

DRAINAGE CALCULATIONS
FOR
PARKING LOT
FOR
U.S. POSTAL ENCODING FACILITY
WICHITA, KANSAS

MARCH 11, 1994

Westudy Addition

PREPARED BY:
CERTIFIED ENGINEERING DESIGN
1330 E. FIRST, #113
WICHITA, KANSAS 67214

M E M O

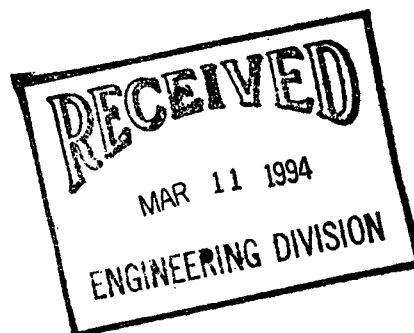
DATE: March 11, 1994

TO: Engineering Division
Department of Public Works
City Hall, 7th floor
455 North Main
Wichita, KS 67202

ATTN: Ms. Vicki Huang, P.E.

ENCL: Drainage Computations for Parking Lot
U.S. Post Office Encoding Facility
Wichita, Kansas

FROM: Harlan D. Foraker, P.E. ^{HDF}
Certified Engineering Design



PROJECT: PARKING LOT GRADING PLAN

DATE 2-8-94

LOCATION: WESTMAN POST OFFICE

BY HOF CKD

CLIENT: RUFFIN COMPANIES

JOB NO. _____ SHEET NO. _____ OF _____

COMPUTE DRAINAGE RUNOFF

ENTIRE DRAINAGE AREA = 4.9 ACRES, HOWEVER ONLY AN
AREA = 3.27 ACRES WHICH WILL CONTRIBUTE RUNOFF TO POND

$T_c = 15$ minutes $i_5 = 5.21"/hr$
 $i_{100} = 8.98"/hr$

$C_p = 0.87$

$C_{100} = 0.89$

PEAK DISCHARGE

$$Q_5 = 0.87(5.21)(3.27) = 14.8 \text{ cfs}$$

$$Q_{100} = 0.89(8.98)(3.27) = 26.1 \text{ cfs}$$

$$Q_1 = 0.87(3.04)(3.27) = 8.65 \text{ cfs}$$

$$Q_2 = 0.87(4.06)(3.27) = 11.6 \text{ cfs}$$

VOLUME OF RUNOFF

FROM WORKSHEET #2

$$Q_5 = 4.27''$$

$$Q_{100} = 7.6''$$

TOTAL VOLUME

$$Q_5 = \frac{4.27''}{12} (3.27 \text{ acres}) = 1.16 \text{ ACRES-FT} = 50,530 \text{ ft}^3$$

$$Q_{100} = \frac{7.6''}{12} (3.27 \text{ acres}) = 2.07 \text{ ACRES-FT} = 90,213 \text{ cu. ft.}$$

SIZE RETENTION POND

TRY

$$\text{AREA} = 100' \times 200' = 20,000 \text{ ft}^2$$

$$\text{DEPTH REQ'D} = \frac{90,213 \text{ cu. ft.}}{20,000} = \underline{\underline{4.5 \text{ FT.}}} \quad \text{NO GOOD}$$

TRY $50' \times 500' = 25,000 \text{ ft}^2$

$$\text{AREA @ 5' DEPTH} = 0' = (50)(500) = 25,000 \text{ ft}^2$$

$$\text{DEPTH REQ'D} = \frac{90,213}{25,000} = 3.6'$$

$$\text{AREA @ 5' DEPTH} = 4' = (75)(524) = 38,776 \text{ ft}^2$$

$$\text{STORAGE VOL.} = \frac{(25,000 + 38,776)}{2} (9') = 102,552 \text{ ft}^3$$

ACTUAL STORAGE VOL. REQ'D. = 90,213 ft³ < 102,552 ft³ OK

Worksheet 2: Runoff curve number and runoff

Project Parking Lot By HOF Date _____
 Location Westway Post Office Checked _____ Date _____
 Circle one: Present Developed

1. Runoff curve number (CN)

Soil name and hydrologic group <small>(appendix A)</small>	Cover description <small>(cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)</small>	CN ^{1/}			Area <input type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Fig. 2-3	Fig. 2-4		
1/ Use only one CN source per line.		Totals =				

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ Use CN =

2. VOLUME
Runoff $CN = 98 \quad S = \frac{1000}{98} - 10 = 0.204$

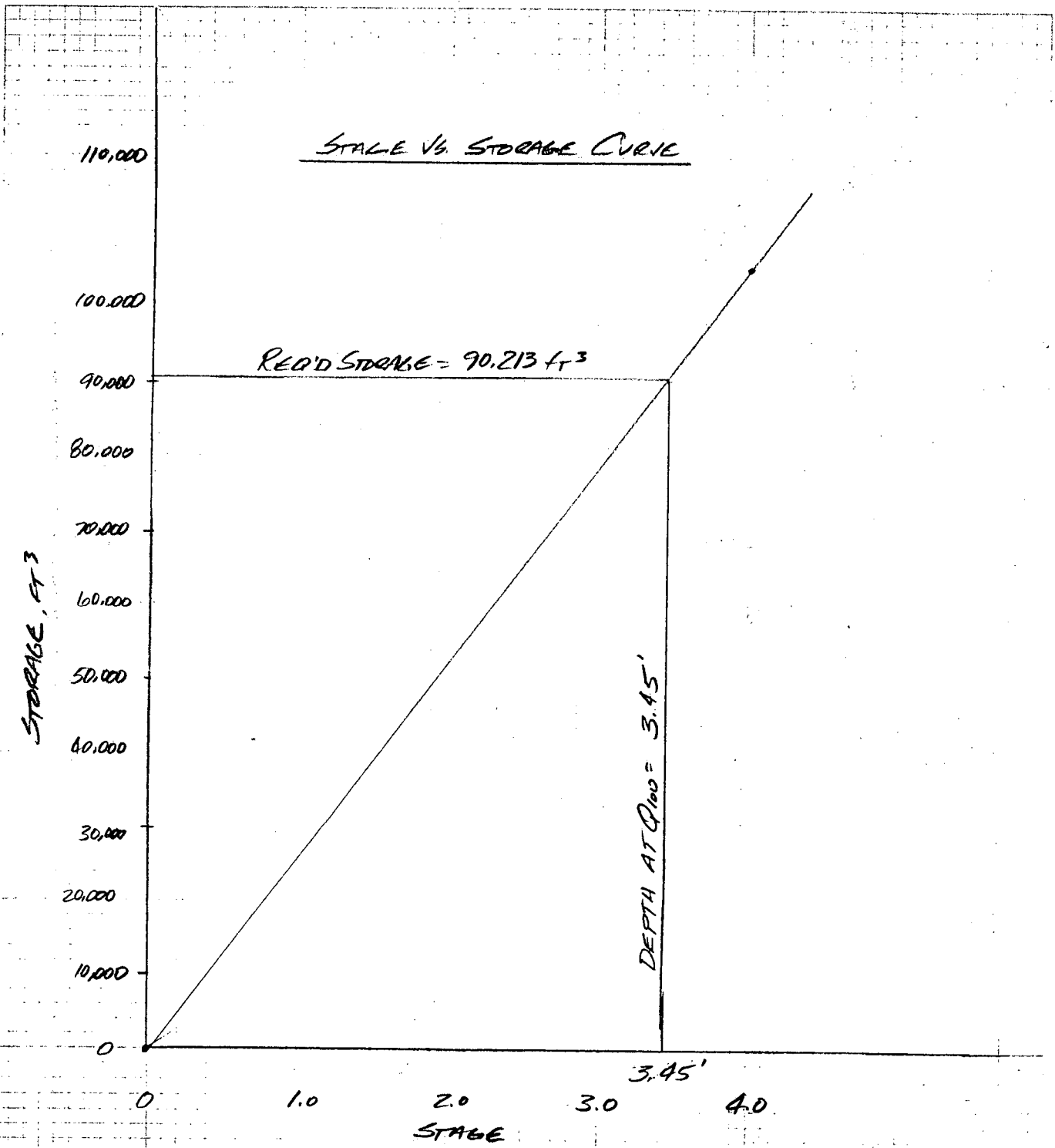
Frequency yr
 Rainfall, P (24-hour) in
 Runoff, Q in
(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3
5	100	
4.5	7.8	
4.27"	7.6"	

$$Q = \frac{(P - 0.25)^2}{P + 0.05} ; \quad Q_5 = \frac{(4.5 - 0.2(0.2))}{4.5 + 0.8(0.2)} = 4.27 \quad Q_{100} = \frac{(7.8 - 0.2(0.2))^2}{(7.8 + 0.8(0.2))} = 7.6"$$

PROJECT: PARKING LOT GRADING PLAN
 LOCATION: WESTWAY POST OFFICE
 CLIENT: RUFFIN COMPANY

DATE: 2-9-94
 BY: HOF CKD
 JOB NO. _____ SHEET NO. _____ OF _____



SIZE WEIR INTO POND: $Q = CLH^{3/2}$ FOR $L = 12'-0"$ $Q = 2.3(12)(1.5)^{3/2} = 9.8 CFS$

THIS WEIR WILL ACCOMMODATE BETWEEN THE 1 AND 2 YEAR FLOW.
 ANY LARGER STORMS WILL OVERTOP CURB AND ENTER POND. USE
 WEIR WIDTH = 12'-0"

CONCLUSION

Presently, a storm sewer system of adequate depth or capacity is not available to serve the site for the proposed parking lot of the U.S. Post Office Encoding Facility. Area inlets and a small storm sewer system were installed with the construction of the Westway Shopping Center to capture runoff around the perimeter of the building. The proposed paving adjacent to the existing building will be drained to these existing inlets. However, this storm sewer is not deep enough to drain runoff from the proposed parking lot. The existing topography on this site is very flat and it will be necessary to fill the parking lot area in order to provide a proper surface grade of at least one percent. As a result, a retention pond was designed for 3.3 acres of the parking lot and sized to retain the 100 year, 24 hour runoff of 7.6 inches. The remaining portion of the parking lot will be drained to Elizabeth street.

The proposed retention pond is 4.0 feet deep and will retain the 100 year, 24 hour runoff at a stage of 3.45 feet. Based on preliminary calculations this depth of pond will meet the borrow requirements for the parking area and no offsite material will be required.

Evaporation and percolation will provide the mechanisms by which the runoff stored in the retention pond will be depleted. For this location annual evaporation is 58 inches while annual precipitation is 32 inches. On an annual basis the evaporation and percolation from the pond will exceed the runoff which it collects because of the distribution of the rainfall throughout the year. The purpose of detention or retention storage is to reduce the effects which a high rainfall intensity storm and the resulting large peak runoff will have on storm sewer systems designed for lower intensity storms. Therefore, this retention pond has been designed to capture the 100 year, 24 hour runoff event with a freeboard of 0.5 feet and will eliminate the effects this runoff could have in overtaxing the nearest existing storm sewer system and causing flooding. However, if the pond was not completely empty at the time that the 100 year event occurred the capacity of the pond could be exceeded. If this were to occur the excess runoff would sheet flow out of the southwest corner of the pond, into the east gutter of Elizabeth Street and flow to the nearest storm sewer.

The parking lot and retention pond will be separately fenced with an 8 foot tall chain link fence. In accordance with the C.U.P. a ten foot wide planting strip will be installed and maintained along the west side of the parking lot and retention pond. The owner of this property will be responsible for the maintenance of the parking lot and retention pond.

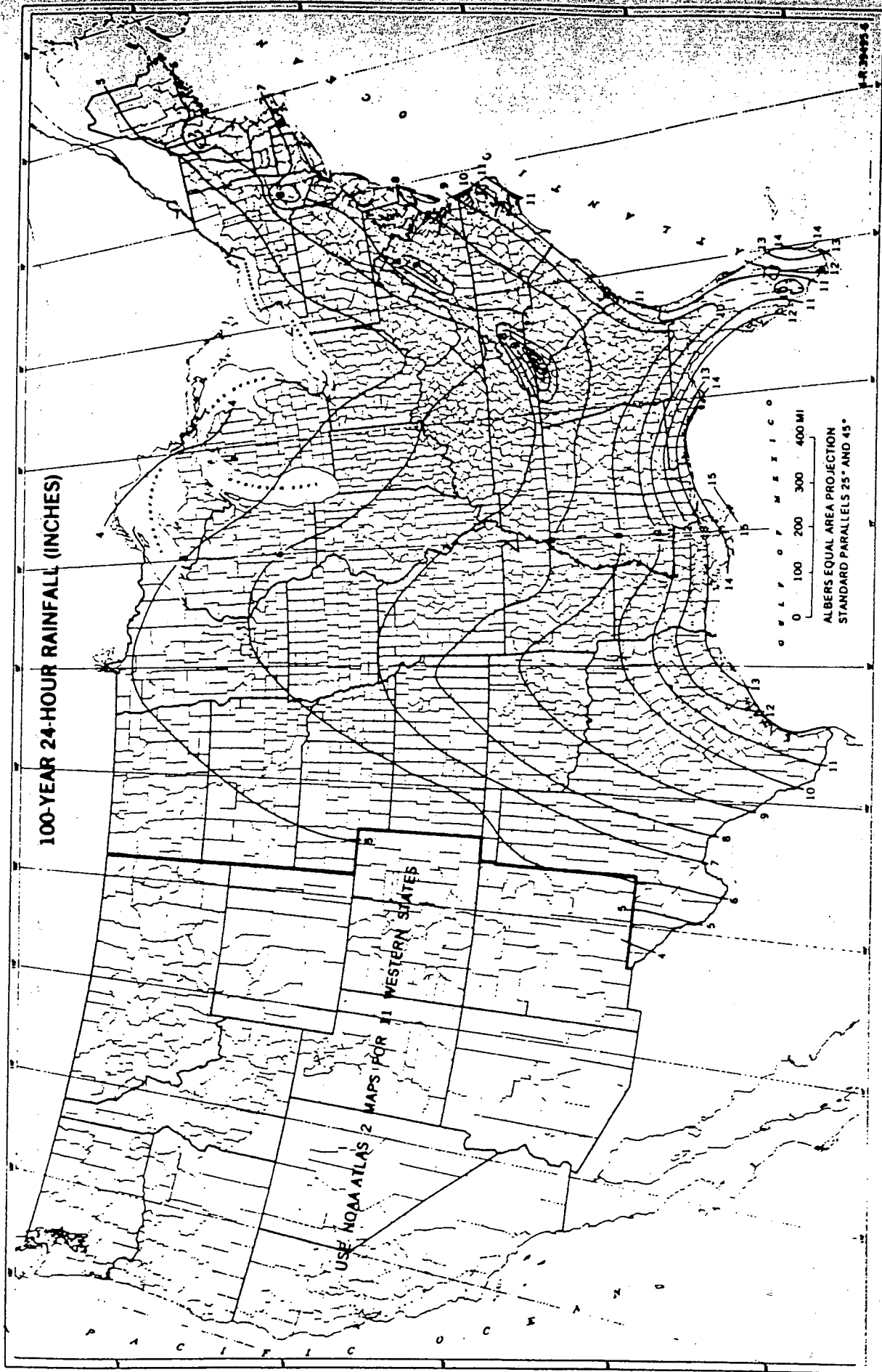
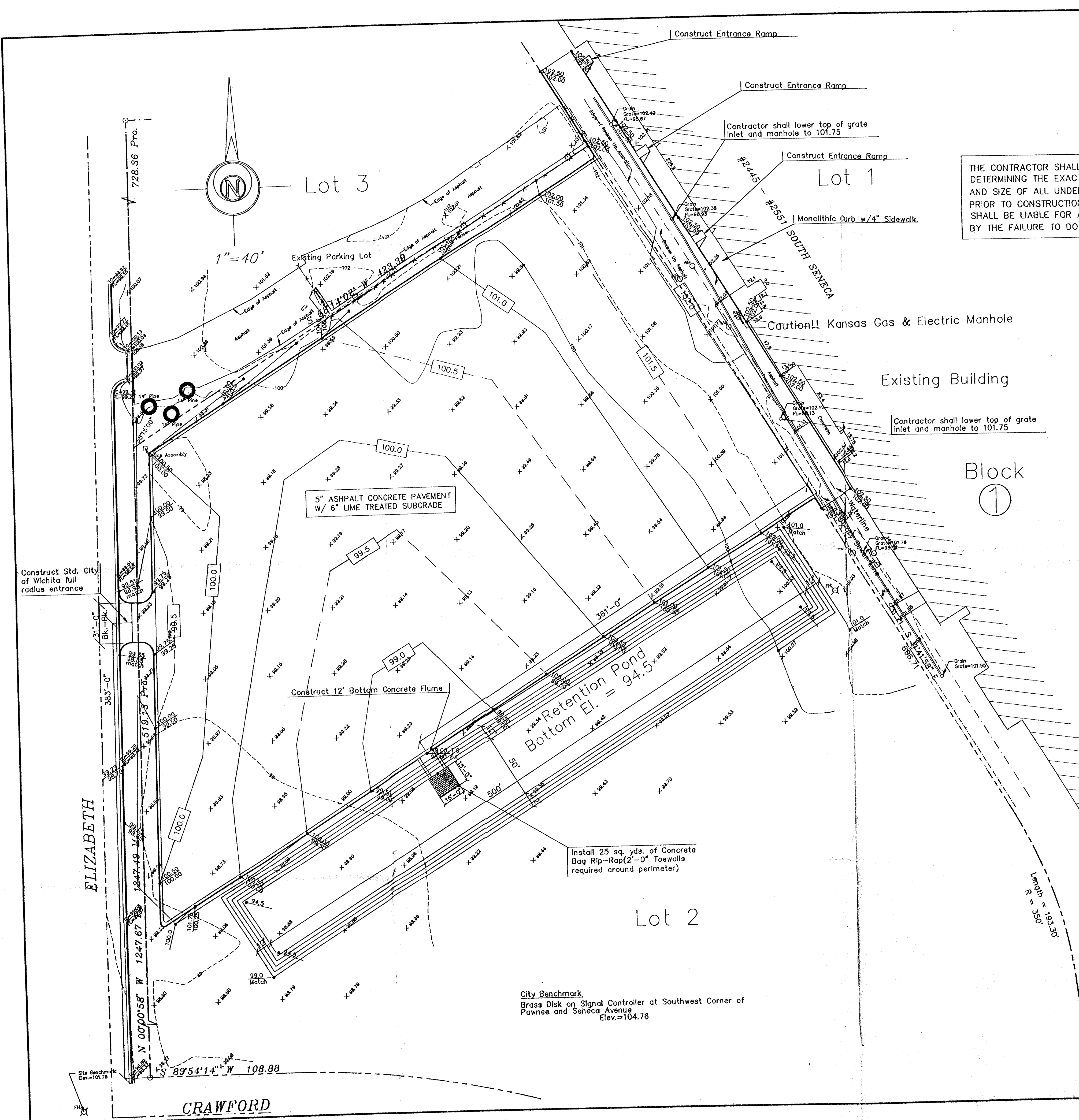
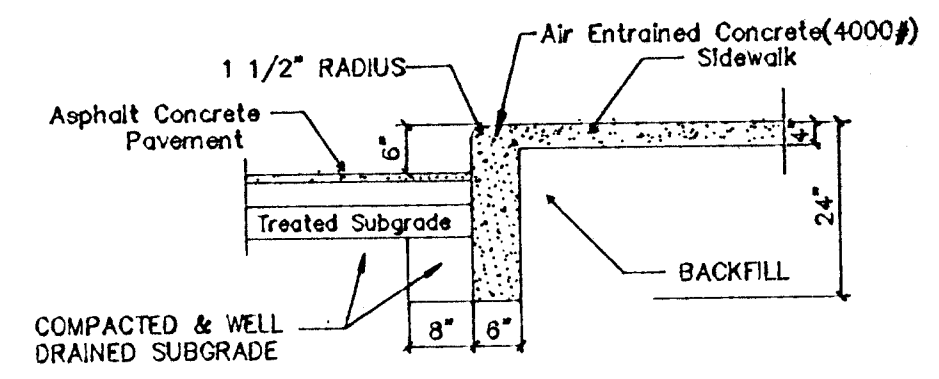


Figure B-8.—One-hundred-year, 24-hour rainfall.

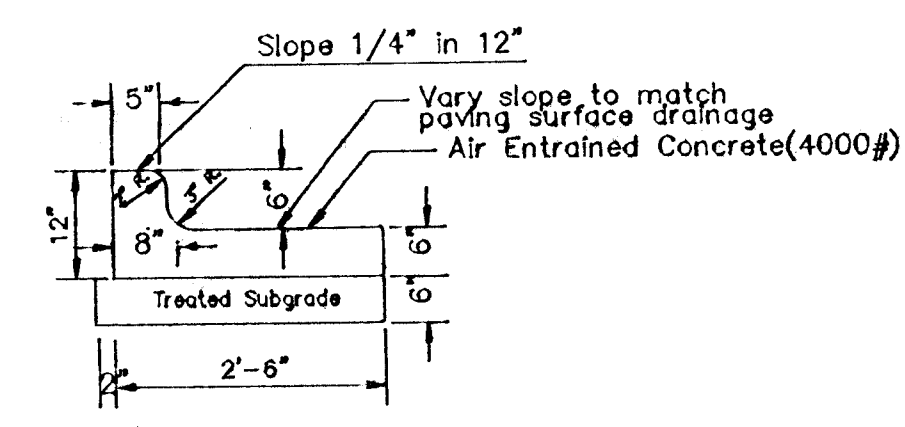


THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION, DEPTH AND SIZE OF ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE CAUSED BY THE FAILURE TO DO SO.



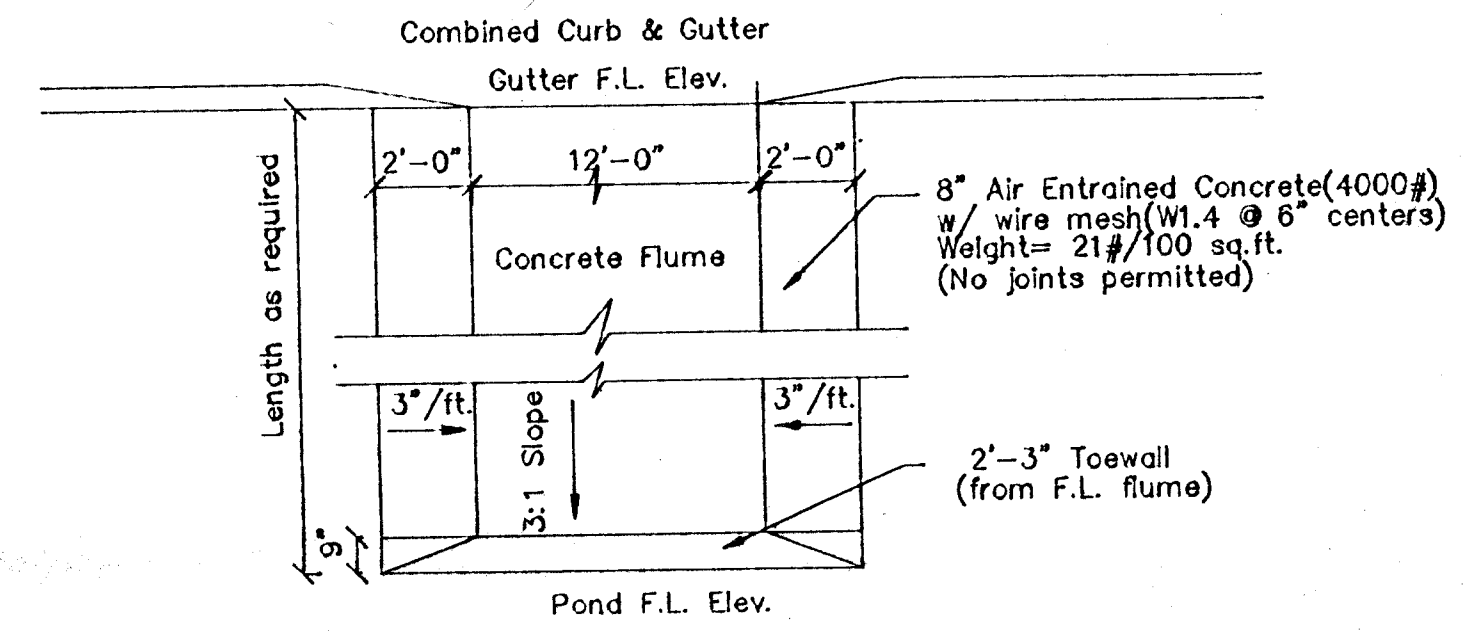
Monolithic Curb w/ Sidewalk

Scale: 1/2" = 1'-0"



Comb. Curb & Gutter

Scale: 1/2" = 1'-0"

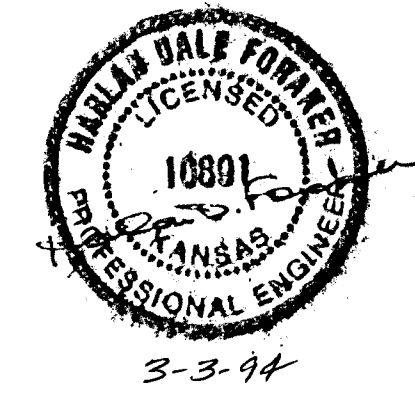


Concrete Flume

Scale: 1/4" = 1'-0"

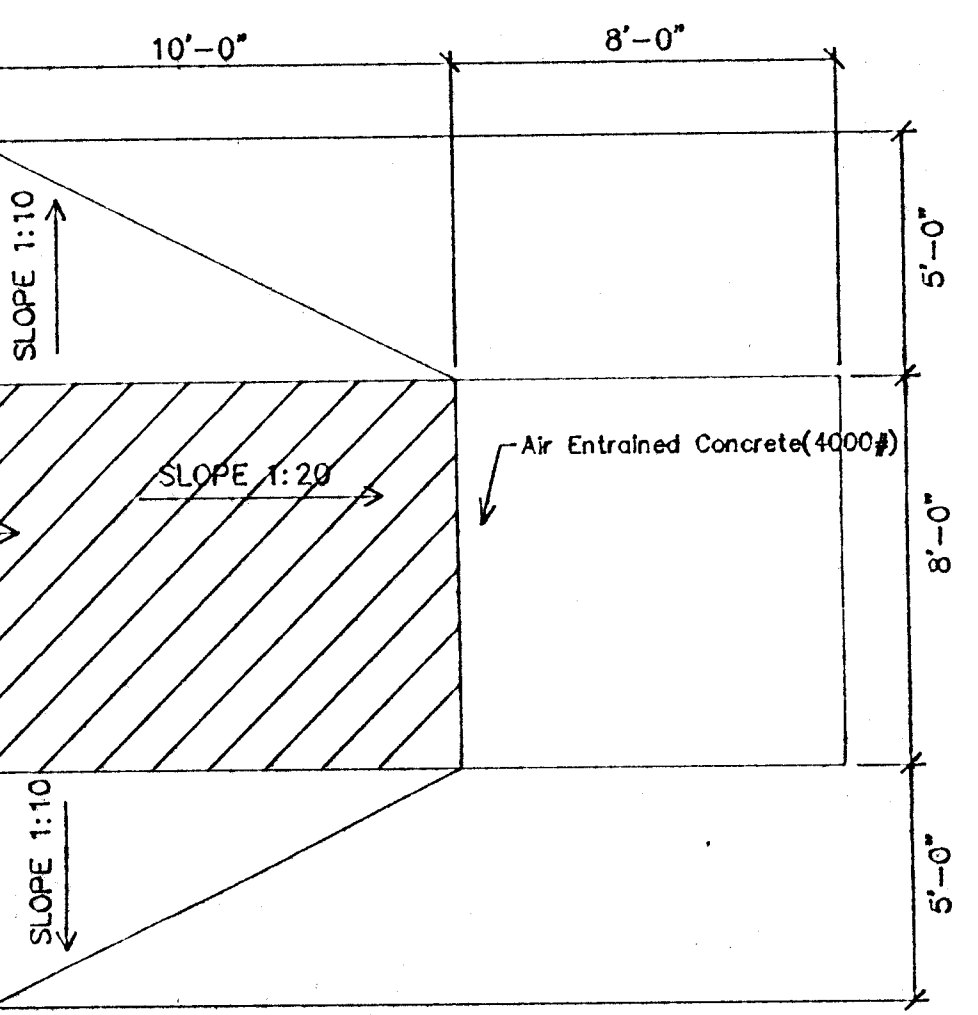
LEGEND

- - Survey Monument Found
- ◊ - Water Meter
- - Water Valve
- ⊕ - Fire Hydrant
- ⊕ - Sanitary Sewer Man Hole
- - Light Pole
- ⊕ - Fence
- ⊕ - Platted
- ⊕ - Prorated
- ⊕ - Measured
- - Property line
- - Utility Easement line
- - Ridgeline
- - Existing Spot Elevation
- - Proposed Spot Elevation
- - Proposed Contour



NOTES:

- Contractor and materials on this project shall conform to City of Wichita Specifications.
- Contractor shall verify existing grades and notify the engineer of any discrepancies.
- Elevations are Based on City Datum.
- Grades shown are finished grades and represent the top of the surface lift of asphalt or other materials.
- Pavement is to be 5" Asphalt Concrete(2" Surface Course w/ 3" Base Course) w/ 6" Lime Treated Subgrade. Alternative pavement thickness and/or types of Subgrade treatment to be determined upon evaluation of soils used in construction of fill by an approved Soils Engineer. Contractor shall strip site of topsoil and stockpile this material to be used in graded areas. All soil placed in fill shall be approved and compacted as recommended by the Soils Engineer.
- Curb in front of building shall be 6" Monolithic Curb. All other curb shall be Combined Curb & Gutter.
- Contractor shall fertilize, seed and mulch all areas disturbed by this construction and which are not shown to be paved.



Building Entrance Ramp

SCALE: 1/4" = 1'-0"

U.S. Post Office Facility		
SITE GRADING PLAN		
Lot 2, Block 1, Westway Addition, Wichita, Kansas		
PROJ. NO.: 94002		
CERTIFIED ENGINEERING DESIGN		
CEd	1930 E. FIRST, # 119 WICHITA, KANSAS 67214 (319) 262-8908	
	DESIGNED: HDF	SCALE: 1" = 40'
DRAWN: HDF	DATE: 2-94	SHEET 2
CHECKED: HDF	CEd FILE: CED-94002	TOTAL 2