HYDROLOGY K22/D3 APACHE ELEMENTARY SCHOOL

K22/D3

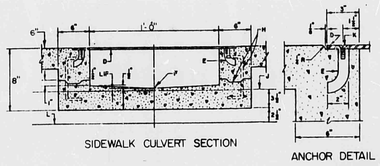
APACHE ELEMTARY SCHOOL

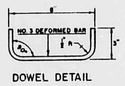
2 PLANS

PROJECT BENCHMARK:
ACS BM 14-K22 ELEVATION: 5637.90 FEET (M.S.L.D.)
TBM:
AS SHOWN. ELEVATION: 5679.92 FEET (M.S.L.D.)
STREET ADDRESS:
12800 COPPER AVE. NE

CONSTRUCTION NOTES:

1. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 765-1234, FOR LOCATION OF EXISTING UTILITIES.
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL POTENTIAL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
3. ALL WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS, RULES AND REGULATIONS CONCERNING CONSTRUCTION SAFETY AND HEALTH.
4. ALL CONSTRUCTION WITHIN PUBLIC RIGHT-OF-WAY SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE CITY OF ALBUQUERQUE STANDARDS AND PROCEDURES.

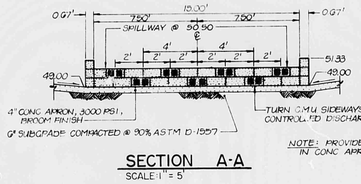




SIDEWALK CULVERT DETAILS

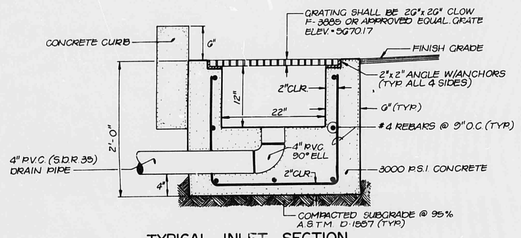
CONSTRUCTION NOTES:

A. JOIN NEAREST SCORE LINE OR WEAKENED PLANE JOINT, PLACE ½" EXPANSION JOINT MATERIAL.
B. SIDEWALK OR SETBACK, (VARIABLE).
C. 3" RADIUS, (TYPICAL).
D. ¼" CHECKERED STEEL PLATE CULVERT TOP
E. ADD ANCHOR 1" x 5".
F. "V" INVERT.
G. SIDEWALK GRADE.
H. DOWEL AND JOINT, (OPTIONAL).
J. GUTTER FLOWLINE ELEV.
K. ¼" x 1" FH. CHUNK STAINLESS STL. MACHINE SCREW
L. BOTTOM OF GUTTER.
M. DRAIN WIDTH, 24" MAX. 12" MIN.
N. SLOPE ¼" PER FT. MIN.

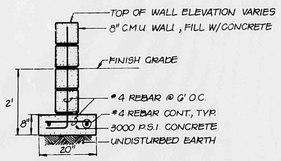


SECTION A-A
SCALE: 1" = 5'

NOTE: PROVIDE ¾" SCORED JOINTS IN CONC. APRON @ 6' O.C.E.W.

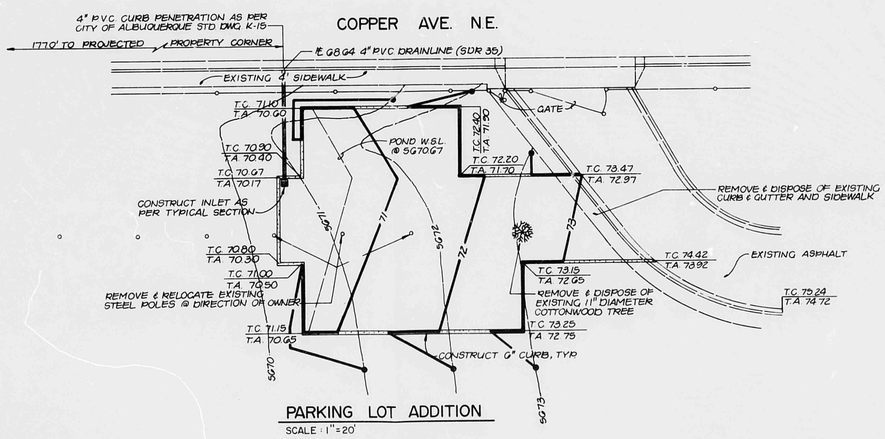


TYPICAL INLET SECTION
SCALE: 1" = 1'

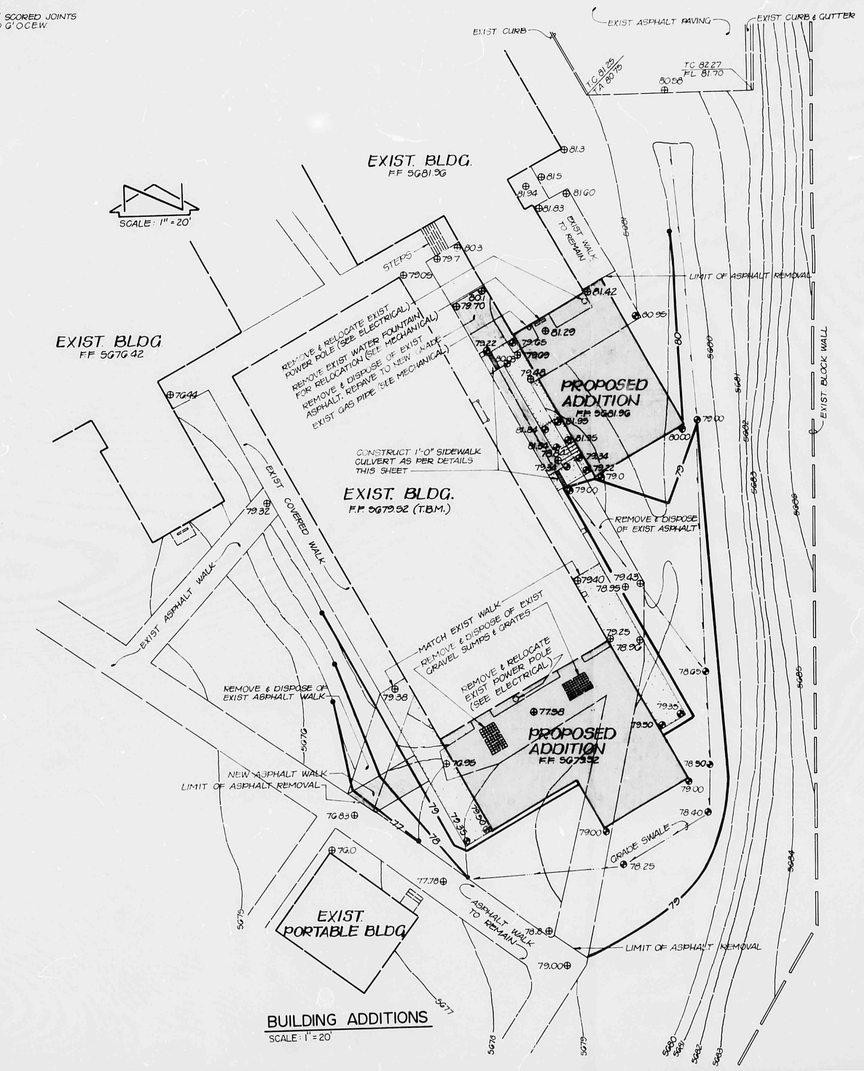


TYPICAL WALL SECTION FOR SEDIMENTATION BASIN
SCALE: 1" = 2'

SCALE: 1" = 20'



PARKING LOT ADDITION
SCALE: 1" = 20'



BUILDING ADDITIONS
SCALE: 1" = 20'

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
THOMAS J. MANN
LAND SURVEYOR

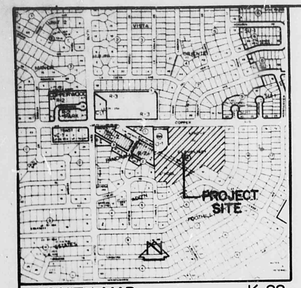
REVISIONS:

JOB: 1-0133
DRW: CCC
CHK: JGM
DATE: 1-84

BLAND & ASSOCIATES
ARCHITECTS / PLANNERS
6500 MONROE NE
SUITE 201
ALBUQUERQUE
NEW MEXICO 87112
(505) 294-1448

GRADING AND DRAINAGE PLAN · APACHE ELEMENTARY SCHOOL

SHEET NO
OF SHEETS



VICINITY MAP
SCALE: 1" = 800'

K-22
DRAINAGE PLAN

The following items concerning the Apache Elementary School Drainage Plan are contained hereon:

1. Vicinity Map
2. Site Grading Plan
3. Calculations

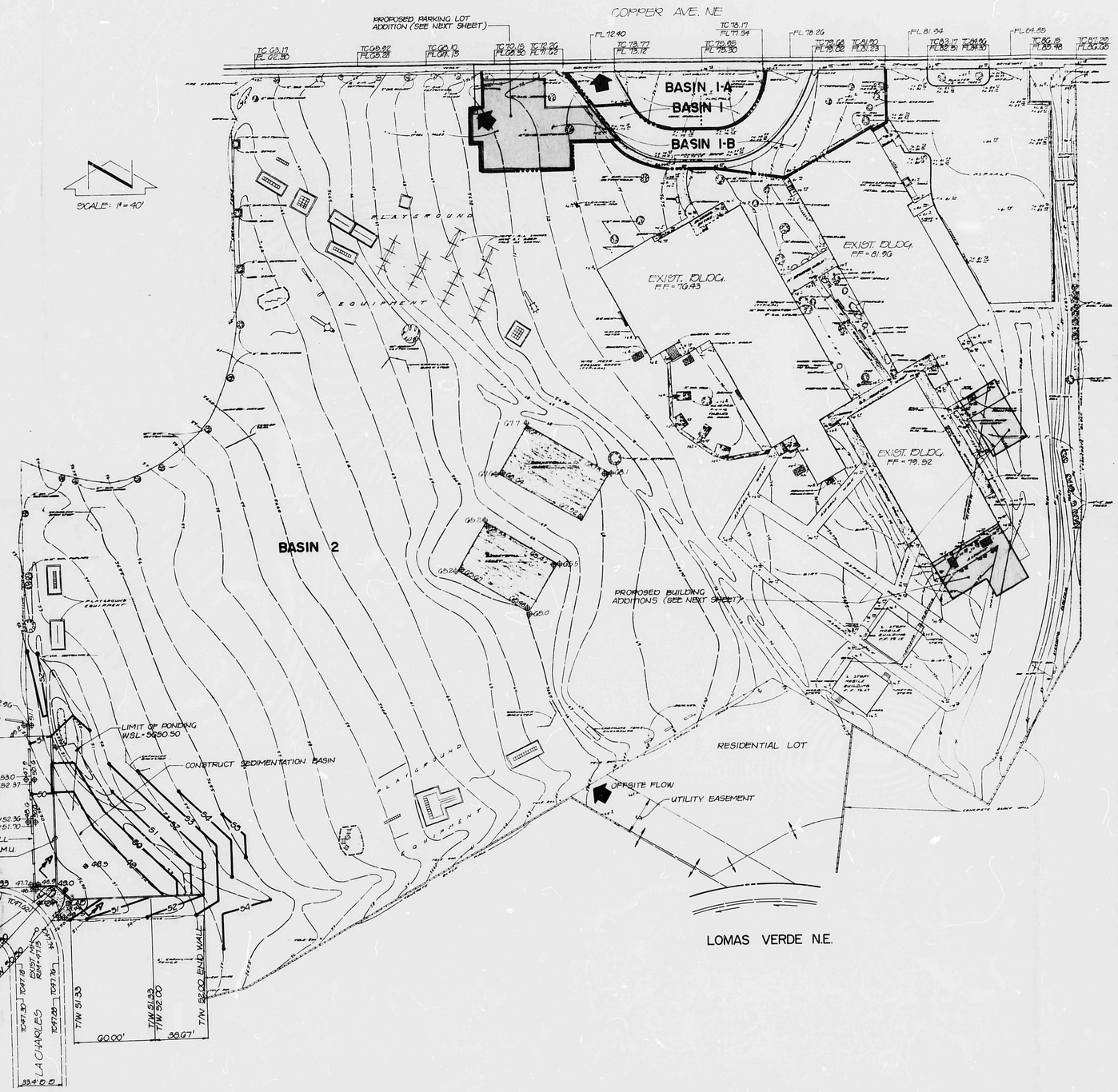
The proposed improvements, as shown by the Vicinity Map, are located on the south side of Copper Avenue N.E. just east of Chelwood Park Boulevard N.E. At present, the site is developed as an elementary school campus. The surrounding area is developed residentially.

As shown by Plate K22 of the Albuquerque Master Drainage Study, the site does not lie within a designated flood hazard zone. This plate does, however, indicate that downstream flooding exists beginning at the northwest corner of the site. It is based upon this that it is stated that offsite flows do not enter the site from Copper Avenue. Much of the east and south property lines are defined by an existing concrete block wall which prohibits offsite flows from those areas from entering the site. There is, however, a relatively short distance along the south property line that does not have a concrete block wall but rather a chain link fence. An offsite flow is contributed from this area as shown on the adjacent plan. As shown by the calculations, the contribution from this small offsite area is negligible. Offsite flows do not enter the site from the west being the downhill side of the site.

Another area of concern with respect to the development of this site is the extreme southwest corner where there is an existing soil erosion problem. In response to complaints from the neighborhood and efforts from the City to understand the existing problem, a sedimentation basin is proposed to control the discharge of sediment from the vast unpaved playground area. The sedimentation basin has been designed to contain the 10-year, 6-hour runoff volume after a rating curve was applied to that hydrograph. The sedimentation basin will still permit pedestrian access to the site from the southwest corner and at the same time control the discharge of runoff from the site in a manner which will be more acceptable to the neighborhood and the City.

The Grading Plan shows 1) existing and proposed grades indicated by spot elevations and contours at 1' 0" intervals, 2) continuity between existing and proposed elevations, 3) the limit and character of the existing improvements, and 4) the limit and character of the proposed improvements. As shown by this plan, the proposed improvements include the construction of two building additions, a parking lot addition, and a sedimentation basin. At present, the majority of the runoff from the site flows from east to west to discharge at the southwest corner of the site as previously mentioned. A small portion of the runoff from the site does discharge to Copper Avenue N.E. This portion of the site has been designated Basin 1 in the existing condition and Basin 1-A and 1-B for the developed condition. The remaining larger portion of the site has been designated Basin 2. The existing pattern of drainage will not be significantly altered by development. A slightly larger contribution of runoff will be discharged to Copper Avenue due to the enlargement of Basin 1 by the construction of the proposed parking lot addition. The total runoff from Basin 2 will remain approximately the same as pre-construction. Construction details and enlarged grading plans for the building and parking lot additions appear on the following sheet.

The Calculations which appear on this sheet analyze both the existing and developed conditions for the 100-year, 6-hour rainfall event. The Rational Method has been used for this analysis in accordance with the City of Albuquerque Development Process Manual, Volume II. The evaluation of pond release rates is based upon the Orifice Equation. The evaluation of pond volumes is based upon the Average End Area Method. Hydrograph construction and analysis is based upon a triangular hydrograph in which the area under the curve is the runoff volume. Supplemental calculations accompany this submittal.



CALCULATIONS

Ground Cover Information

1. From SCS Bernalillo County Soil Survey, Plate 32:
   PTC Embudo-Nijeras Complex
   Hydrologic Soil Group B

2. Existing Condition
   a. Basin 1
      A_{total} = 12,630 sf = 0.29 Ac
      A_{imp} = 3120 sf, % impervious = 25%
      $'C'$ = 0.45 (DPM Plate 22.2C-1)
   b. Basin 2
      A_{total} = 359,800 sf = 8.26 Ac
      A_{imp} = 67,880 sf, % impervious = 19%
      $'C'$ = 0.42 (DPM Plate 22.2C-1)

3. Developed Condition
   a. Basin 1-A
      A_{total} = 4200 sf = 0.10 Ac
      A_{imp} = 970 sf, % impervious = 23%
      $'C'$ = 0.44 (DPM Plate 22.2C-1)
   b. Basin 1-B
      A_{total} = 15,300 sf = 0.35 Ac
      A_{imp} = 7000 sf, % impervious = 46%
      $'C'$ = 0.56 (DPM Plate 22.2C-1)
   c. Basin 2
      A_{total} = 352,930 sf = 8.1 Ac
      A_{imp} = 71,400 sf, % impervious = 20%
      $'C'$ = 0.43 (DPM Plate 22.2C-1)

Rational Method

1. Discharge: $Q = CiA$
   where C varies
   $i = P_6\,(6.84)\,T_c^{-0.51} = 5.28$ in/hr (Basin 1)
   $i = 3.62$ in/hr (Basin 2)
   $P_6 = 2.5$ in (DPM Plate 22.2D-1)
   $T_c = 10$ min (minimum) - Basin 1
   $T_c = 21$ min (overland method) - Basin 2
   A = area, acres

2. Volume: $V = CP_6A(1/12)$
   where C varies, A = area, sf and
   $P_6 = 2.5$ in (DPM Plate 22.2D-1)

Existing Condition

a. Basin 1 (to Copper)
   $Q_{100} = CiA = 0.45\ (5.28)\ (0.29) = 0.7$ cfs
   $V_{100} = CP_6A = 0.45\ (2.5/12)\ (12,630) = 1180$ cf
b. Basin 2 (to Conejo)
   $Q_{100} = 0.42\ (3.62)\ (8.26) = 12.6$ cfs
   $V_{100} = 0.42\ (2.5/12)\ (359,800) = 31,480$ cf

Developed Condition

a. Basin 1-A

   $Q_{100} = CiA = 0.44\ (5.28)\ (0.10) = 0.2$ cfs

   $V_{100} = CP_6A = 0.44\ (2.5/12)\ (4200) = 380$ cf

b. Basin 1-B

   $Q_{100} = CiA = 0.56\ (5.28)\ (0.35) = 1.0$ cfs

   $V_{100} = CP_6A = 0.56\ (2.5/12)\ (15,300) = 1780$ cf

   $Q_{release} = CA\sqrt{2gh} = 0.7$ cfs

   where C = 0.8, A = 0.0873 sf, g = 32.2 ft/sec^2

   and h = 70.67 - 70.17 -1' = 1.5'

   By hydrograph analysis, $V_{required} = 160$ cf

   $V_{pond} = 1/2\ (A_{70.17} + A_{70.67})\ (70.67 - 70.67)$

   $= 1/2\ (0 + 620)\ (0.5) = 155$ cf $= V_{required}$

c. Basin 2

   $Q_{100} = CiA = 0.43\ (3.62)\ (8.1) = 12.6$ cfs

   $V_{100} = CP_6A = 0.43\ (2.5/12)\ (352,930) = 31,620$ cf

   $Q_{10} = F_r\ Q_{100} = 0.657\ (12.6) = 8.3$ cfs

   $V_{10} = F_r = 0.657\ (31,620) = 20,770$ cf

   By hydrograph analysis, $V_{required} = 2100$ cf

   $V_{provided} = 7660$ cf

   $V_{pond} = 1/2\ [(A_{48.5} + A_{49})(49 - 48.5) +$

   $(A_{49} + A_{50})(50 - 49) +$

   $(A_{50} + A_{50.5})(50.5 - 50)]$

   $= 1/2\ [(0 + 3200)(0.5) +$

   $(3200 + 5000)(1) + (5000 + 6050)(0.5)]$

   $V_{pond} = V_{provided} = 7660$ cf $> V_{required}$

Spillway capacity = 25 cfs

$Q = CLH^{3/2} = 25$ cfs $> Q_{100}$

where C = 3, L = 15', H = 0.67'

Comparison

a. Basin 1
   $\Delta Q_{100} = 0.7 - (0.2 + 0.7) = 0.2$ cfs (increase)
   $\Delta V_{100} = 1180 - (380 + 1780) = 980$ cf (increase)
b. Basin 2
   $\Delta Q_{100} = 12.6 - 12.6 = 0$ cfs (no change)
   $\Delta V_{100} = 31,480 - 31,620 = 140$ cf (increase)

Offsite Flows

A = 17,000 sf = 0.4 Ac
C = 0.45 (assumed)
i = 5.28 in/hr
$Q_{100} = CiA = 0.45\ (5.28)\ (0.4) = 1$ cfs
$V_{100} = CP_6A = 0.45\ (2.5/12)\ (17,000) = 1600$ cf

APPROVED FOR DRAINAGE
2/20/84
DATE
Billy J. Goolsby
SIGNATURE
ADVISE DRAINAGE INSPECTOR WHEN GRADING EXECUTED

REGISTERED PROFESSIONAL ENGINEER
STATE OF NEW MEXICO
THOMAS T. MANN, JR.
3792

REVISIONS:

JOB: 1-0133
DRW: TMA
CHK: JGM
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BLAND & ASSOCIATES
ARCHITECTS / PLANNERS

GRADING AND DRAINAGE PLAN · APACHE ELEMENTARY SCHOOL

SHEET NO
OF SHEETS