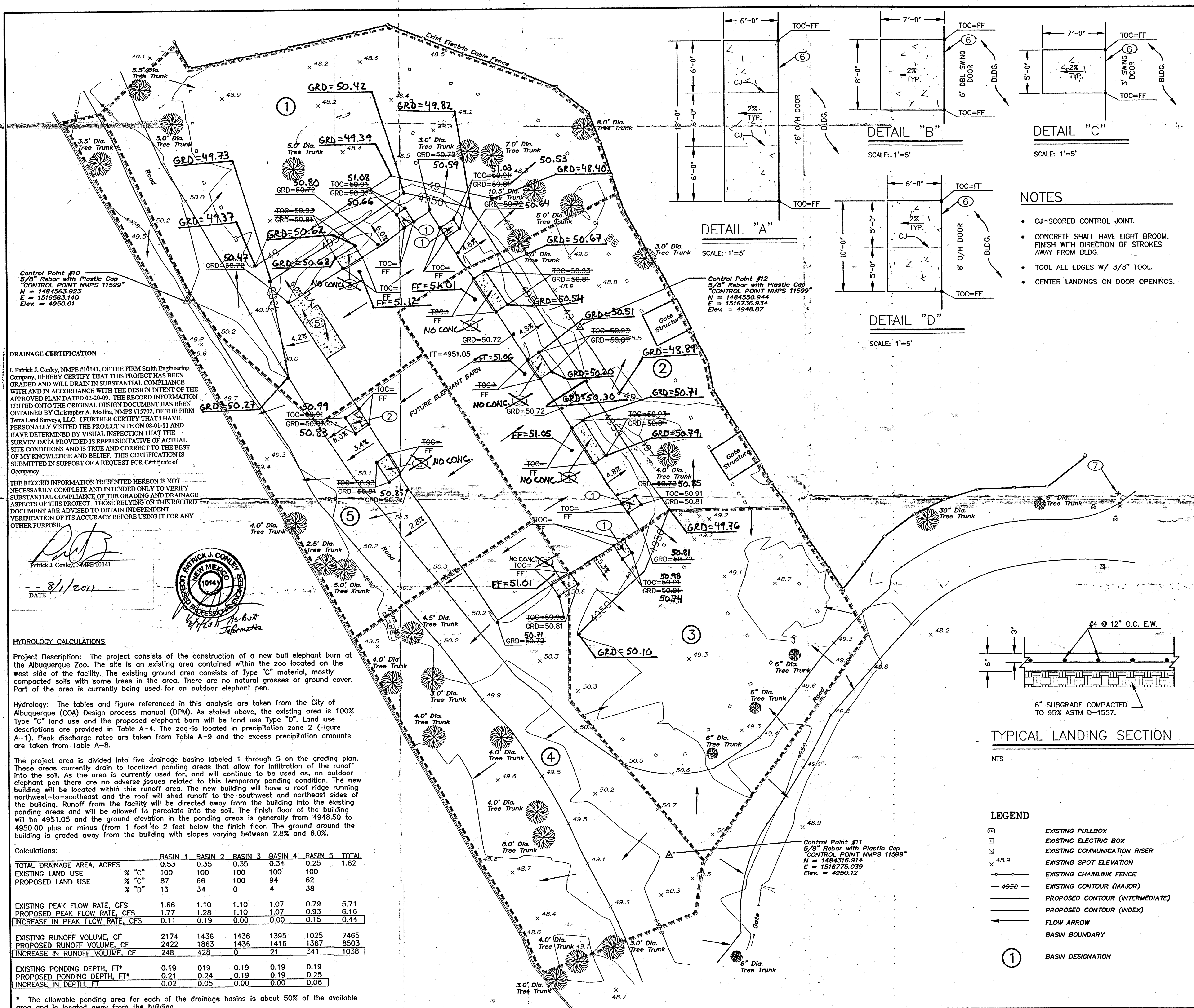




PROJECT LOCATION

NOTES

- CJ=SCORED CONTROL JOINT.
- CONCRETE SHALL HAVE LIGHT BROOM FINISH WITH DIRECTION OF STROKES AWAY FROM BLDG.
- TOOL ALL EDGES W/ 3/8" TOOL.
- CENTER LANDINGS ON DOOR OPENINGS.

KEYED NOTES

- CONSTRUCT 5' WIDE X 7' DEEP LANDING. SEE DETAIL "C" THIS SHEET.
- CONSTRUCT 8' WIDE X 7' DEEP LANDING. SEE DETAIL "B" THIS SHEET.
- CONSTRUCT 10' WIDE X 6' DEEP LANDING. SEE DETAIL "D" THIS SHEET.
- CONSTRUCT 18' WIDE X 6' DEEP LANDING. SEE DETAIL "A" THIS SHEET.
- HAY STORAGE AREA (CONCRETE). CONSTRUCTED WITH BUILDING.
- 1/2" EXPANSION JOINT WITH SEALANT BETWEEN LANDING AND BUILDING.
- EXISTING FIRE HYDRANT.

TYPICAL LANDING SECTION

LEGEND

- EXISTING PULLBOX
- EXISTING ELECTRIC BOX
- EXISTING COMMUNICATION RISER
- EXISTING SPOT ELEVATION
- EXISTING CHAINLINK FENCE
- EXISTING CONTOUR (MAJOR)
- PROPOSED CONTOUR (INTERMEDIATE)
- PROPOSED CONTOUR (INDEX)
- FLOW ARROW
- BASIN BOUNDARY
- BASIN DESIGNATION

AS BUILT INFORMATION

CONTRACTOR	DATE
SMITH ENGINEERING COMPANY	02/19/09

REVISIONS

NO.	DATE	REMARKS
1	02/19/09	DESIGN

CITY OF ALBUQUERQUE

TITLE: RIO GRANDE ZOO-BULL ELEPHANT BARN GRADING AND DRAINAGE PLAN

Design Review Committee: City Engineer Approval

Project No. K-13-Z Sheet No. GD-1 Drawing No. 1-1

DRAINAGE CERTIFICATION

I, Patrick J. Conley, NMPE #10141, OF THE FIRM Smith Engineering Company, HEREBY CERTIFY THAT THIS PROJECT HAS BEEN GRADED AND WILL DRAIN IN SUBSTANTIAL COMPLIANCE WITH AND IN ACCORDANCE WITH THE DESIGN INTENT OF THE APPROVED PLAN DATED 02-20-09. THE RECORD INFORMATION EDITED ONTO THE ORIGINAL DESIGN DOCUMENT HAS BEEN OBTAINED BY Christopher A. Medina, NMPS #15702, OF THE FIRM Terra Land Surveys, LLC. I FURTHER CERTIFY THAT I HAVE PERSONALLY VISITED THE PROJECT SITE ON 08-01-11 AND HAVE DETERMINED BY VISUAL INSPECTION THAT THE SURVEY DATA PROVIDED IS REPRESENTATIVE OF ACTUAL SITE CONDITIONS AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. THIS CERTIFICATION IS SUBMITTED IN SUPPORT OF A REQUEST FOR Certificate of Occupancy.

THE RECORD INFORMATION PRESENTED HEREON IS NOT NECESSARILY COMPLETE AND INTENDED ONLY TO VERIFY SUBSTANTIAL COMPLIANCE OF THE GRADING AND DRAINAGE ASPECTS OF THIS PROJECT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY BEFORE USING IT FOR ANY OTHER PURPOSE.

Patrick J. Conley, NMPE #10141
DATE: 8/1/2011

HYDROLOGY CALCULATIONS

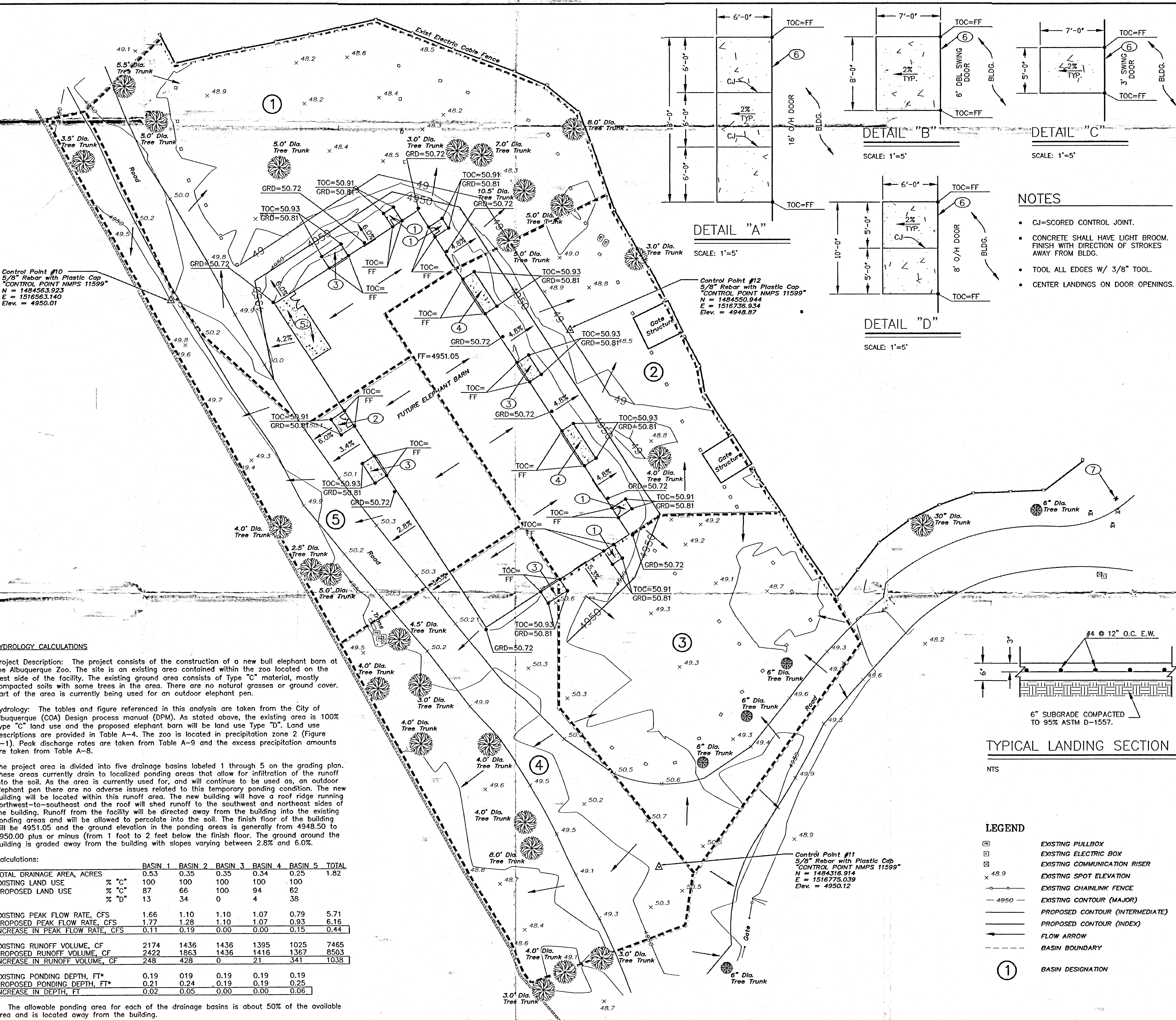
Project Description: The project consists of the construction of a new bull elephant barn at the Albuquerque Zoo. The site is an existing area contained within the zoo located on the west side of the facility. The existing ground area consists of Type "C" material, mostly compacted soils with some trees in the area. There are no natural grasses or ground cover. Part of the area is currently being used for an outdoor elephant pen.

Hydrology: The tables and figure referenced in this analysis are taken from the City of Albuquerque (COA) Design process manual (DFM). As stated above, the existing area is 100% Type "C" land use and the proposed elephant barn will be land use Type "D". Land use descriptions are provided in Table A-4. The zoo is located in precipitation zone 2 (Figure A-1). Peak discharge rates are taken from Table A-9 and the excess precipitation amounts are taken from Table A-8.

The project area is divided into five drainage basins labeled 1 through 5 on the grading plan. These areas currently drain to localized ponding areas that allow for infiltration of the runoff into the soil. As the area is currently used for, and will continue to be used as, an outdoor elephant pen there are no adverse issues related to this temporary ponding condition. The new elephant pen there are no adverse issues related to this temporary ponding condition. The new building will be located within this runoff area. The new building will have a roof ridge running northwest-to-southeast and the roof will shed runoff to the southwest and northeast sides of the building. Runoff from the facility will be directed away from the building into the existing ponding areas and will be allowed to percolate into the soil. The finish floor of the building will be 4951.05 and the ground elevation in the ponding areas is generally from 4948.50 to 4950.00 plus or minus (from 1 foot to 2 feet below the finish floor). The ground around the building is graded away from the building with slopes varying between 2.8% and 6.0%.

Calculations:	BASIN 1	BASIN 2	BASIN 3	BASIN 4	BASIN 5	TOTAL
TOTAL DRAINAGE AREA, ACRES	0.53	0.35	0.35	0.34	0.25	1.82
EXISTING LAND USE	% "C"	100	100	100	100	100
PROPOSED LAND USE	% "C"	87	66	100	94	62
	% "D"	13	34	0	4	38
EXISTING PEAK FLOW RATE, CFS	1.66	1.10	1.10	1.07	0.79	5.71
PROPOSED PEAK FLOW RATE, CFS	1.77	1.28	1.10	1.07	0.93	6.16
INCREASE IN PEAK FLOW RATE, CFS	0.11	0.19	0.00	0.00	0.15	0.44
EXISTING RUNOFF VOLUME, CF	2174	1436	1436	1395	1025	7465
PROPOSED RUNOFF VOLUME, CF	2422	1863	1436	1416	1367	8503
INCREASE IN RUNOFF VOLUME, CF	248	428	0	21	341	1038
EXISTING PONDING DEPTH, FT*	0.19	0.19	0.19	0.19	0.19	0.19
PROPOSED PONDING DEPTH, FT*	0.21	0.24	0.19	0.19	0.25	0.25
INCREASE IN DEPTH, FT	0.02	0.05	0.00	0.00	0.06	0.06

* The allowable ponding area for each of the drainage basins is about 50% of the available area and is located away from the building.



AS BUILT INFORMATION

CONTRACTOR	DATE	ELEVATIONS ARE NAVD 88 ADJUSTED TO THE
SMITH ENGINEERING COMPANY	01/09	ACS CONTROL STATION "14-112"
INSPECTOR'S BY	DATE	ELEVATION=4955.465 FEET.
FIELD ENGINEER BY	DATE	
CHECKED BY	DATE	
RECORDED BY	DATE	
NO.		

BENCH MARKS

SURVEY INFORMATION

FIELD NOTES	DATE	BY
11599	01/09	STEVE TOLER

ENGINEERS' SEAL

KEYED NOTES

- CONSTRUCT 5' WIDE X 7' DEEP LANDING. SEE DETAIL "C" THIS SHEET.
- CONSTRUCT 8' WIDE X 7' DEEP LANDING. SEE DETAIL "B" THIS SHEET.
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- 1/2" EXPANSION JOINT WITH SEALANT BETWEEN LANDING AND BUILDING.
- EXISTING FIRE HYDRANT.

REVISIONS

NO.	DATE	REMARKS	BY
1	02/19/09	DESIGN	PJC
2	02/19/09	SEC	PJC
3	02/19/09	PJC	

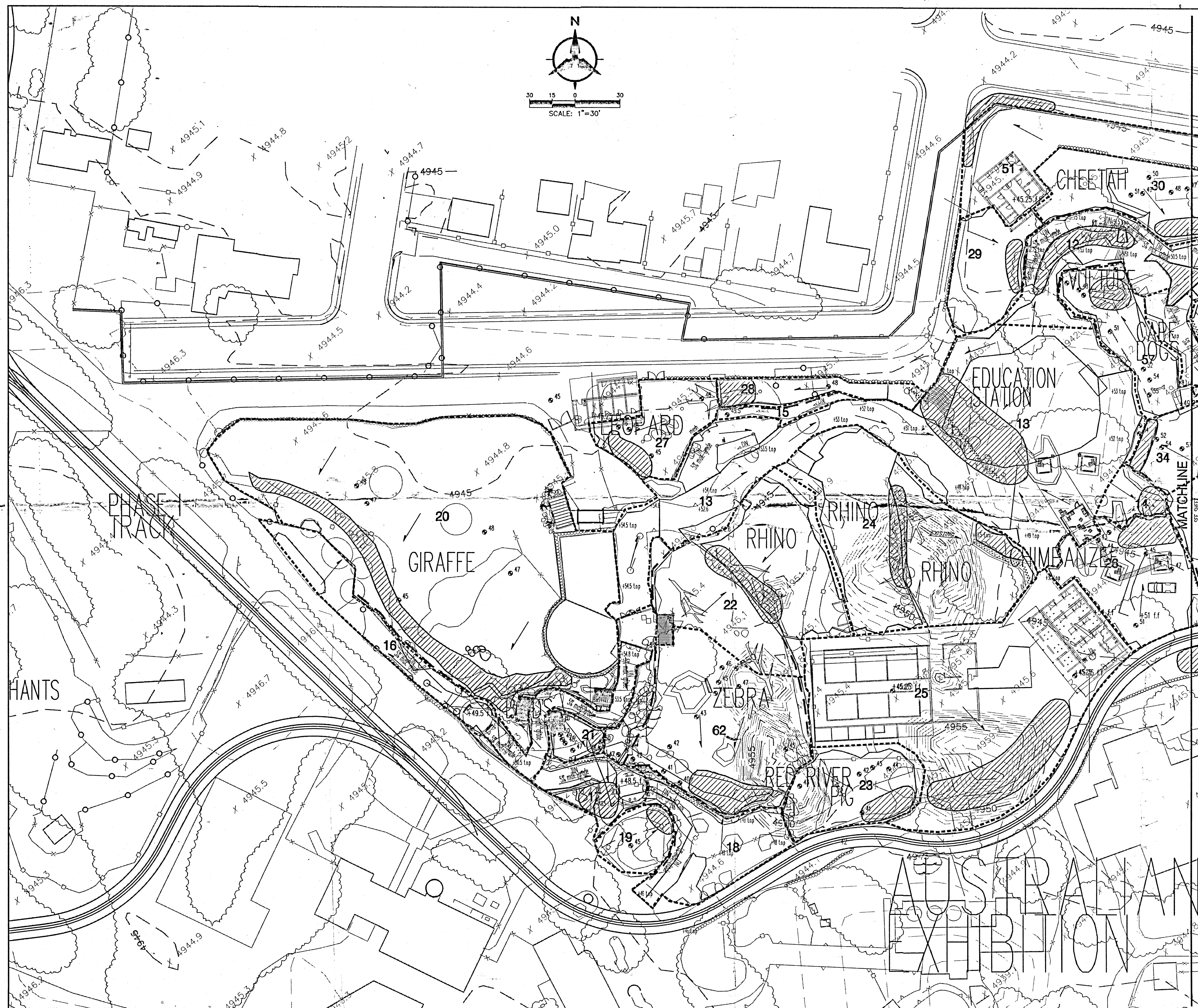
CITY OF ALBUQUERQUE

TITLE: RIO GRANDE ZOO-BULL ELEPHANT BARN
GRADING AND DRAINAGE PLAN

Design Review Committee City Engineer Approval

Project No. Zone Map No. Sheet No. Drawing No. Of

K-13-Z GD-1 1 1



VICINITY MAP
ZONE ATLAS K-13
SCALE: 1"=1000'

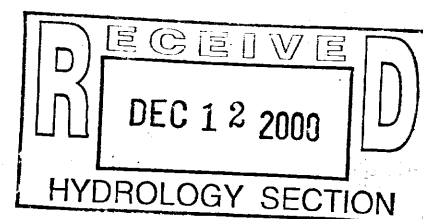
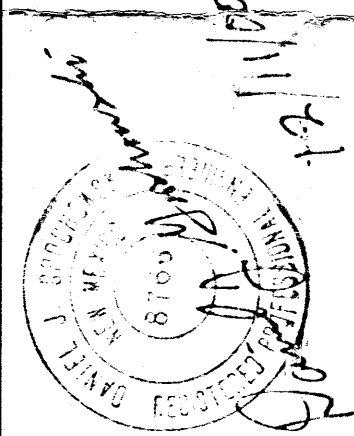
BENCHMARK INFORMATION

Benchmark #1
Station is located approximately 1/2 mile southwest of downtown Albuquerque. To reach the station from intersection of Central Ave., and Eighth Street, S.W. go south on Eighth Street 0.40 miles to the intersection with Stover Ave. The station is then 0.7 ft. west of the west curb on Eighth Street, and is approximately 225' south of Stover Ave. Station mark is a standard ACS brass tablet stamped, "1-K13", set in top of a concrete post, approximately 0.2 ft. below the turf. Elevation = 4944.026, N=1484655.758, E=378361.3965

Benchmark #2
Station is located in the old African Exhibit at the Rio Grande Zoo.
Station mark is a PK nail and aluminum washer.
N=1484792.291, E=377243.632

LEGEND

-  POND
 BASIN BOUNDARY
 BASIN ID
 RETAINING WALL
 SPOT ELEVATION
 FLOW ARROW



Bollanham & Hirston

Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109

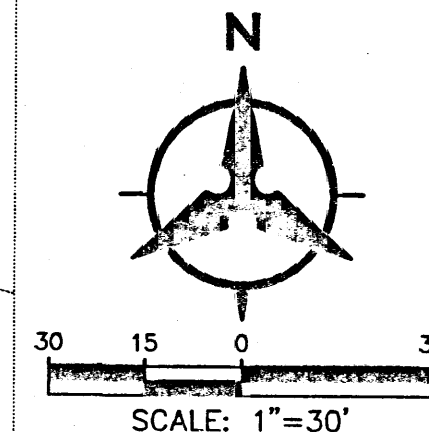
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS



**CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP**

RIO GRANDE ZOO AFRICAN TRAIN & ZOO EXHIBIT DRAINAGE BASIN PLAN

Design Review Committee		City Engineer Approval		Last Design Update	Mo./Day/Yr.	Mo./Day/Yr.
City Project No.		Zone Map No.	Sheet	Of		
		K-13	1	2		



Basin/Pond	Type	Area (ft ²)	Volume (ft ³)	Area Needed for 3' Pond (ft ²)	For 2' (ft ²)	For 1' (ft ²)	Designed Pond Area (ft ²)
1	exhibit	1337	157	52	79	157	
2	path	3301	983	194	292	583	
3	path	2065	365	122	182	365	Goes to pond in Basin 3
4	exhibit	8936	915	308	458	915	656
5	path	1807	319	106	160	319	458
6	path	3322	587	198	293	587	432
7	path	1866	330	110	165	330	356
8	path	8176	1445	482	722	1445	1077
9	path	20511	3624	1208	1812	3624	Three ponds (below)
9a							421
9b							655
9c							2240
10	path	1771	313	104	156	313	Goes to pond in Basin 33
11	path	3414	603	201	302	603	Goes to pond in Basin 36
12a	path	6351	1122	374	561	1122	Two ponds (below)
12b							913
13(education center)	exhibit	6557	671	224	336	671	462
13(path)	path	18962	3351	1117	1675	3351	
13 TOTAL			4022	1341	2011	4022	2815
14	path	1141	202	67	101	202	282
15	path	737	130	43	65	130	Goes to pond in Basin 28
16	path	6617	1169	390	585	1169	Goes to pond in Basin 20
17	path	2335	413	138	206	413	495
18	path	4670	825	275	413	825	Goes to pond in Basin 62
19	exhibit	1709	175	58	88	175	210
20	exhibit	33167	3399	1133	1700	3399	2952
21	exhibit	1006	34	34	52	103	144
22	exhibit	11221	1149	383	575	1149	513
23	exhibit	4354	446	149	223	446	919
24	exhibit	13028	1334	445	667	1334	1087
25	path	20918	3696	1232	1848	3696	2587
26	exhibit	5588	572	191	286	572	607
27	exhibit	3389	347	116	174	347	434
28	exhibit	1958	201	67	100	201	414
29	exhibit	3473	356	119	178	356	267
30	exhibit	4954	507	169	254	507	355
31	exhibit	6116	626	209	313	626	626
32	exhibit	2776	284	95	142	284	341
33	exhibit	12213	1251	417	625	1251	1173
34	exhibit	2252	231	77	115	231	288
35	exhibit	5417	555	185	277	555	1109
36	exhibit	1673	171	86	126	171	389
37	path	7265	1284	428	642	1284	Goes to Pond 9c
38	exhibit	1985	203	68	102	203	This basin already a pond
39	exhibit	973	100	33	50	100	139
40	exhibit	5708	584	195	292	584	409
41	exhibit	1016	104	35	52	104	146
42	exhibit	1080	111	37	55	111	156
43	exhibit	4005	410	137	205	410	503
44	exhibit	1617	166	55	83	166	215
45	exhibit	2124	217	72	109	217	255
46	exhibit	1103	113	38	56	113	201
47	exhibit	11042	1203	408	611	1223	1840
48	path	11208	1980	650	960	1980	Goes to pond in Basin 49
49	exhibit	3147	322	107	161	322	1151
50	path	13916	2459	820	1229	2459	Goes to pond in Basin 47
51 (building)	path	1384	244	81	122	244	
51 (other)	exhibit	4991	501	167	250	501	
51 TOTAL			745	248	373	745	783
52 (building)	path	1505	266	89	133	266	
52 (other)	exhibit	4853	497	166	248	497	
52 TOTAL			763	254	381	763	801
53 (building)	path	2371	419	140	209	419	
53 (other)	path	4868	850	287	430	860	
53 TOTAL			1279	426	640	1279	1023
54 (building)	path	2371	419	140	209	419	
54 (other)	path	4477	791	264	396	781	
54 TOTAL			1210	403	605	1210	1065
55 (building)	path	798	141	47	71	141	
55 (other)	exhibit	8137	833	278	417	833	

GRADING AND DRAINAGE PLAN

As discussed with City Hydrology prior to the preparation of this plan, the project site is a closed basin. No runoff from offsite enters the site and no onsite runoff is discharged offsite. Detention ponds are intended to prevent any onsite flow from going offsite, as well as preventing flooding in human occupancy areas and animal exhibits. All drainage calculations were done in accordance with the City of Albuquerque Development Process Manual, Chapter 22. The FEMA map is the 100-year, 6-hour storm in Zone 2 (FEMA Chapter 22, Figure A-1). According to FEMA planning the area is protected from 100 year flooding by levees, but the levees are not shown on the map. The study boundary is shown on the map. The proposed contours, and structural divisions (buildings, walls), the basins were treated as either "exhibit" or "path." An exhibit basin was assumed to be 90% Land treatment C, and 10% Land treatment D. A "path" area was assumed to be 100% D and included impermeable walkways and buildings. The excess runoff volume was calculated for each basin type based on a per square foot basis as shown in the Calculations Section.

Due to the shallow ground water in this area, the maximum depth for ponds was set at 3 feet. Included with the accompanying table is the required pond volume for each basin and land areas needed for pond depths of 1, 2 and 3 feet. These are calculated assuming a purely vertical containment wall for the ponds. The graphical area shown for the ponds assumed side slopes of 3:1 or 2:1. The 2:1 slope was only used for the 3 foot deep pond. The 3:1 slope was used for the 1 and 2 foot deep ponds. The 3:1 slope supports the slope. Grading will be done by Rio Grande Zoo personnel. The purpose of this plan is to show drainage basins, flow directions and pond volumes. Actual final grades and elevations will be done to meet the intent of these drainage requirements if not the actual spot elevations and pond configurations. Proposed retaining wall and plan for the ponds are shown for informational purposes only. These will be constructed in accordance with standard ZOO details and specifications.

CALCULATIONS

FOR EXHIBITS-

Excess Precipitation = $(0.9)(1.13 \text{ inches}) + (0.1)(2.12 \text{ inches}) = 1.23 \text{ inches}$
Volume per square foot = $1.23/12 = 0.1024 \text{ cubic feet per square foot}$
(DPM 22.2 Table A-8)

FOR PATHS
Excess Precipitation = 2.12 inches
Volume per square foot = $2.12/12 = 0.1767$ cubic foot per square foot

The underlined value was then multiplied by the basin area to calculate the runoff from that basin. An example is shown below.

Basin 4 (an exhibit) has area = 8936 square feet
Runoff volume = $8936 \times 0.1024 = 915$ cubic feet

EROSION CONTROL

Due to the site being a closed basin, there is no chance of depositing silt offsite. If there is erosion on site, the sediment will be collected in the detention ponds and redistributed when the ponds are periodically cleaned out. The contractor shall conform to all City, County, State and Federal dust control requirements and is responsible for preparing and obtaining all necessary NPDES applications and approvals.

LEGEND

- | | |
|---|----------------|
|  | POND |
|  | BASIN BOUNDARY |
| 14 | BASIN ID |
|  | RETAINING WALL |
|  | SPOT ELEVATION |
|  | FLOW ARROW |

Bohannan-Huston

 Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
 ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS



CITY OF ALBUQUERQUE
PUBLIC WORKS DEPARTMENT
ENGINEERING DEVELOPMENT GROUP

RIO GRANDE ZOO AFRICAN TRAIN & ZOO EXHIBIT DRAINAGE BASIN PLAN

Design Review Committee	City Engineer Approval	Least Design Update	Mo./Day/Yr.	Mo./Day/Yr.
City Project No.		Zone Map No. K-13	Sheet 2	Of 2

AS-BUILT INFORMATION	
CONTRACTOR	DATE
WORK STAKED BY	DATE
INSPECTOR'S ACCEPTANCE BY	DATE
REVISIONS BY	DATE
DRAWINGS CORRECTED BY	DATE
MICRO-FILM INFORMATION	
RECORDED BY	DATE
NO.	

[illegible][illegible][illegible]

No.		Date	REMARKS	By
DESIGN				
Designed By: H.W.F.			DATE: 11/13/00	
Drawn By: S.F.G.			DATE: 11/13/00	
Checked By: L.W.F.			DATE: 11/13/00	