM THE EXISTING CONDITIONS, HOWEVER THIS PLAN DIVERTS FLOWS DIRECTLY INTO THE EXISTING 60" SD WHICH HELPS ALLEVIATE FLOWS FROM EXISTING SMALLER DOWNSTREAM SYSTEMS. THE EXISTING ROADWAY INLETS AND SLOPES WILL REMAIN THE SAME. THESE ADJUSTMENTS DEMONSTRATE THAT THE DRAINAGE ELEMENTS PROPOSED WITH THE PROJECT ARE CAPABLE OF SAFELY CONVEYING THE 100 YR, 6 HR STORM EVENT IN ACCORDANCE WITH THE DEVELOPMENT PROCESS MANUAL. SUBSEQUENT GRADING AND DRAINAGE PLANS IN SUPPORT OF BUILDING PERMIT APPROVAL AND PUBLIC WORK ORDER APPROVAL WILL BE PROVIDED AS SPECIFIC SITES DEVELOP. WITH THIS SUBMITTAL, WE ARE REQUESTING GRADING AND DRAINAGE APPROVAL IN SUPPORT OF SITE PLAN FOR BUILDING PERMIT APPROVAL.



KEYNOTES

1. EXISTING STORM DRAIN INLET
2. RELOCATED STORM DRAIN INLETS BY ART PROJECT
3. STORM DRAIN TO BE REMOVED
4. STORM DRAIN TO BE RELOCATED
5. PROPOSED STORM DRAIN
6. EXISTING STORM DRAIN TO REMAIN
7. PROPOSED STORM DRAIN INLET
8. NEW CURB ALONG OLD SPRUCE ST. INTERSECTION

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAIN
- PROPOSED BASIN BOUNDARY
- PROPOSED STORM DRAIN
- EXISTING FLOW PATH

N

60 30 0 60
1"=60'

BASIN DATA TABLE

Highlands Development
ULTIMATE Developed Conditions Basin Data Table
This table is based on the DPM Section 22.2, Zone: 2

Basin ID	Area (SQ. FT)	Area (AC.)	Land Treatment Percentages A	B	C	D	Q(100yr) (cfs/ac.)	Q(100yr) (CFS)	V(100yr) (inches)	$V_{(100yr-6hr)}$ (CF)	$V_{(100yr-24hr)}$ (CF)	$V_{(100yr-10day)}$ (CF)	FIRST FLUSH (CF)
PROPOSED BASINS													
D1	14324	0.33	0.0%	0.0%	10.0%	90.0%	4.54	*1.49*	*2.02*	*2412*	*2842*	*2842*	*365*
D2A	2040	0.05	0.0%	0.0%	10.0%	90.0%	4.54	*0.21*	*2.02*	*344*	*405*	*405*	*52*
D2B	79501	1.83	0.0%	0.0%	10.0%	90.0%	4.54	*8.29*	*2.02*	*13389*	*15774*	*15775*	*2027*
D3A	124731	2.86	0.0%	0.0%	10.0%	90.0%	4.54	*13.01*	*2.02*	*21007*	*24749*	*24750*	*3181*
D3B	19153	0.44	0.0%	0.0%	10.0%	90.0%	4.54	*2.00*	*2.02*	*3226*	*3800*	*3801*	*488*
D4A	67153	1.54	0.0%	0.0%	10.0%	90.0%	4.54	*7.01*	*2.02*	*11310*	*13324*	*13325*	*1712*
D4B	196990	4.52	0.0%	0.0%	10.0%	90.0%	4.54	*20.55*	*2.02*	*33176*	*39086*	*39089*	*5023*
TOTAL	**503892**	**11.57**	-	-	-	-	-	***52.56***	-	***84864***	***99981***	***99988***	***12849***

STORM DRAIN PIPE CAPACITY

SD ID	SIZE	SLOPE	EX CAPACITY [MANNING EQ] Q(100yr) (CFS)	DIFF. FROM EX TO PROPOSED Q Q(100yr) (CFS)	% DIFFERENCE FROM ONSITE CONTRIBUTING FLOW	NOTES
A	12"	6.32%	9.55	-0.14	-1.5%	
B	18"	2.86%	19.93	-0.87	-4.4%	
C	18"	1.85%	15.23	-13.27	-87.1%	
D	21"	0.85%	15.57	-14.13	-90.8%	
E	60"	0.36%	166.61	17.82	10.7%	
F	21"	5.20%	38.51	10.81	28.1%	This onsite pipe will be upsized to handle the capacity prior to construction in Tract 6.

NOTE: '-' indicates a decrease from existing to proposed.

Bohannan Huston
www.bhinc.com 800.877.5332

AS-BUILT INFORMATION
BENCH MARKS
SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL
MICHAEL BALASHONAK NEW MEXICO 18187 6.23.17 LICENSED PROFESSIONAL ENGINEER

CONTRACTOR
WORK STAKED BY DATE
INSPECTIONS BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO. DATE

NO.	DATE	REMARKS	BY
		REVISIONS	
		DESIGN	

DESIGNED BY MJB 06/17
DRAWN BY EGN 06/17
CHECKED BY MJB 06/17

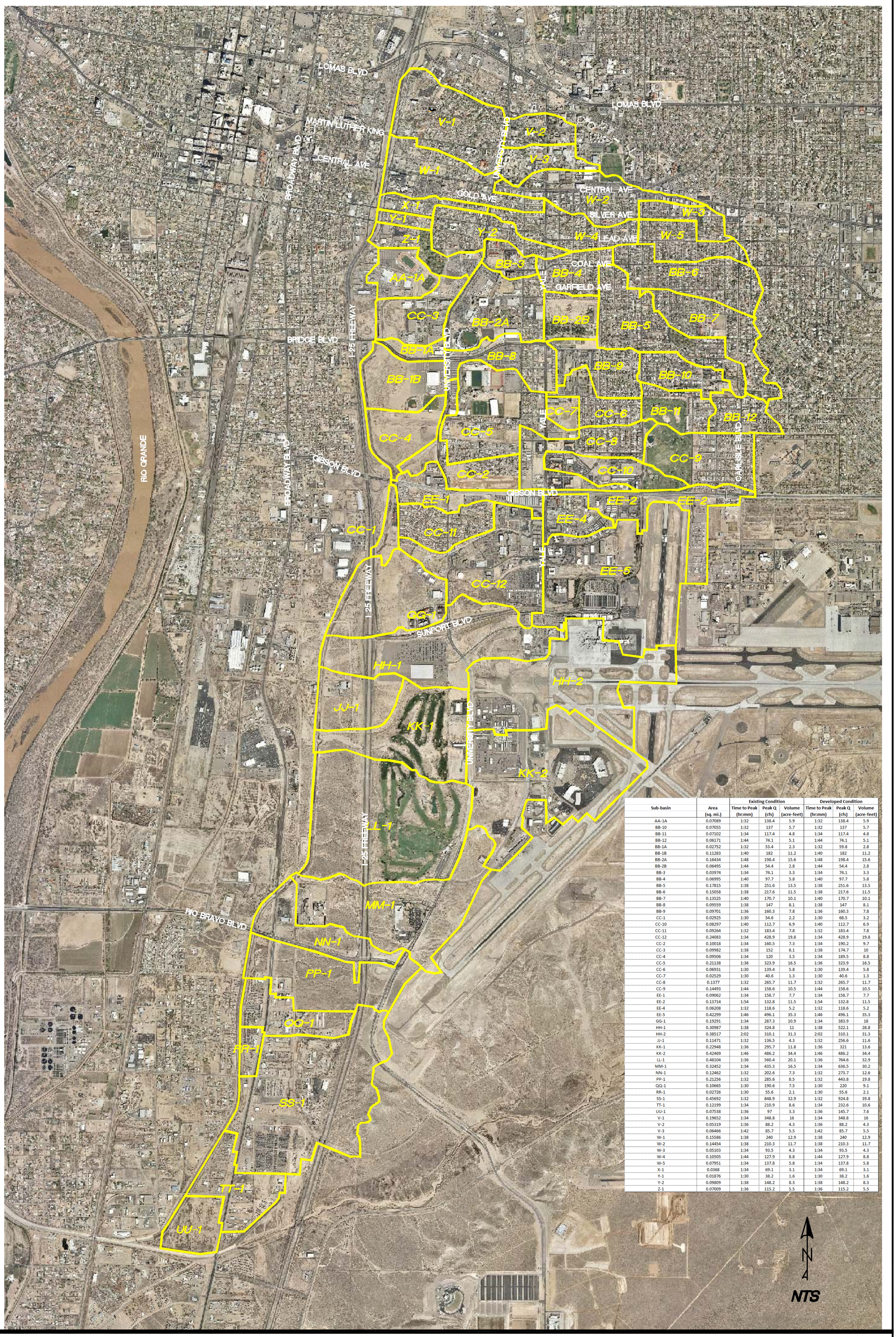
CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT

HIGHLAND DEVELOPMENT OVERALL GRADING & DRAINAGE PLAN
PROPOSED GRADING & DRAINAGE

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	LAST DESIGN UPDATE	MO./DAY/YR.	MO./DAY/YR.

CITY PROJECT NO. | ZONE MAP NO. | SHEET 2 OF 2

P:\20160155\CDP\Plans\General\20160155_DMP01_Overall.dwg
Wed, 28-Jun-2017 - 3:57:pm, Plotted by: ENEWMAN



Sub-basin	Area	Existing Condition			Developed Condition		
	(sq. mi.)	Time to Peak (hr:mm)	Peak Q (cfs)	Volume (acre-feet)	Time to Peak (hr:mm)	Peak Q (cfs)	Volume (acre-feet)
AA-1A	0.07089	1:32	138.4	5.9	1:32	138.4	5.9
BB-10	0.07055	1:32	137	5.7	1:32	137	5.7
BB-11	0.07102	1:34	117.4	4.8	1:34	117.4	4.8
BB-12	0.06171	1:44	74.1	5.1	1:44	74.1	5.1
BB-1A	0.02752	1:32	53.4	2.3	1:32	59.8	2.8
BB-1B	0.11283	1:40	182	11.2	1:40	182	11.2
BB-2A	0.16434	1:48	198.4	15.6	1:48	198.4	15.6
BB-2B	0.06495	1:44	54.4	2.8	1:44	54.4	2.8
BB-3	0.03974	1:34	74.1	3.3	1:34	74.1	3.3
BB-4	0.06995	1:40	97.7	5.8	1:40	97.7	5.8
BB-5	0.17815	1:38	251.6	13.5	1:38	251.6	13.5
BB-6	0.15058	1:38	217.6	11.5	1:38	217.6	11.5
BB-7	0.13525	1:40	170.7	10.1	1:40	170.7	10.1
BB-8	0.09559	1:38	147	8.1	1:38	147	8.1
BB-9	0.09701	1:36	160.3	7.8	1:36	160.3	7.8
CC-1	0.02925	1:30	54.6	2.2	1:30	68.5	3.2
CC-10	0.08297	1:40	112.7	6.9	1:40	112.7	6.9
CC-11	0.09264	1:32	183.4	7.8	1:32	183.4	7.8
CC-12	0.24083	1:34	428.9	19.8	1:34	428.9	19.8
CC-2	0.10018	1:34	160.5	7.3	1:34	190.2	9.7
CC-3	0.09982	1:38	152	8.1	1:38	174.7	10
CC-4	0.09506	1:34	120	3.5	1:34	189.5	8.8
CC-5	0.21138	1:36	323.9	16.5	1:36	323.9	16.5
CC-6	0.06931	1:30	139.4	5.8	1:30	139.4	5.8
CC-7	0.02529	1:30	40.6	1.3	1:30	40.6	1.3
CC-8	0.1377	1:32	265.7	11.7	1:32	265.7	11.7
CC-9	0.14493	1:44	158.6	10.5	1:44	158.6	10.5
EE-1	0.09062	1:34	158.7	7.7	1:34	158.7	7.7
EE-2	0.13714	1:54	132.8	11.5	1:54	132.8	11.5
EE-4	0.06208	1:32	118.6	5.2	1:32	118.6	5.2
EE-5	0.42299	1:46	496.1	35.3	1:46	496.1	35.3
GG-1	0.19291	1:34	287.3	10.9	1:34	383.9	18
HH-1	0.30987	1:38	324.8	11	1:38	522.1	28.8
HH-2	0.38517	2:02	310.1	31.3	2:02	310.1	31.3
JJ-1	0.11471	1:32	136.5	4.3	1:32	256.6	11.6
KK-1	0.22948	1:36	295.7	11.8	1:36	321	13.6
KK-2	0.42469	1:46	486.2	34.4	1:46	486.2	34.4
LL-1	0.48104	1:36	560.4	20.1	1:36	764.6	32.9
MM-1	0.32452	1:34	435.3	16.5	1:34	636.5	30.2
NN-1	0.12462	1:32	202.6	7.3	1:32	273.7	12.6
PP-1	0.21256	1:32	285.6	8.5	1:32	443.8	19.8
QQ-1	0.10665	1:30	190.6	7.5	1:30	220	9.1
RR-1	0.02726	1:30	55.6	2.1	1:30	55.6	2.1
SS-1	0.45692	1:32	848.9	32.9	1:32	924.8	39.8
TT-1	0.12199	1:34	210.9	8.6	1:34	232.6	10.6
UU-1	0.07538	1:36	97	3.3	1:36	145.7	7.6
V-1	0.19652	1:34	348.8	16	1:34	348.8	16
V-2	0.05319	1:36	88.2	4.3	1:36	88.2	4.3
V-3	0.06466	1:42	85.7	5.5	1:42	85.7	5.5
W-1	0.15586	1:38	240	12.9	1:38	240	12.9
W-2	0.14454	1:38	210.3	11.7	1:38	210.3	11.7
W-3	0.05103	1:34	93.5	4.3	1:34	93.5	4.3
W-4	0.10505	1:44	127.9	8.8	1:44	127.9	8.8
W-5	0.07951	1:34	137.8	5.8	1:34	137.8	5.8
X-1	0.0368	1:34	69.1	3.1	1:34	69.1	3.1
Y-1	0.01876	1:30	38.2	1.6	1:30	38.2	1.6
Y-2	0.09809	1:38	148.2	8.3	1:38	148.2	8.3
Z-1	0.07009	1:36	115.2	5.5	1:36	115.2	5.5

N

NTS

PLATE 1 - PROJECT AREA WITH HYDROLOGY RESULTS

Easterling Consultants LLC
Engineering and Environmental Consulting

LEGEND

- BASIN BOUNDARY ESTABLISHED IN "THE SOUTH DIVERSION CHANNEL CAPACITY ANALYSIS" BY EASTERLING CONSULTANTS, INC. (DOC ID 363.01.12.08).
- BASIN CONTRIBUTING TO THE 60" SD WITHIN CEDAR ST./CENTRAL AVE.

CONTRIBUTING EXISTING BASIN	Q (100 yr) CFS
V-1	217.10
W-1	42.40
TOTAL	**259.50**

NOTE: This calculation was made using the similar methodology as described in "The South Diversion Channel Capacity Analysis" by using the associated land treatments, time of concentration and running in AHYMO.

BASIN BOUNDARY REFERENCED IN AMAFCA REPORT (TYP)

LAS LOMAS RD NE

69.19 AC OF HIGHLANDS OFFSITE BASIN IN EX BASIN V-1

EX BASIN V-1

I-25

UNIVERSITY BLVD NE

SITE

0.25 AC OF HIGHLANDS OFFSITE BASIN IN EX BASIN W-1

15.39 AC OF HIGHLANDS OFFSITE BASIN IN EX BASIN W-1

CENTRAL AVE NE

EX BASIN W-1

BASIN BOUNDARY REFERENCED IN AMAFCA REPORT (TYP)

Bohannan Huston

THE HIGHLANDS

BASIN ANALYSIS EXHIBIT

DRAWN BY:	EGN	DATE:	06/16/17
CHECKED BY:	MJB	PROJECT NO.	20160155
		SHEET NO.	1 of 1

P:\20160155\CDP\Hydro\20160155_Existing Basin Areas.dwg
June 22, 2017 - 4:48pm
Layout1

NEXT SHEET NO. J-15

Y10

Y9

Y8

Y7

Y6

Y5

Y4

Y3

Y2

Y1

NEXT SHEET NO. K-14

NEXT SHEET NO. K-16

Storm Legend

- Lateral Stubout Inlet Connector
- Collector
- Reservor Drain Siphon
- Double Pipe
- Force Main
- Abandon Lines
- Manhole
- Inlet Catch Basin
- Junction Box
- Vault
- Standpipe/Riser
- Surface Flow
- Pipe Flow
- Water Course Holding Ponds Dams
- Well
- Reservoir
- Pump Station

0 100 200 400 600

SCALE

MAP GRID K-15

Notes:

1. Map is for information only and is subject to corrections. (Corrections call 768-3608.)

NEXT SHEET NO. J-14

Y10

Y9

Y8

Y7

Y6

Y5

Y4

Y3

Y2

Y1

NEXT SHEET NO. K-13

NEXT SHEET NO. K-15

Storm Legend

- Lateral Stubout Inlet Connector
- Collector
- Reservor Drain Siphon
- Double Pipe
- Force Main
- Abandon Lines
- Manhole
- Inlet Catch Basin
- Junction Box
- Vault
- Standpipe/Riser
- Surface Flow
- Pipe Flow
- Water Course Holding Ponds Dams
- Well
- Reservoir
- Pump Station

0 100 200 400 600

SCALE

MAP GRID K-14

Notes:

1. Map is for information only and is subject to corrections. (Corrections call 768-3608.)
2. Features are drawn for general