# HYDROLOGY REPORT

## for

# LEWIS LAKESIDE UNIT FIVE SUBDIVISION

### Reno, Washoe County, Nevada

Prepared by:
CODEGA & FRICKE, INC.
3700 Grant Drive, Suite G
Reno, Nevada 89509



September 1990

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**September 1990**

REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
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No. 7721
9-28-90

ME
10-12-90
AS NOTED

ALL COMMENTS ADDRESSED
IN REVISED REPORT,
DATED OCT. 1990
KRK
CODEGA + FRICKE, INC
10-29-90

# Hydrology Report



## Lewis Lakeside Unit Five

## Introduction

The proposed Lewis Lakeside Unit Five Subdivision (Assessor's Parcel Number: a portion of 040-081-06) is located in the northwest 1/4 of Section 36, T. 19 N., R. 19 E., in Reno, Nevada. (See Figure 1.) The subdivision is bordered on the north by Lewis Lakeside Unit One, on the east by Lewis Lakeside Unit Three on the south by Wheatland Road, and on the west by Lakeside Drive.

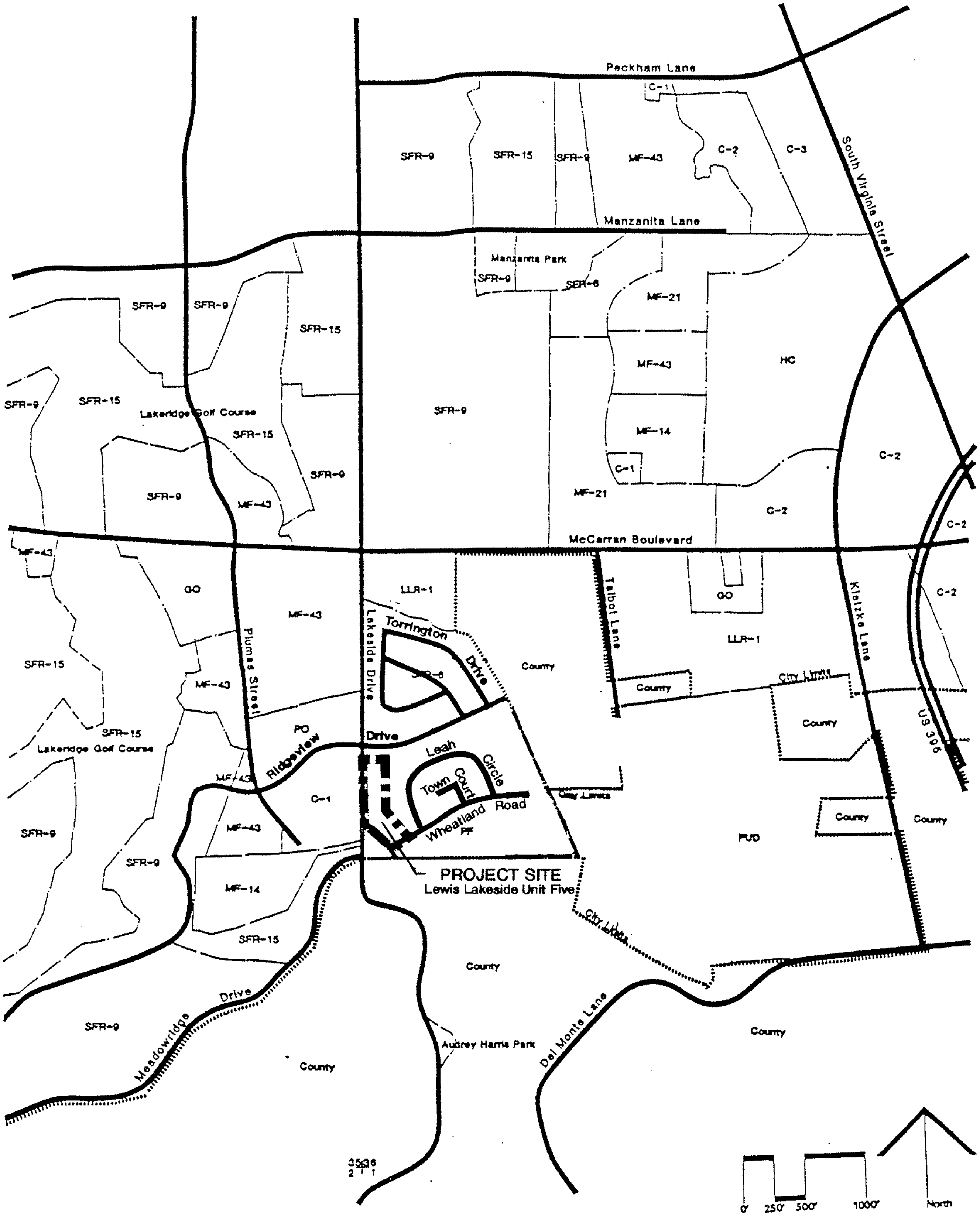
The topography of the site consists of gently sloping alluvium. The site drains to the northeast and contains no major or minor drainageways. Ground cover consists of native grasses and sagebrush.

Runoff from the site travels in a northeasterly direction, where historically, it was intercepted by Lake Ditch and taken away from the site. Runoff from Lewis Lakeside Unit Five is now intercepted by the storm drain systems installed in the earlier phases of the Lewis Lakeside Development and directed to Evans Creek. (These storm drain systems were designed to include flows from Lewis Lakeside Unit Five.) Evans Creek will affect the site only in the event of a large storm, such as the "100-year storm".

Presently, stormwater runoff is by sheet flow. Some channelization occurs on the site to direct runoff away from Lewis Lakeside Unit Three. According to FEMA's Flood Insurance Rate Maps, dated January 5, 1984, the site is located in an AO zone. This indicates one foot of flooding with velocities ranging from ~~3 to~~ 4 fps for a given 24-hour duration, 100-year return period storm. This will be considered further in the discussion on historic drainage systems.

New Maps were prepared, dated April 16, 1990, please ref. these - SEE REVISED REPORT

Proposed development consists of 24 single family residences on approximately 4.48 acres. Access is via Wheatland Road or Ridgeview Drive. With development, runoff will be collected and directed to the existing storm drain systems in Wheatland Road and Ridgeview Drive.




Location Map

**FIGURE 1**

Previous reports and studies include the following:

1. "Hydrology Report for Lewis Lakeside Subdivision", CODEGA & FRICKE, INC.; December 1987
2. "Flood Hazard Analysis", G.C. Wallace, Inc.; September, 1988
3. "Hydrology Report for Lewis Lakeside Subdivision Unit Two", CODEGA & FRICKE, INC.; October 1988
4. "Hydrology Report for Lewis Lakeside Subdivision Unit Three", CODEGA & FRICKE, INC.; October 1989
5. "Hydrology Report for Lewis Lakeside South and Lewis Lakeside Unit Four Subdivision", CODEGA & FRICKE, INC.; July 1989

## Historic Drainage System

The site has no on-site drainage features, but is affected by Evans Creek in the event of a "100-year storm". As can be seen in Figure 2, the site tends to drain as a unit to the north-east.

Under pre-development conditions, runoff from the site is intercepted by the Lake Ditch and carried to the south. Evans Creek, to the south, remains completely contained within its own banks in the event of a 5-year storm, but will overtop its banks in a 100-year storm. In this situation, the proposed subdivisions will lie in the flood plain of Evans Creek. A portion of the 100-year flow will return to the Evans Creek channel, while the remainder will ultimately find its way to the Cochran Ditch near South Virginia Street. (For a detailed study on this subject, see "Flood Hazard Analysis" prepared by G. C. Wallace, Inc., dated September 23, 1988.)

No visible erosion exists on the site.

Using the rational method, the following flows were calculated for the Lewis Lakeside Unit Five Subdivision site:

# FLOW PATTERNS – UNDEVELOPED CONDITIONS

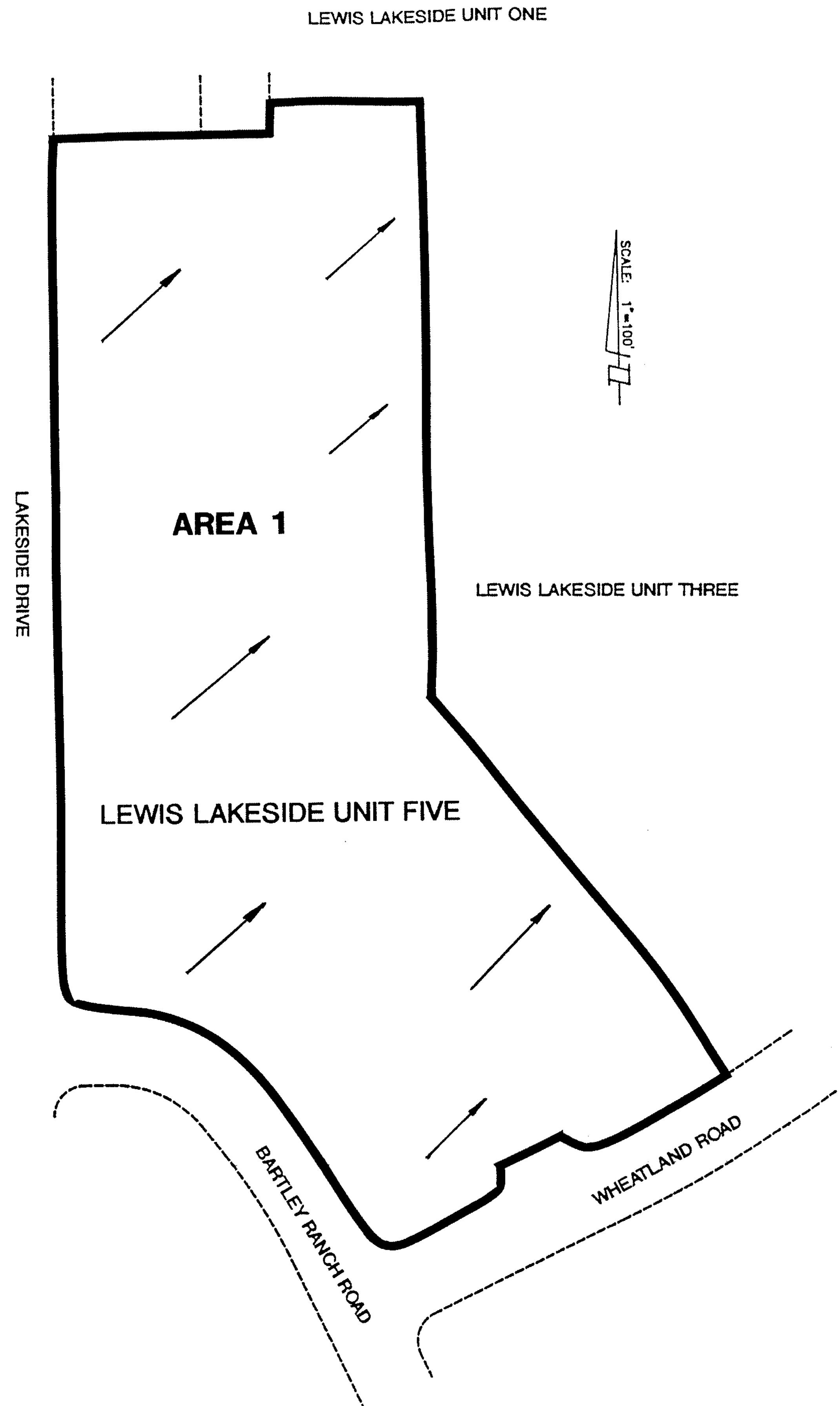



**FIGURE 2**

**Table 1**
**Pre-development Conditions - Peak Flows**

| | Area | Flows To | $Q_5$, cfs | $Q_{100}$, cfs |
|---|---|---|---|---|
| Lewis Lakeside Unit Five | 1 | Lake Ditch | 1.88 | 5.11 |

The above flows are generated on-site, and do not take into account the possibility of Evans Creek overtopping Lakeside Drive during a 100-year storm. See "Flood Hazard Analysis" by G.C. Wallace, Inc. for the 100-year flows generated by Evans Creek.

## Proposed Drainage System

The storm drain system for the Lewis Lakeside Unit Five Subdivision will consist of concrete swales, yard drains and catch basins tied into storm drain lines that will remove storm runoff from the site. The proposed storm drain system for Unit Five will be connected to the existing storm drain in Ridgeview Drive to the north and the existing storm drain in Wheatland Road to the south. The existing storm drains in Ridgeview Drive and Wheatland Road drain to an existing storm drain line in Torrington Drive, which currently empties into Evans Creek via an earth channel. (The earth channel will be replaced by a storm drain line as part of the Lewis Lakeside South improvements.) Thus, all flows generated on-site will be discharged into Evans Creek.

The existing storm drain lines in Wheatland Road and Ridgeview and Torrington Drives were installed in conjunction with earlier Lakeside Units and Huffaker Elementary School. All existing and proposed storm drain lines downstream of Unit Five were designed to include the flows from Unit Five.

Flows reaching the catch basins and yard drains are listed in the Catch Basin Flow Summary in this report. See Figure 3 and the Drainage Plan for a description of the catch basins and their respective contributing areas.

The following flows will be discharged into the existing Lewis Lakeside storm drainage system and routed to Evans Creek.

**Table 2**
**Post-Development Conditions - Peak Flow Generated On-Site**

| | Area | Flows To | $Q_5$, cfs | $Q_{100}$, cfs |
|---|---|---|---|---|
| Lewis Lakeside Unit Five | 1-3 | Ridgeview Drive SD | 1.74 | 4.64 |
| | 4,5&7 | Wheatland Road SD | 1.11 | 2.98 |
| | 6 | Wheatland Road SD | 0.43 | 1.18 |
| | 8 | Wheatland Road SD | 0.57 | 1.56 |
| Total | | | 3.85 | 10.36 |

# FLOW PATTERNS – DEVELOPED CONDITIONS

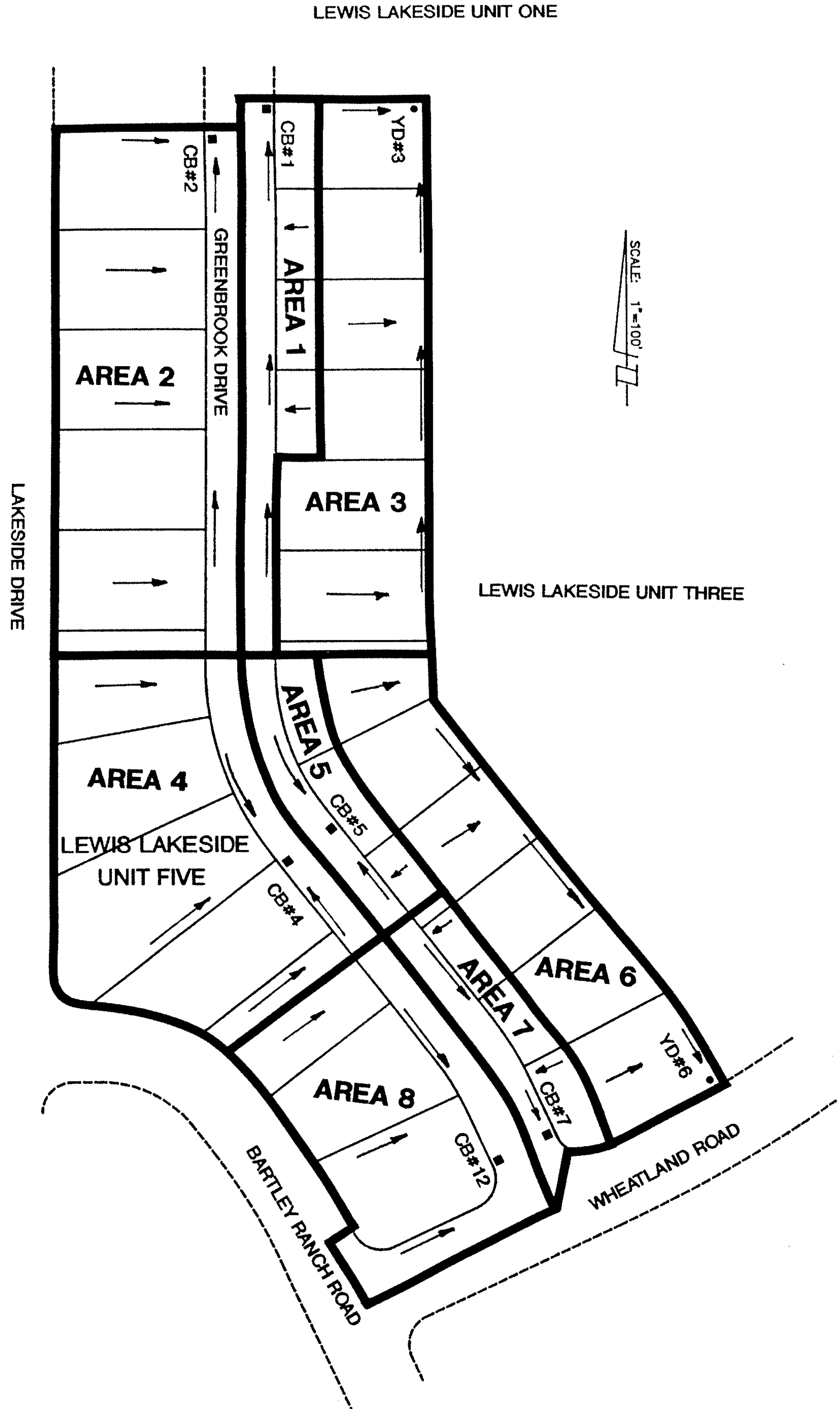



FIGURE 3

The above flows are generated on-site. The runoff from Evans Creek overtopping Lakeside Drive in the 100-year storm is routed around the site via Ridgeview Drive, Lakeside Drive and the Huffaker Elementary School site. The 100-year flow flowing down Lakeside Drive to Ridgeview Drive will not flow east into Lewis Lakeside Unit Five. The 100-year flow will be contained in Lakeside Drive by the existing concrete wall at the base of the fence located on the east side of Lakeside Drive. See Flood Hazard Analysis prepared by G.C. Wallace, dated September 1988, for a more detailed review.

These flows cannot be appropriately compared to those on the undeveloped site as undeveloped flows go unchecked into Lake Ditch, and the majority of runoff from the developed site is directed to Evans Creek. However, development of the Lewis Lakeside Subdivisions results in a decrease in flow to Lake Ditch.

## Conclusion

Site generated flows are small and can adequately be handled by the Lewis Lakeside storm drain system. Off-site flows from the 100-year storm will pass around the site in a manner consistent with the method proposed by G. C. Wallace in their detailed study of the Evans Creek hydrology.

## Appendix
## Sample Calculations
## Rational Method

$Q = i\Sigma CA$

Where:

$Q$ = flow (cfs)

$C$ = runoff coefficient

$i$ = rainfall intensity (in/hr)

$A$ = area (ac)

$t_c$ = 10 min or L/[v (60)]

$t_c$ = concentration time (min)

$L$ = length of flow (ft)

$v$ = velocity of flow (ft/s)

**Assumptions:**

| | |
|---|---|
| Undeveloped Land | $C = 0.30$ |
| Lot Area | $C = 0.55$ |
| Pavement | $C = 0.90$ |

**Undeveloped Conditions**

Area 1

$A$ = 4.48 ac

$C$ = 0.30

$t_c$ = 10 min

$i_5$ = 1.4 in/hr

$i_{100}$ = 3.8 in/hr

$Q_5$ = (1.4 in/hr)(0.30)(4.48 ac) = 1.88 cfs

$Q_{100}$ = (3.8 in/hr)(0.30)(4.88 ac) = ~~5.11~~ cfs

4.48

SEE REVISED REPORT

**Developed Conditions**

Area 1

$A$ = 0.37 ac

$\Sigma CA$ = 0.27

$t_c$ = 10 min

$i_5$ = 1.4 in/hr

$i_{100}$ = 3.8 in/hr

$Q_5$ = (1.4 in/hr)(0.27) = 0.38 cfs

$Q_{100}$ = (3.8 in/hr)(0.27) = 1.03 cfs

# Catch Basin Flow Summary

| Inlet # | Contrib. Area(Ac) | C | Concentr. Time(Min) | 5-Year Intensity | 100 Year Intensity | 5-Year Flow(cfs) | 100-Year Flow(cfs) |
|---|---|---|---|---|---|---|---|
| CB 1 | 0.37 | 0.73 | 10 | 1.4 | 3.8 | 0.38 | 1.03 |
| CB 2 | 1.02 | 0.62 | 10 | 1.4 | 3.8 | 0.88 | 2.39 |
| YD 3 | 0.70 | 0.55 | 10 | 1.4 | 3.8 | 0.55 | 1.48 |
| CB 4 | 0.84 | 0.60 | 10 | 1.4 | 3.8 | 0.70 | 1.90 |
| CB 5 | 0.22 | 0.73 | 10 | 1.4 | 3.8 | 0.22 | 0.61 |
| YD 6 | 0.56 | 0.55 | 10 | 1.4 | 3.8 | 0.43 | 1.18 |
| CB 7 | 0.28 | 0.68 | 10 | 1.4 | 3.8 | 0.27 | 0.72 |
| Existing CB 12 | 0.61 | 0.67 | 10 | 1.4 | 3.8 | 0.57 | 1.56 |

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JOB 1025.30

CALCULATED BY KRK DATE 9-18-90
CHECKED BY ______ DATE ______
SCALE LEWIS LAKESIDE UNIT FIVE

# HYDROLOGY CALCULATIONS

## ASSUMPTIONS

1. 5-YR STORM FLOWS ARE CONTAINED WITHIN BANKS OF EVANS CREEK ∴ NO OFF-SITE 5-YR FLOWS.

2. PRE-DEVELOPMENT RUNOFF (HISTORIC DRAINAGE SYSTEM) FROM LEWIS LAKESIDE UNIT FIVE FLOWS TO LAKE DITCH.

3. RUNOFF FROM THE DEVELOPED SITE WILL BE ROUTED TO THE EXISTING STORM DRAIN SYSTEM.

4. COMPUTE FLOWS BY RATIONAL METHOD:

$Q = i \Sigma CA$

WHERE: $Q$ = FLOW (cfs)
$i$ = RAINFALL INTENSITY (in/hr)
$C$ = RUNOFF COEFFICIENT
$A$ = AREA (ac)

TIME OF CONCENTRATION, $t_c = 10$ MIN (MINIMUM) OR $\frac{L}{V(60)}$

WHERE: $L$ = LONGEST FLOW PATH (ft)
$V$ = FLOW VELOCITY (fps)

| SURFACE | C, RUNOFF COEFFICIENT |
|---|---|
| UNDEVELOPED LAND (0-5%) | 0.30 |
| SINGLE FAMILY LOT | 0.55 |
| PAVEMENT | 0.90 |

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PRE-DEVELOPMENT CONDITIONS

LEWIS LAKESIDE UNIT FIVE DRAINS AS A UNIT.

AREA 1 = 4.48 ac.

UNDEVELOPED LAND, C = 0.30

CALCULATE TIME OF CONCENTRATION

L = 320'
$\Delta$ ELEV = 4607 − 4593 = 14'
SLOPE, $S = \frac{14'}{320'} = 0.044$
V = 2.0 fps, NEARLY BARE GROUND

$$t_c = \frac{320'}{(2.0\,fps)(60\,sec/min)} = 2.7\text{ MIN.}$$

USE: $t_c$ = 10 MIN
$i_5$ = 1.4 in/hr
$i_{100}$ = 3.8 in/hr.

CALCULATE $Q_5$ & $Q_{100}$

$Q_5 = (1.4\ in/hr)(0.30)(4.48\ ac) = 1.88\ cfs$

$Q_{100} = (3.8\ in/hr)(0.30)(4.48\ ac) = 5.11\ cfs$

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## POST-DEVELOPMENT CONDITIONS

CALCULATE $\Sigma CA$

| DRAIN AREA | ACRES (TOTAL) | Pavement Ac. | Pavement C | Pavement CA | Lot Ac. | Lot C | Lot CA | $\Sigma CA$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.37 | 0.20 | 0.90 | 0.18 | 0.17 | 0.55 | 0.09 | 0.27 |
| 2 | 1.02 | 0.19 | 0.90 | 0.17 | 0.83 | 0.55 | 0.46 | 0.63 |
| 3 | 0.70 | — | — | — | 0.70 | 0.55 | 0.39 | 0.39 |
| 4 | 0.84 | 0.11 | 0.90 | 0.10 | 0.73 | 0.55 | 0.40 | 0.50 |
| 5 | 0.22 | 0.10 | 0.90 | 0.09 | 0.12 | 0.55 | 0.07 | 0.16 |
| 6 | 0.56 | — | — | — | 0.56 | 0.55 | 0.31 | 0.31 |
| 7 | 0.28 | 0.11 | 0.90 | 0.10 | 0.17 | 0.55 | 0.09 | 0.19 |
| 8 | 0.61 | 0.21 | 0.90 | 0.19 | 0.40 | 0.55 | 0.22 | 0.41 |

SEE FIGURE 3 AND DRAINAGE PLAN FOR DRAINAGE AREAS.

CALCULATE TIME OF CONCENTRATION

LENGTHS OF FLOW FOR ALL DRAINAGE AREAS ARE VERY SHORT (< 150' OVERLAND FLOW AND < 500' GUTTER FLOW) SO:

$t_c$ = 10 MIN FOR ALL DRAINAGE AREAS

$i_5 = 1.4$ in/hr
$i_{100} = 3.8$ in/hr

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CALCULATE $Q_5$ & $Q_{100}$

| AREA # | FLOWS TO | AC. | ΣCA | $i_5$ (in/hr) | $i_{100}$ (in/hr) | $Q_5$ (cfs) | $Q_{100}$ (cfs) |
|---|---|---|---|---|---|---|---|
| 1 | CB #1 | 0.37 | 0.27 | 1.4 | 3.8 | 0.38 | 1.03 |
| 2 | CB #2 | 1.02 | 0.63 | 1.4 | 3.8 | 0.88 | 2.39 |
| 3 | YD #3 | 0.70 | 0.39 | 1.4 | 3.8 | 0.55 | 1.48 |
| 4 | CB #4 | 0.84 | 0.50 | 1.4 | 3.8 | 0.70 | 1.90 |
| 5 | CB #5 | 0.22 | 0.16 | 1.4 | 3.8 | 0.22 | 0.61 |
| 6 | YD #6 | 0.56 | 0.31 | 1.4 | 3.8 | 0.43 | 1.18 |
| 7 | CB #7 | 0.28 | 0.19 | 1.4 | 3.8 | 0.27 | 0.72 |
| 8 | EXIST CB #12 | 0.61 | 0.41 | 1.4 | 3.8 | 0.57 | 1.56 |

CHECK $Q_{INTERCEPTED}$ FOR CATCH BASINS

CB#1 - TYPE 4 @ S = 4.25%

| | | HORIZ. SPREAD |
|---|---|---|
| $Q_5 = 0.38$ cfs | $D_5 = 0.14$ | 2.25' |
| $Q_{100} = 1.03$ cfs | $D_{100} = 0.19$ | 4.75' |

D = DEPTH OF FLOW IN STREET, FROM GRAPH PG. 9

$S_T = 0.020$
$S_L = 0.0425$
FROM CHART PG. 12 NEENAH 3067 GRATE
K = 29

$$Q_I = KD^{5/3}$$

@ $D_5$: $Q_I = 29(0.14)^{5/3} = 1.09$ cfs $> Q_5$ - OK
@ $D_{100}$: $Q_I = 29(0.19)^{5/3} = 1.82$ cfs $> Q_{100}$ - OK

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CB #2 - TYPE 4 @ S = 4.25%

| | | HORIZ. SPREAD |
|---|---|---|
| $Q_5 = 0.88$ cfs | $D_5 = 0.18$ | 4.25' |
| $Q_{100} = 2.39$ cfs | $D_{100} = 0.24$ | 7.25' |

$S_T = 0.020$
$S_L = 0.0425$
$K = 29$

@ $D_5$ $Q_I = 29(0.18)^{5/3} = 1.66$ cfs $> Q_5$ - OK
@ $D_{100}$ $Q_I = 29(0.24)^{5/3} = 2.69$ cfs $> Q_{100}$ - OK

CB #4 - TYPE 4 @ SUMP

| | | HORIZ. SPREAD |
|---|---|---|
| $Q_5 = 0.70$ cfs | $D_5 = 0.23$ | 6.75' |
| $Q_{100} = 1.90$ cfs | $D_{100} = 0.30$ | 10.25' |

WEIR FLOW
$P = 2W + L$
$W = 1.48'$ $L = 2.96'$
$P = 2(1.48') + 296 = 5.92$

FROM CHART 11, PG 11
@ $D_5$ $Q_I = 1.8$ cfs $> Q_5$ - OK
@ $D_{100}$ $Q_I = 2.9$ cfs $> Q_{100}$ - OK

CB #5 - TYPE 1 @ SUMP

| | | HORIZ. SPREAD |
|---|---|---|
| $Q_5 = 0.22$ cfs | $D_5 = 0.16$ | 3.25' |
| $Q_{100} = 0.61$ cfs | $D_{100} = 0.22$ | 6.25' |

FROM CHART 12, PG 10
$P = L + 1.8W$
$L = 2.25'$ $W = 1.5'$
$P = 2.25' + 1.8(1.5') = 4.95'$

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@ $D_5$ $Q_I = 0.5$ cfs > $Q_5$ - OK
@ $D_{100}$ $Q_I = 1.1$ cfs > $Q_{100}$ - OK

CB #7 - TYPE 4 @ S = 0.44%

| | | HORIZ SPREAD |
|---|---|---|
| $Q_5 = 0.27$ cfs | $D_5 = 0.17'$ | 3.75' |
| $Q_{100} = 0.72$ cfs | $D_{100} = 0.23'$ | 6.75' |

$S_T = 0.020$
$S_L = 0.0044$
K = 16

@ $D_5$ $Q_I = 16(0.17)^{5/3} = 0.83$ cfs > $Q_5$ - OK
@ $D_{100}$ $Q_I = 16(0.23)^{5/3} = 1.38$ cfs > $Q_{100}$ - OK

EXIST. CB #12 - TYPE 4 @ SUMP

| | | HORIZ. SPREAD |
|---|---|---|
| $Q_5 = 0.57$ | $D_5 = 0.22$ | 6.25' |
| $Q_{100} = 1.56$ | $D_{100} = 0.28$ | 9.25' |

WEIR FLOW
P = 5.92

FROM CHART 11
@ $D_5$ $Q_I = 1.8$ cfs > $Q_5$ - OK
@ $D_{100}$ $Q_I = 2.6$ cfs > $Q_{100}$ - OK

CHECK DEPTH OF FLOW IN STREET, D

| | | HORIZ. SPREAD |
|---|---|---|
| GREENBROOK DRIVE | MAX $D_5 = 0.23$ | 6.75' |
| | MAX $D_{100} = 0.30$ | 10.25' |

FLOW DEPTH OF 0.455' REQUIRED TO CREST ℄. STORM FLOWS ARE CONTAINED IN STREETS

## Storm Drainage Computations

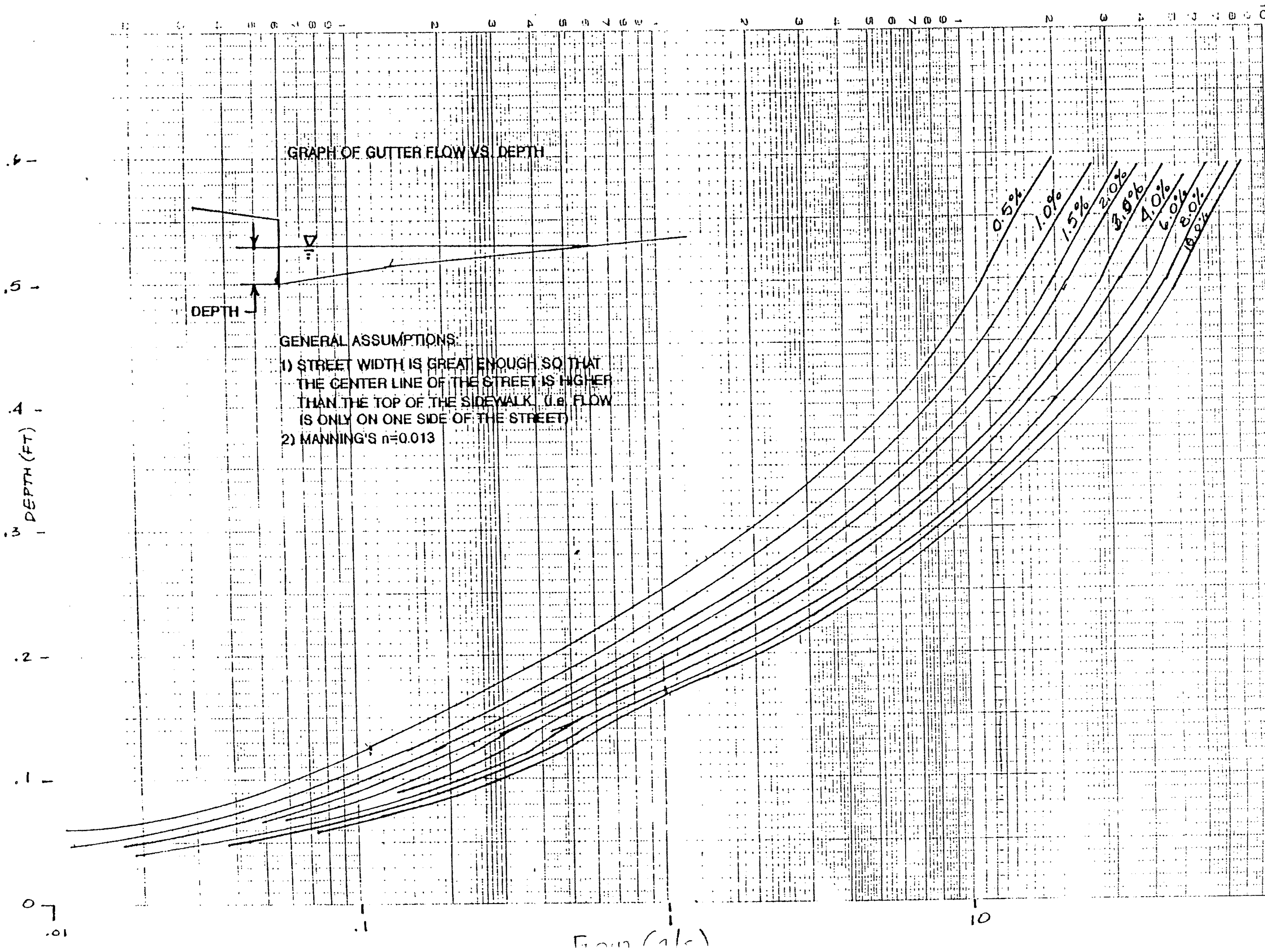
**Project:** Lewis Lakeside Unit Five 1025.30
**Calculated by:** KRK **Date** 9-24-90
**Checked by:** **Date**
**Sheet:** 8 **of** 14

| From Pipe Inlet Location | Flow Line Elev. | To Pipe Outlet Location | Flow Line Elev. | A Acres | C | CA | ΣCA | tc min. | $i_5$ in./hr. | $Q_5$ cfs | $i_{100}$ in./hr. | $Q_{100}$ cfs | Size | n | $Q_{full}$ cfs | S ft./ft. | $V_5$ ft./sec. | Pipe length ft. | Flow line min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YD #3 | 4589.55 | SDMH C-1 | 4588.14 | 0.70 | | 0.39 | 0.39 | 10 | 1.4 | 0.55 | 3.8 | 1.48 | 10" | 0.014 | 2.31 | 0.0129 | 3.5 | 109 | 0.5 |
| CB #1 | 4589.10 | SDMH C-1 | 4588.86 | 0.37 | | 0.27 | 0.27 | 10 | 1.4 | 0.38 | 3.8 | 1.03 | 10" | 0.014 | 3.52 | 0.030 | 4.2 | 8 | 0.03 |
| CB #2 | 458995 | SDMH C-1 | 4588.87 | 1.02 | | 0.63 | 0.63 | 10 | 1.4 | 0.88 | 3.8 | 2.39 | 10" | 0.014 | 3.52 | 0.030 | 4.2 | 36 | 0.14 |
| SDMH C-1 | 4587.94 | SDMH C-2 | 4584.82 | — | | — | 1.29 | 10.5 | 1.35 | 1.74 | 3.6 | 4.64 | 12" | 0.014 | 5.02 | 0.023 | 5.9 | 136 | 0.38 |
| SDMH C-2 | 4584.72 | EXIST. SD SYSTEM IN LAKESIDE DR | | | | | 1.29 | | | | | | | | | | | | |

## Storm Drainage Computations

**Project:** Lewis Lakeside Unit Five 1025.30
**Calculated by:** KRK **Date** 9-24-90
**Checked by:** **Date**
**Sheet:** 7 **of** 14

| From Pipe Inlet Location | Flow Line Elev. | To Pipe Outlet Location | Flow Line Elev. | A Acres | C | CA | ΣCA | tc min. | $i_5$ in./hr. | $Q_5$ cfs | $i_{100}$ in./hr. | $Q_{100}$ cfs | Size | n | $Q_{full}$ cfs | S ft./ft. | $V_5$ ft./sec. | Pipe length ft. | Flow line min. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CB #4 | 4597.43 | SDMH B-1 | 4597.20 | 0.84 | | 0.50 | 0.50 | 10 | 1.4 | 0.70 | 3.8 | 1.90 | 10" | 0.014 | 1.70 | 0.0070 | 3.0 | 33' | 0.18 |
| CB #5 | 4597.43 | SDMH B-1 | 4597.31 | 0.22 | | 0.16 | 0.16 | 10 | 1.4 | 0.22 | 3.8 | 0.61 | 10" | 0.014 | 2.88 | 0.020 | 3.1 | 6' | 0.03 |
| SDMH B-1 | 4597.11 | SDMH B-2 | 4595.81 | — | — | — | 0.66 | 10.18 | 1.4 | 0.92 | 3.8 | 2.51 | 12" | 0.014 | 2.77 | 0.0070 | 3.2 | 186 | 0.97 |
| SDMH B-2 | 4595.71 | SDMH B-3 | 4595.29 | — | — | — | 0.66 | 11.15 | 1.3 | 0.86 | 3.6 | 2.38 | 12" | 0.014 | 2.77 | 0.0070 | 3.1 | 60 | 0.32 |
| CB # 7 | 4597.01 | SDMH B-3 | 4595.33 | 0.28 | | 0.19 | 0.19 | 10 | 1.4 | 0.27 | 3.8 | 0.72 | 10" | 0.014 | 3.52 | 0.030 | 3.9 | 6 | 0.03 |
| SDMH B-3 | 4595.15 | EXIST SD | | — | — | — | 0.8 | 11.47 | 1.3 | 1.11 | 3.5 | 2.96 | 12" | 0.014 | 3.31 | 0.010 | 3.8 | 43 | 0.19 |
| | | (IN WHEATLAND RD) | | | | | | | | | | | | | | | | | |
| EXIST CB # 12 | 4597.05 | EXIST. SD | 4595.76 | 0.61 | | 0.41 | 0.41 | 10 | 1.4 | 0.57 | 3.8 | 1.56 | 12" | 0.014 | 5.80 | 0.0307 | 4.7 | 42' | 0.15 |
| | | (IN WHEATLAND RD.) | | | | | | | | | | | | | | | | | |
| YD # 6 | 4591.20 | EXIST SD | 4588.89 | 0.65 | | 0.36 | 0.36 | 10 | 1.4 | 0.50 | 3.8 | 1.37 | 10" | 0.014 | 9.32 | 0.210 | 9.2 | 11' | 0.02 |
| | | (IN WHEATLAND RD) | | | | | | | | | | | | | | | | | |


GRAPH OF GUTTER FLOW VS. DEPTH
DEPTH
GENERAL ASSUMPTIONS:
1) STREET WIDTH IS GREAT ENOUGH SO THAT THE CENTER LINE OF THE STREET IS HIGHER THAN THE TOP OF THE SIDEWALK. (i.e. FLOW IS ONLY ON ONE SIDE OF THE STREET)
2) MANNING'S n=0.013
0.5%
1.0%
1.5%
2.0%
3.0%
4.0%
6.0%
8.0%
10.0%
DEPTH (FT)
.6
.5
.4
.3
.2
.1
0
.01
.1
1
10
100

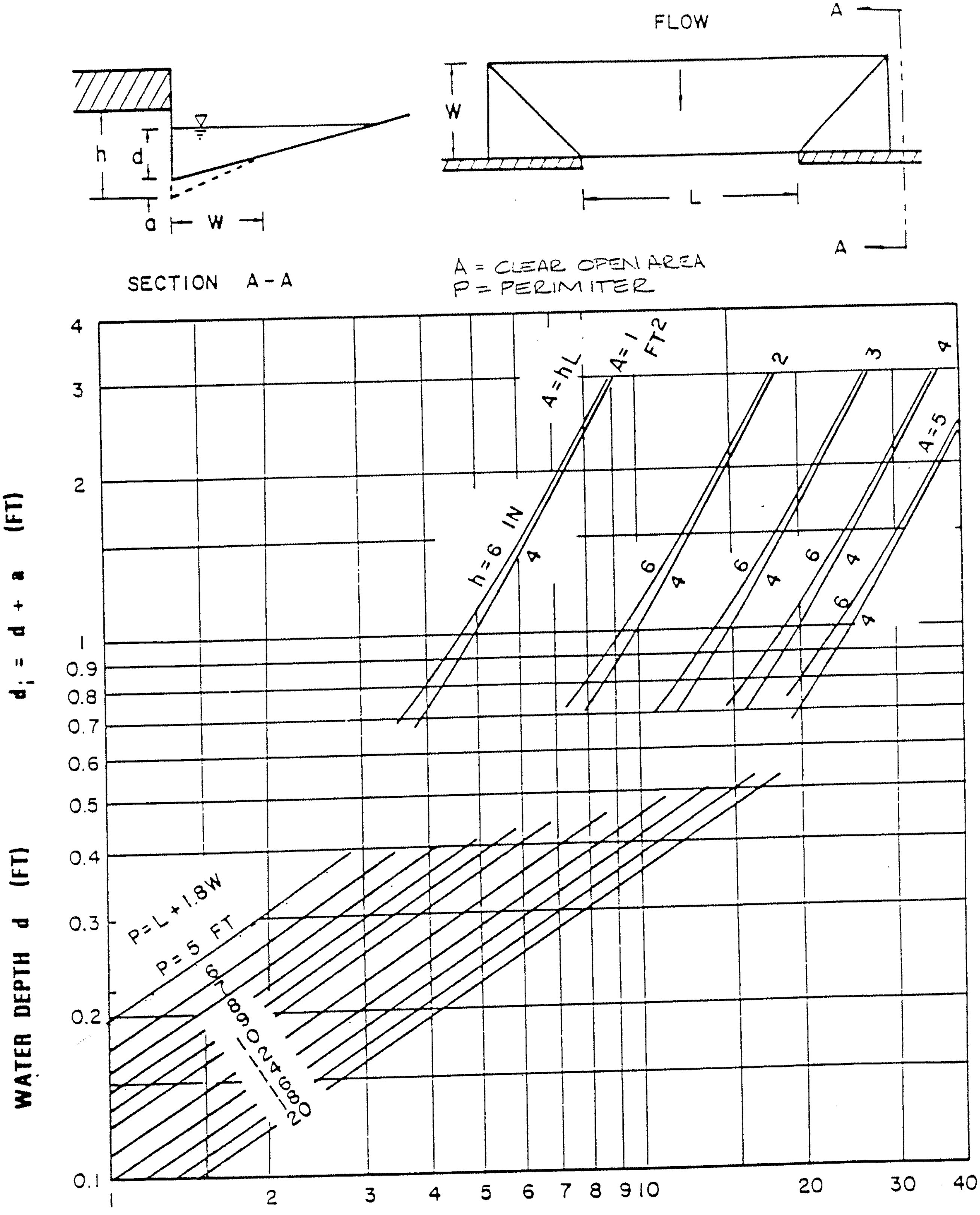



**CHART 12. Depressed curb–opening inlet capacity in sump locations.**

Figure IV-10. Depressed curb-opening inlet capacity in sump locations (Reference IV-4, p. 77)

/14

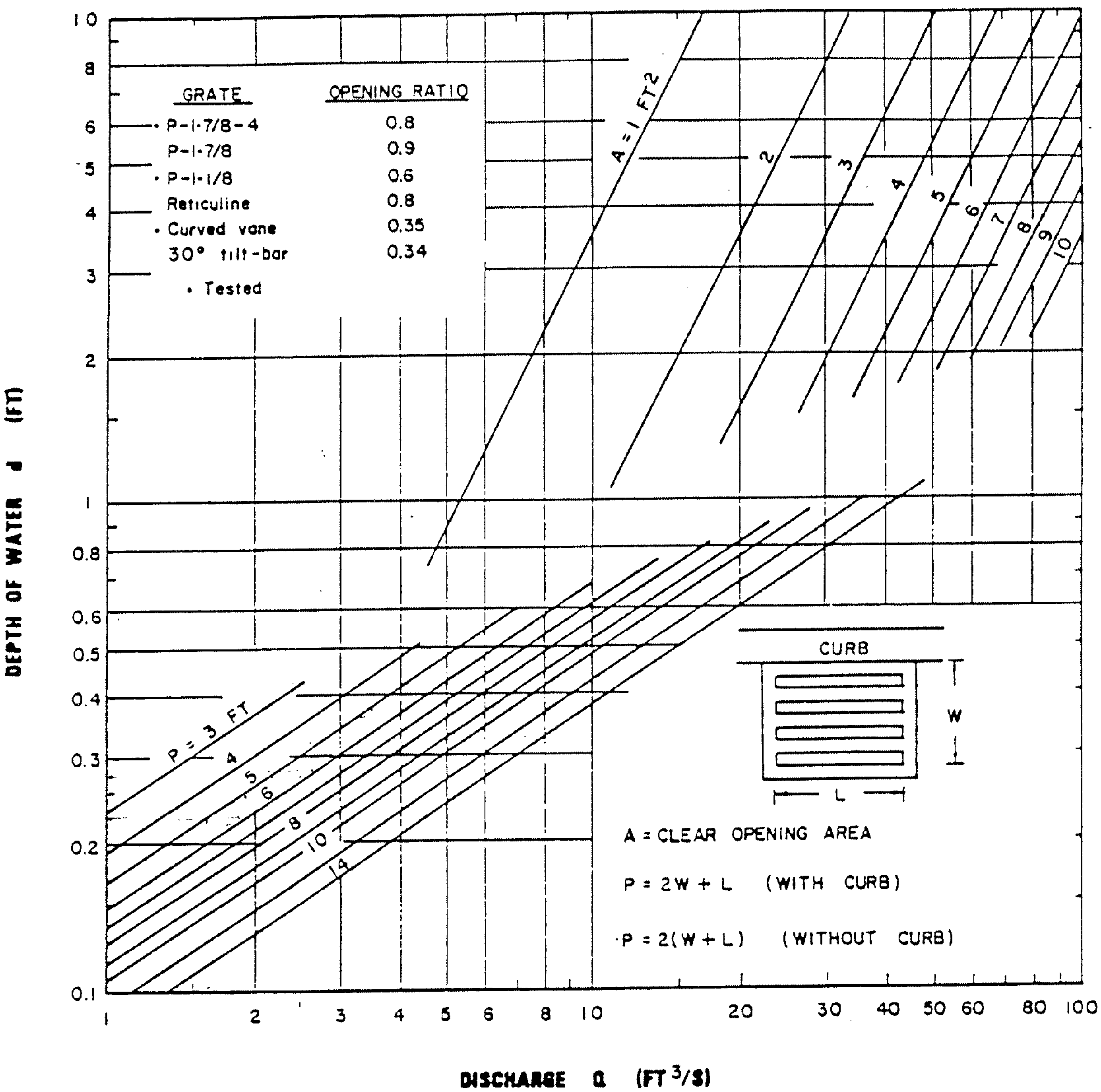
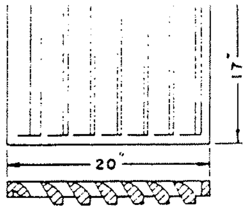


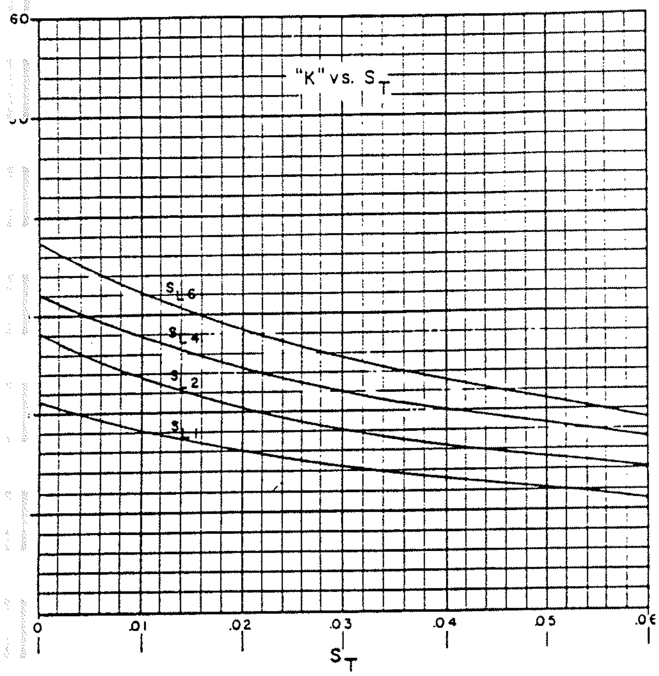

**CHART 11. Grate inlet capacity in sump conditions.**

Figure IV-20. Grate inlet capacity in sump conditions
(Reference IV-4, p. 71)

COMP. CODE - 3065-0002

FLOW ——




$S_T$ = TRANSVERSE GUTTER SLOPE

$S_L$ = LONGITUDINAL GUTTER SLOPE

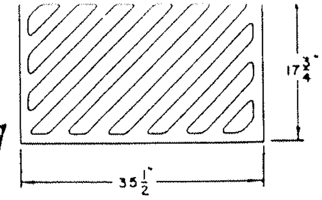
K = GRATE INLET COEFFICIENT

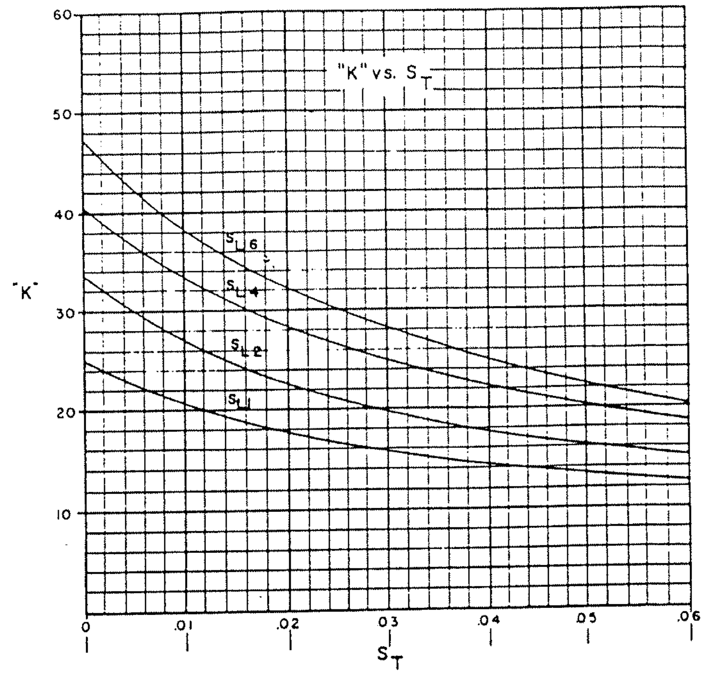


14

NEENAH 3607

FLOW ——




$S_T$ = TRANSVERSE GUTTER SLOPE

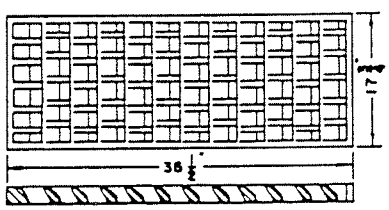
$S_L$ = LONGITUDINAL GUTTER SLOPE

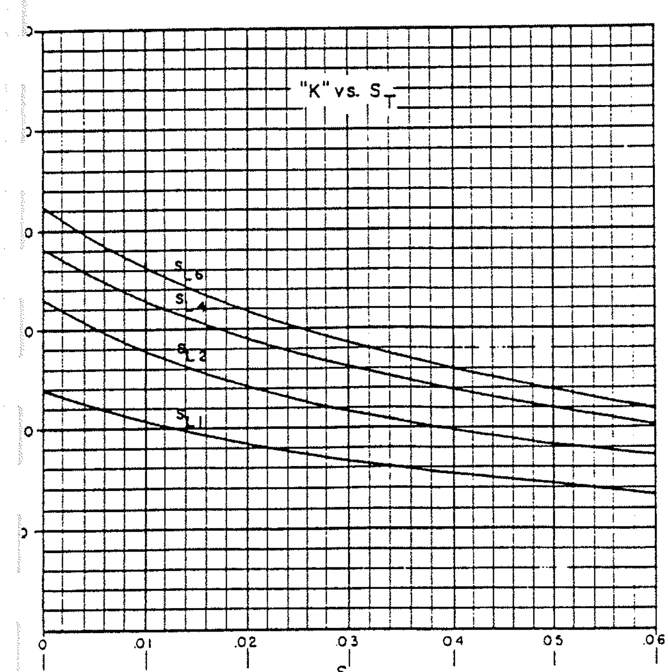
K = GRATE INLET COEFFICIENT



NO. - R-3067-L
CRIPTION - TYPE L
P. CODE - 3067-0006

FLOW ——




$S_T$ = TRANSVERSE GUTTER SLOPE

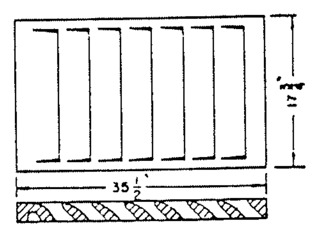
$S_L$ = LONGITUDINAL GUTTER SLOPE

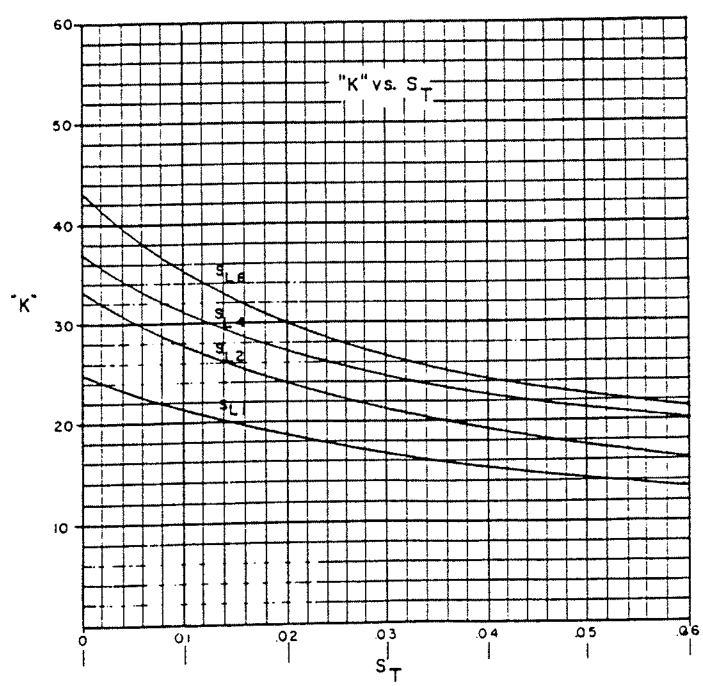
K = GRATE INLET COEFFICIENT



CAT. NO. - R-3067-V
DESCRIPTION - TYPE V
COMP. CODE - 3067-0008

FLOW ——



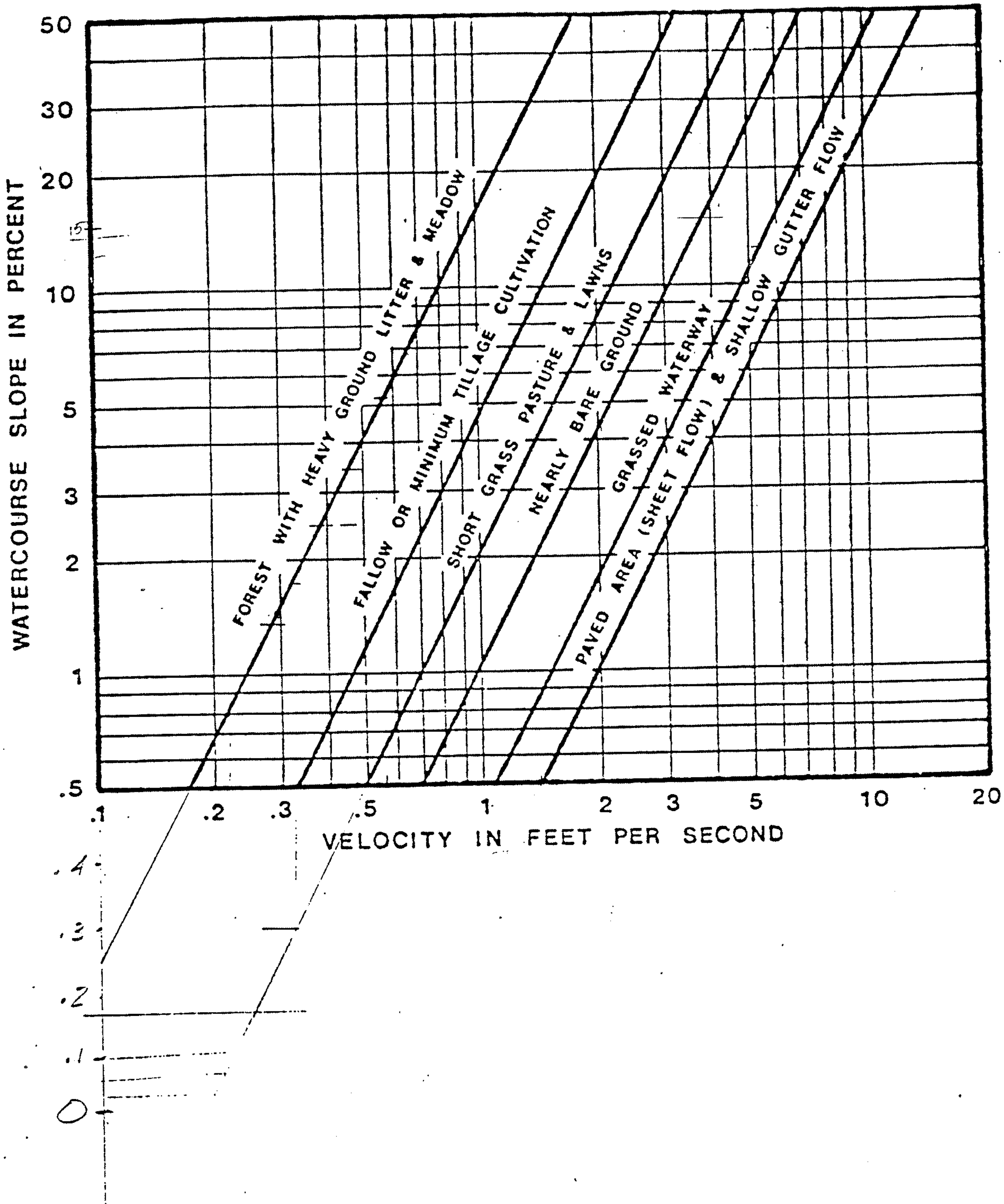

$S_T$ = TRANSVERSE GUTTER SLOPE

$S_L$ = LONGITUDINAL GUTTER SLOPE

K = GRATE INLET COEFFICIENT

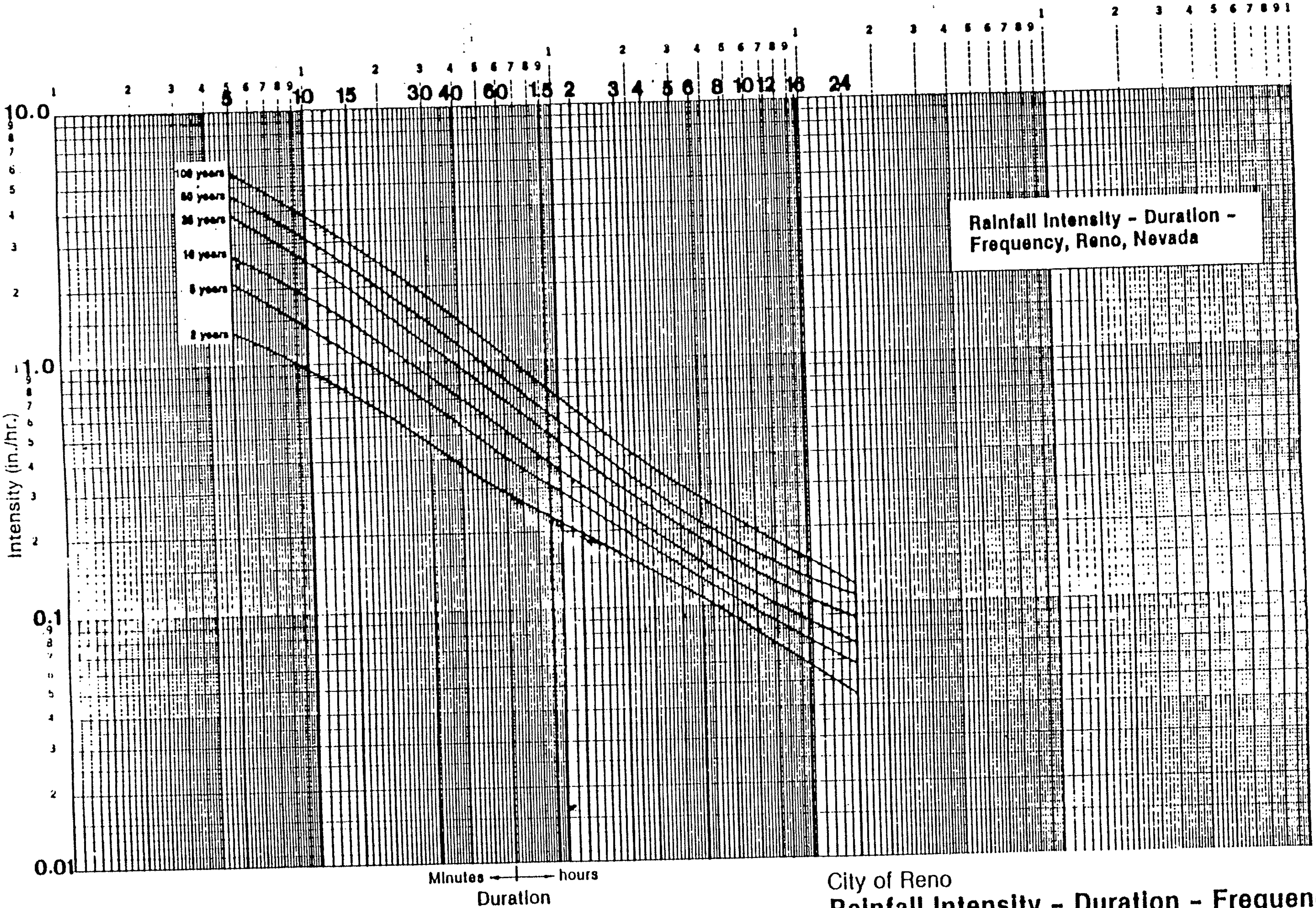
BOILDER COUNTY STORM DRAINAGE CRITERIA MANUAL | FIGURE 802

# TRAVEL TIME VELOCITY FOR RATIONAL METHOD




WRC ENG. | REFERENCE: "Urban Hydrology For Small Watersheds" Technical Release No. 55, USDA SCS Jan. 1975.

14/14

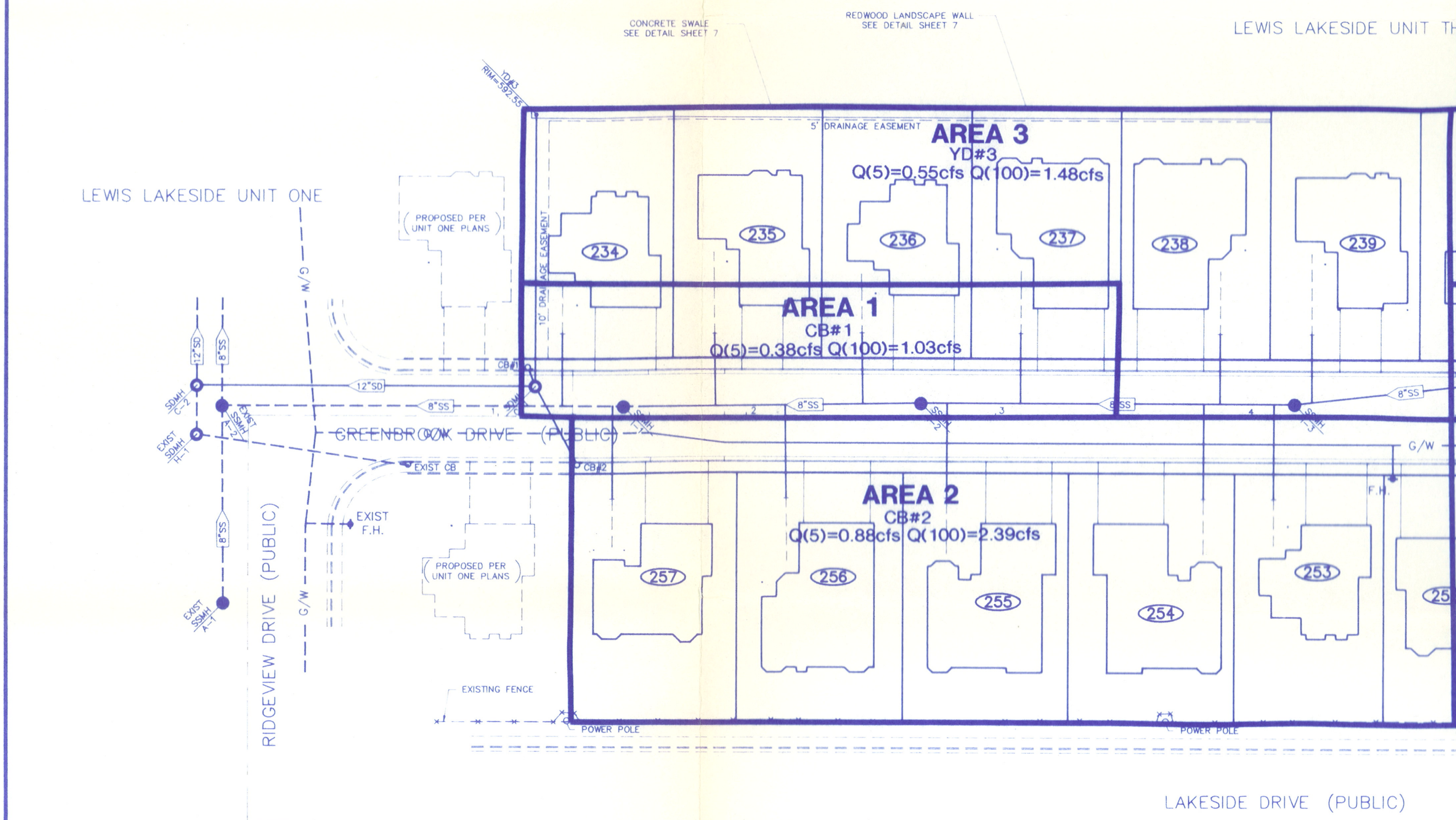



City of Reno

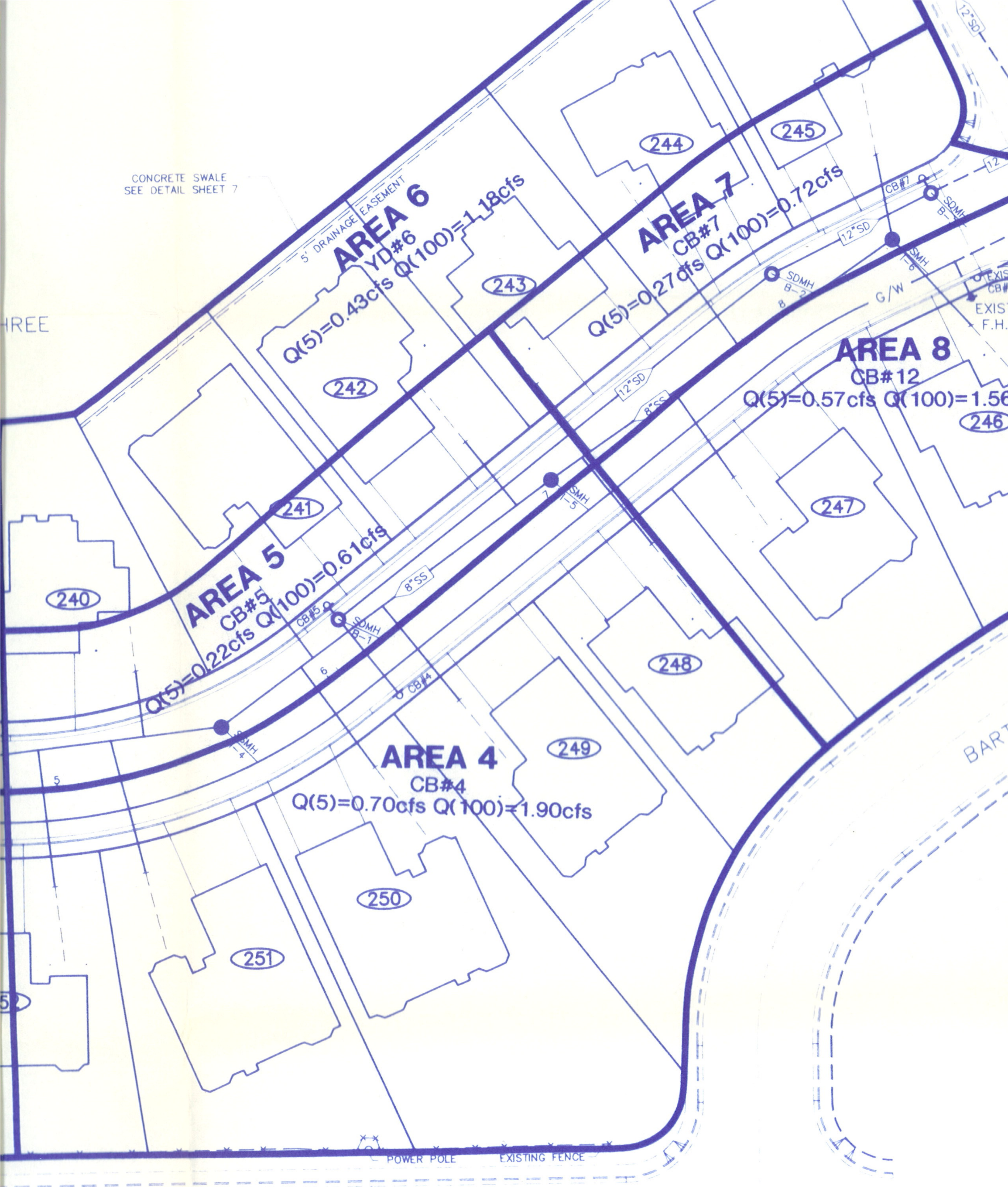
**Rainfall Intensity - Duration - Frequency Curves for General Reno Area**

Based on Rainfall Data from Cannon Airport Gauging Station

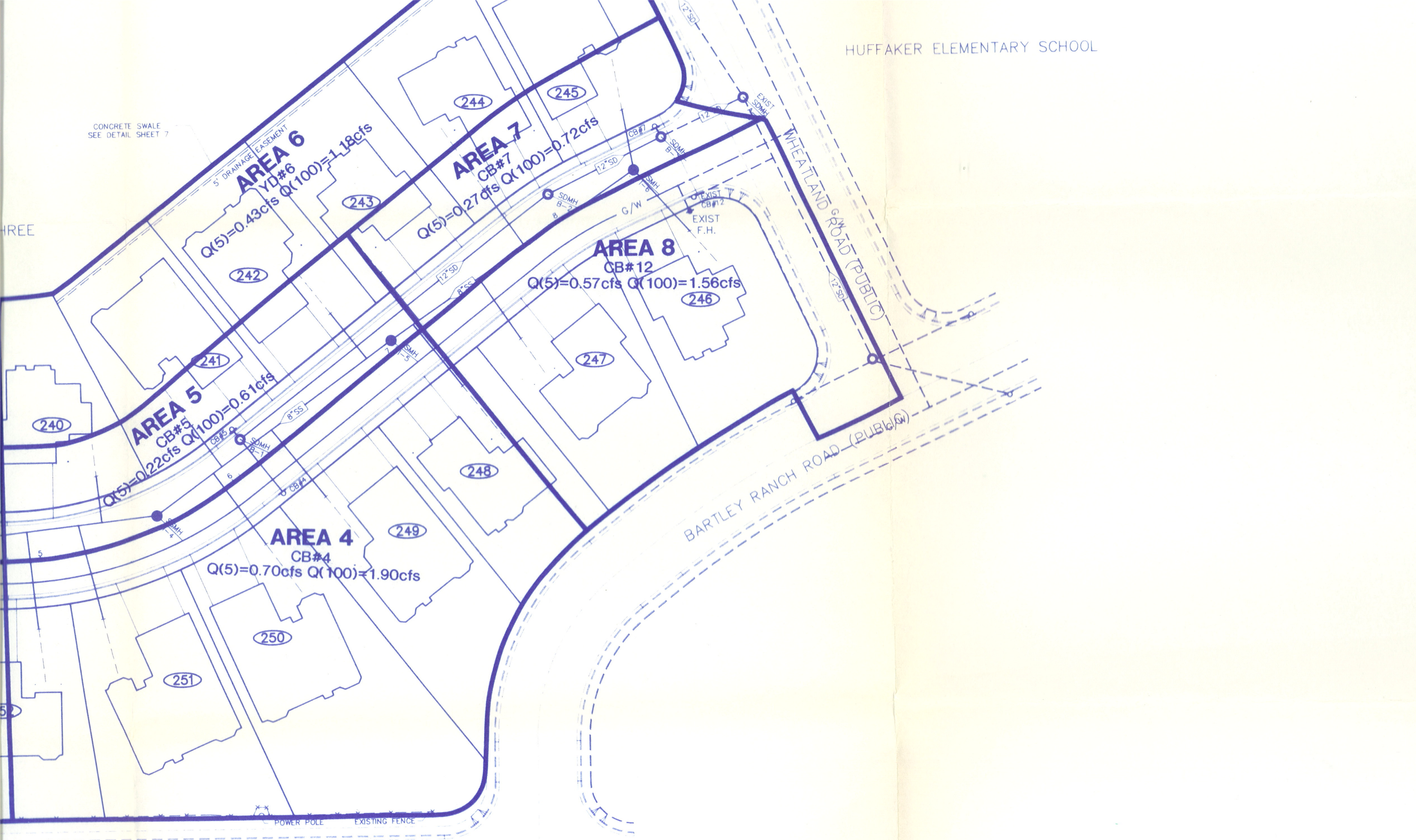
Figure 4



CONCRETE SWALE
SEE DETAIL SHEET 7
REDWOOD LANDSCAPE WALL
SEE DETAIL SHEET 7
LEWIS LAKESIDE UNIT TH
LEWIS LAKESIDE UNIT ONE
YD#3
RIM=592.55
5' DRAINAGE EASEMENT
AREA 3
YD#3
Q(5)=0.55cfs Q(100)=1.48cfs
PROPOSED PER UNIT ONE PLANS
234
235
236
237
238
239
10' DRAINAGE EASEMENT
AREA 1
CB#1
Q(5)=0.38cfs Q(100)=1.03cfs
12"SD
8"SS
CB#1
SDMH C-2
EXIST SSMH A-2
EXIST SDMH H-1
GREENBROOK DRIVE (PUBLIC)
G/W
EXIST CB
CB#2
AREA 2
CB#2
Q(5)=0.88cfs Q(100)=2.39cfs
EXIST F.H.
F.H.
257
256
255
254
253
RIDGEVIEW DRIVE (PUBLIC)
EXIST SSMH A-1
EXISTING FENCE
POWER POLE
POWER POLE
LAKESIDE DRIVE (PUBLIC)

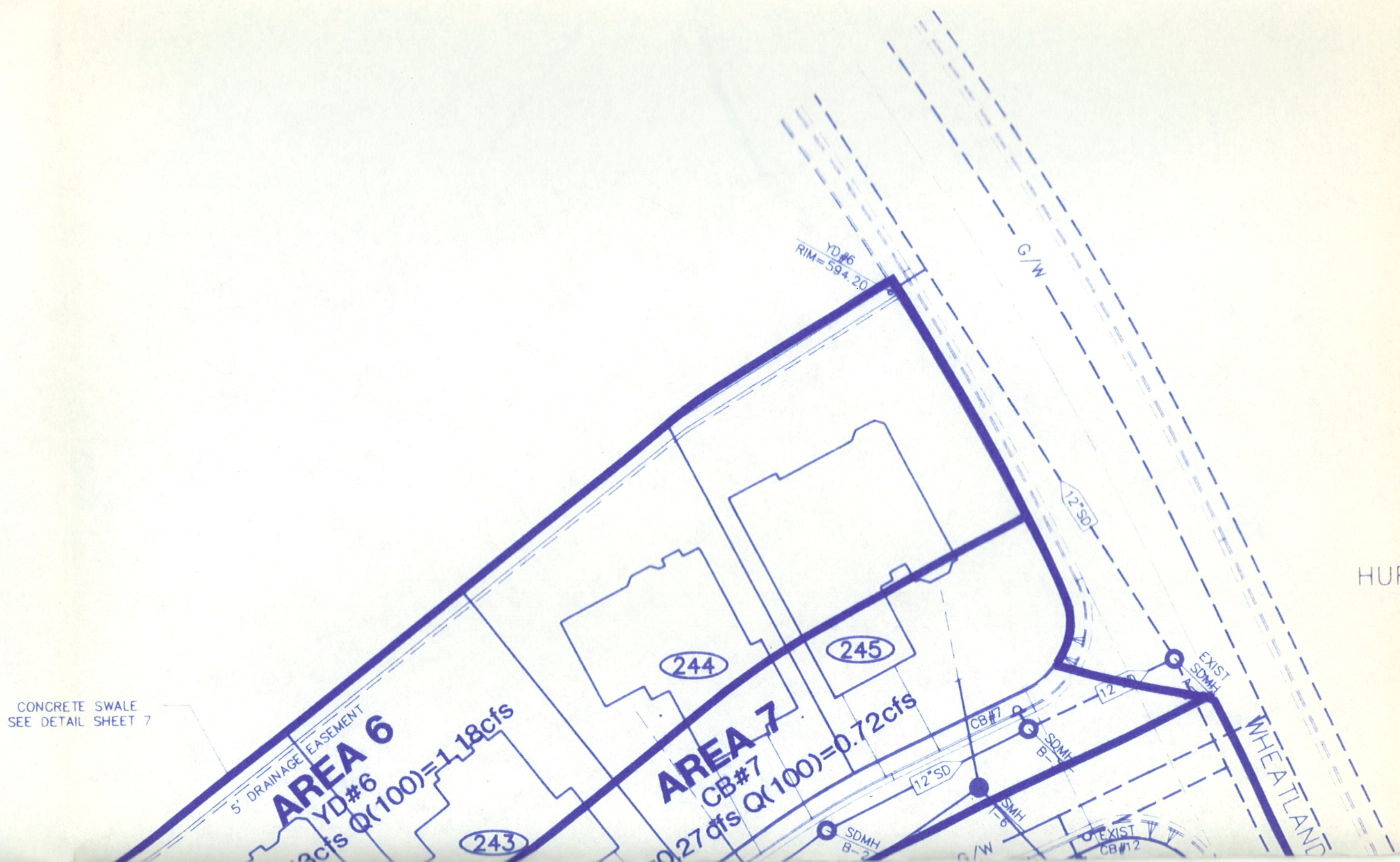


CONCRETE SWALE
SEE DETAIL SHEET 7
AREA 6
YD#6
Q(5)=0.43cfs Q(100)=1.18cfs
5' DRAINAGE EASEMENT
AREA 7
CB#7
Q(5)=0.27cfs Q(100)=0.72cfs
AREA 8
CB#12
Q(5)=0.57cfs Q(100)=1.56
AREA 5
CB#5
Q(5)=0.22cfs Q(100)=0.61cfs
AREA 4
CB#4
Q(5)=0.70cfs Q(100)=1.90cfs
240
241
242
243
244
245
246
247
248
249
250
251
12"SD
8"SS
SDMH B-1
SDMH B-2
SDMH 1-4
SDMH 1-5
SDMH 1-6
G/W
EXIST F.H.
POWER POLE
EXISTING FENCE
HREE
BART


HUFFAKER ELEMENTARY SCHOOL
CONCRETE SWALE
SEE DETAIL SHEET 7
5' DRAINAGE EASEMENT
AREA 6
YD#6
Q(5)=0.43cfs Q(100)=1.18cfs
AREA 7
CB#7
Q(5)=0.27cfs Q(100)=0.72cfs
AREA 8
CB#12
Q(5)=0.57cfs Q(100)=1.56cfs
AREA 5
CB#5
Q(5)=0.22cfs Q(100)=0.61cfs
AREA 4
CB#4
Q(5)=0.70cfs Q(100)=1.90cfs
HREE
240
241
242
243
244
245
246
247
248
249
250
251
EXIST F.H.
EXIST CB#12
EXIST SDMH
WHEATLAND ROAD (PUBLIC)
BARTLEY RANCH ROAD (PUBLIC)
G/W
12"SD
8"SS
SDMH B-2
SDMH B-1
CB#7
CB#5
CB#4
POWER POLE
EXISTING FENCE

NOTES:

1. A 7.5' PUBLIC UTILITY EASEMENT SHALL BE LOCATED ALONG ALL STREET RIGHT-OF-WAYS.
2. A 2.5' PUBLIC UTILITY EASEMENT SHALL BE LOCATED ALONG ALL SIDE AND REAR LOT LINES.
3. A 2.5' DRAINAGE EASEMENT SHALL BE LOCATED ALONG ALL SIDE AND REAR LOT LINES FOR MUTUAL BENEFIT OF THE ADJACENT PROPERTY OWNERS.
4. ALL SANITARY SEWER LATERALS SHALL BE 4" PVC AND SHALL HAVE A MINIMUM SLOPE OF 2%.
5. CLEANOUTS SHALL BE INSTALLED ON SEWER LATERALS AT ALL ANGLE POINTS.
6. THE GAS AND WATER LAYOUT AS SHOWN IS A SCHEMATIC DRAWING ONLY. FINAL PLANS AS PREPARED BY SIERRA PACIFIC POWER COMPANY SHALL BE USED FOR THE INSTALLATION OF THE GAS AND WATER SYSTEM.
7. A 10' HORIZONTAL AND 18" VERTICAL SEPARATION SHALL OCCUR BETWEEN THE SANITARY SEWER AND WATER MAINS.
8. ALL SANITARY SEWER AND STORM DRAIN SYSTEMS SHALL BE OWNED AND MAINTAINED BY THE CITY OF RENO.
9. ALL IMPROVEMENTS ARE PUBLIC AND SHALL BE MAINTAINED BY THE CITY OF RENO.
10. THE SUBCONTRACTOR SHALL HAVE ALL EXISTING UTILITIES LOCATED BY CALLING "USA" TOLL FREE AT 1-800-227-2600.
11. A DUST CONTROL PLAN SHALL BE OBTAINED PRIOR TO ANY GRADING.
12. IF WATER IS ENCOUNTERED IN THE SEWER TRENCH ALL SEWER PIPE SHALL BE WATER CLASS PIPE AND ALL MANHOLES SHALL BE SEALED.



NOTES:

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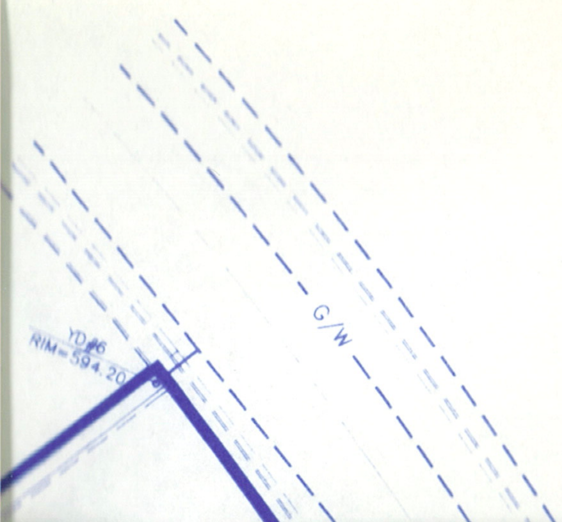
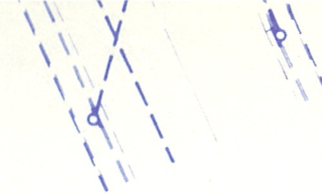



| Revisions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| No | | | | | | | | |

Codega & Fricke, inc.
engineers + planners
Suite J • Reno, Nevada 89509 • 702 827-8833





# DRAINAGE PLAN
# LEWIS LAKESIDE UNIT FIVE
## LEWIS HOMES OF NEVADA

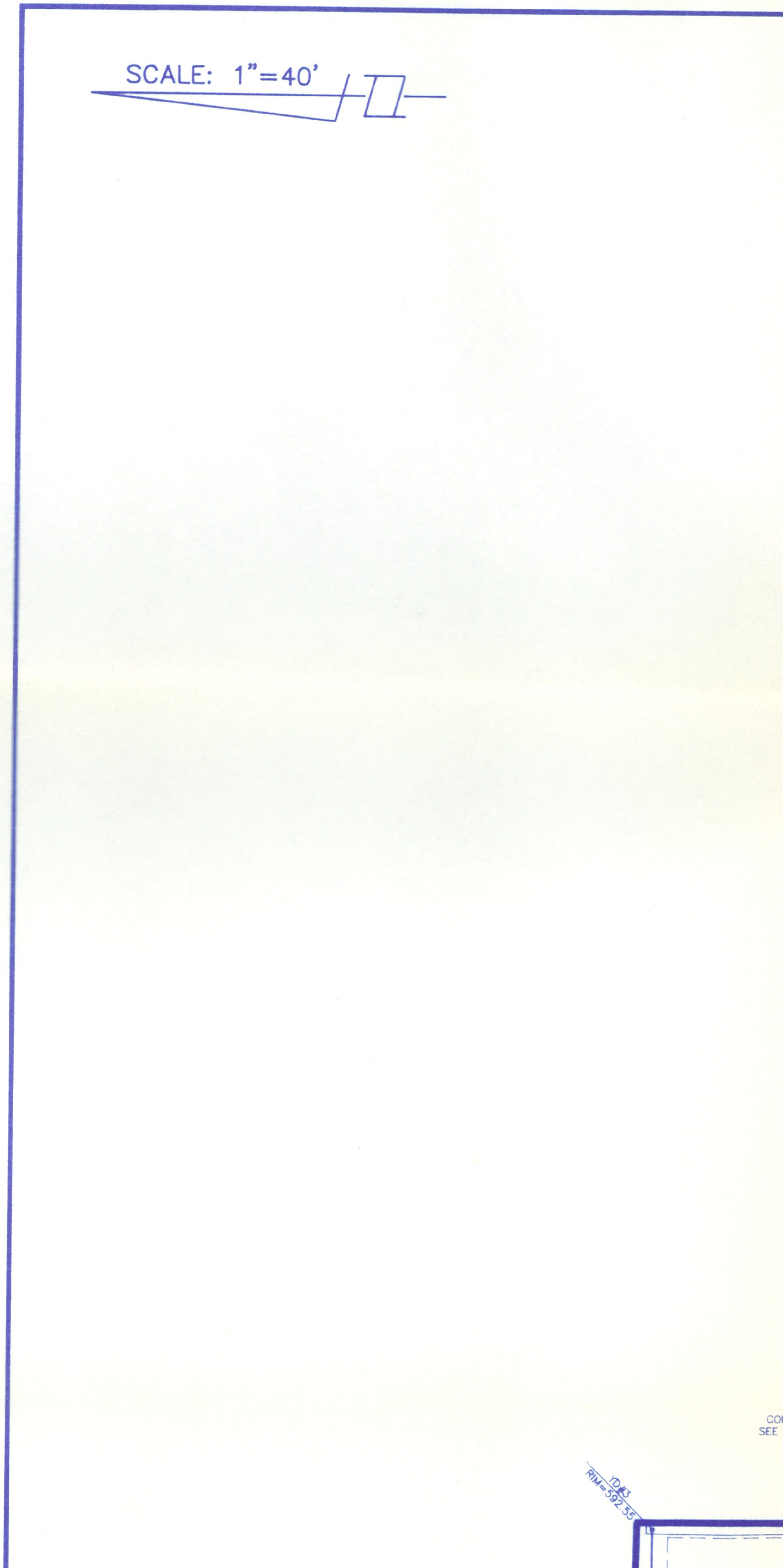
RENO | WASHOE COUNTY | NEVA

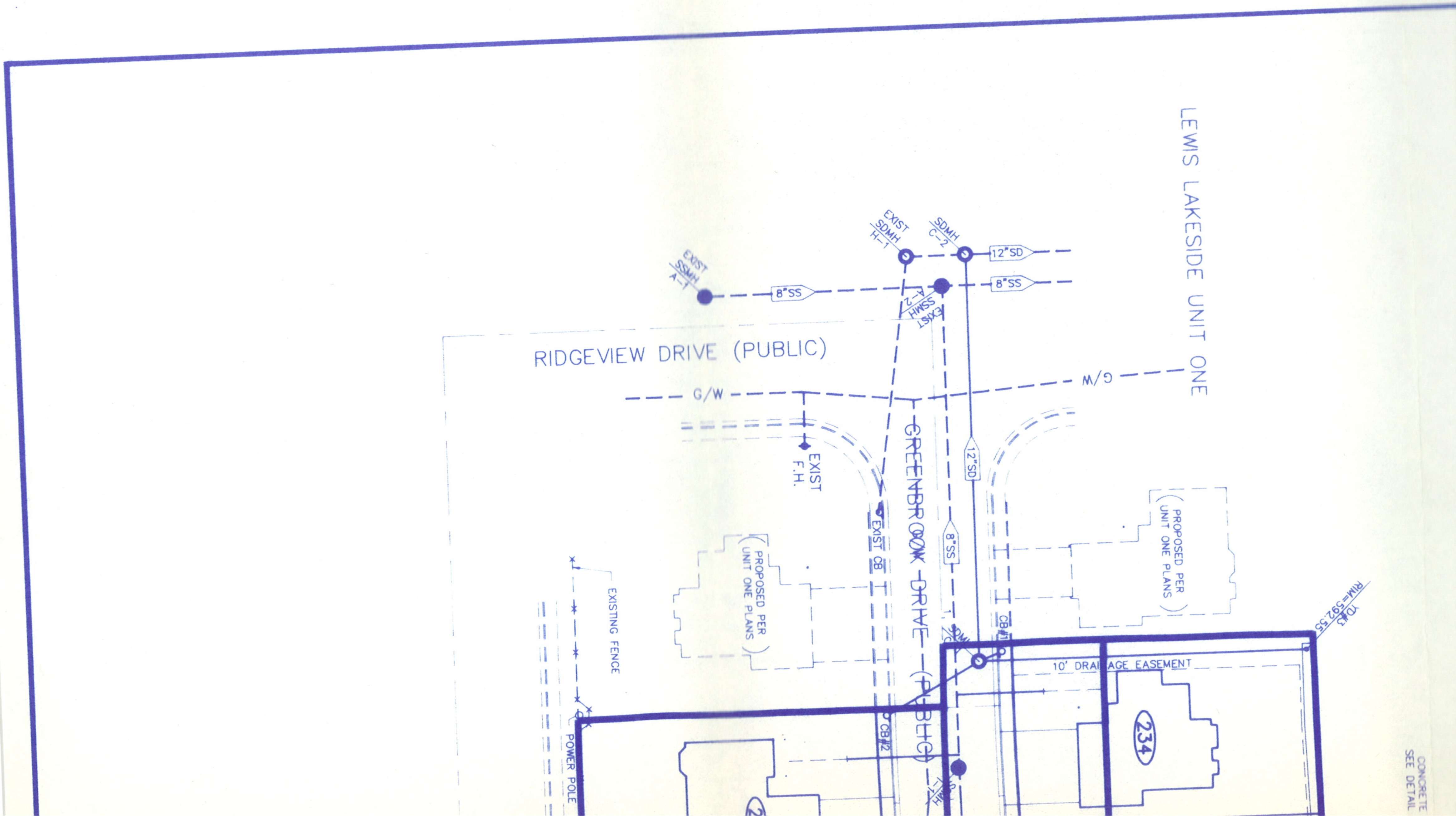
| | |
|---|---|
| Job No | 1025.30 |
| Designed | KRK |
| Drawn | HP |
| Comp | |
| Checked | |
| Date | AUGUST 1990 |

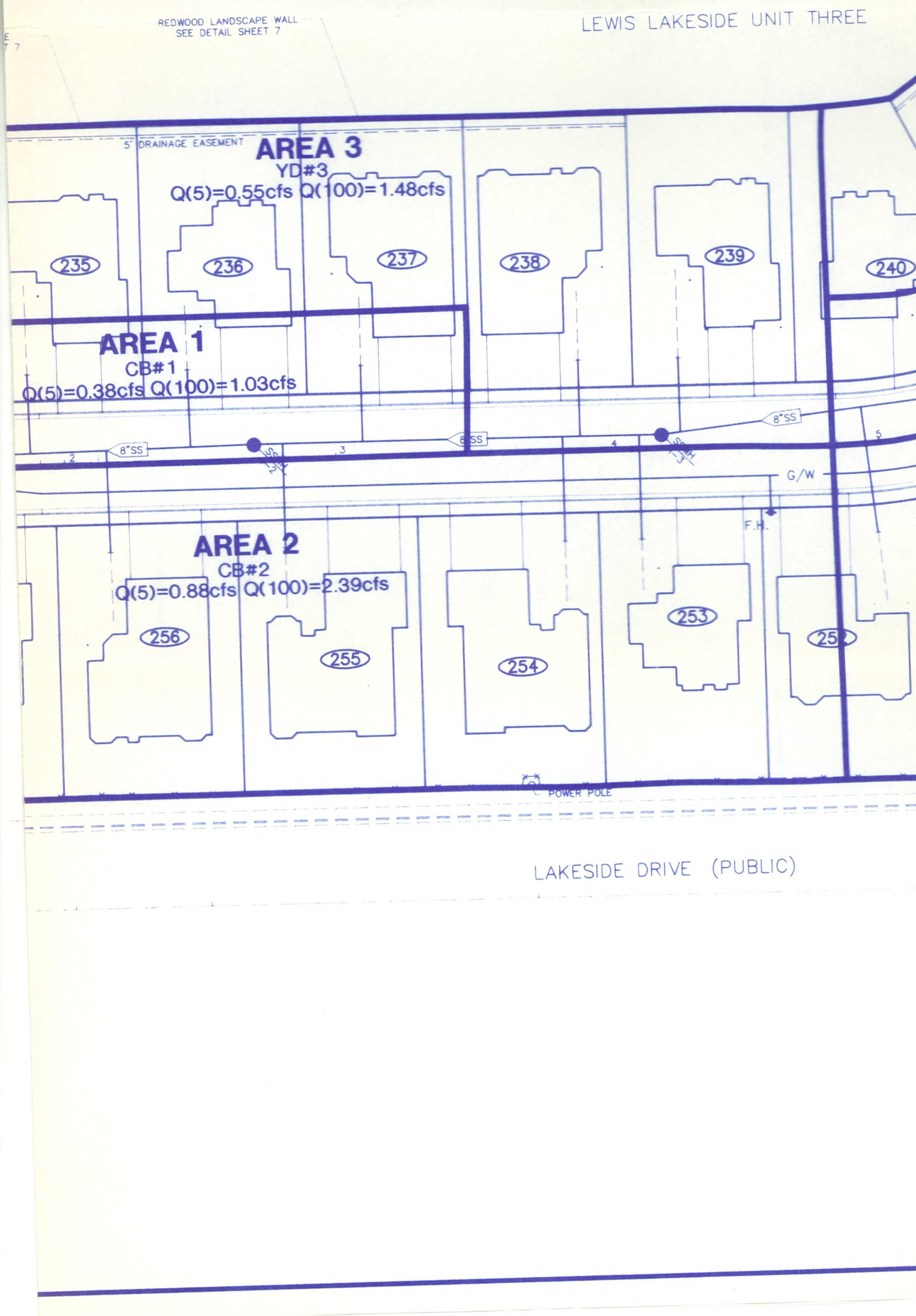
1

OF 1 SHEETS

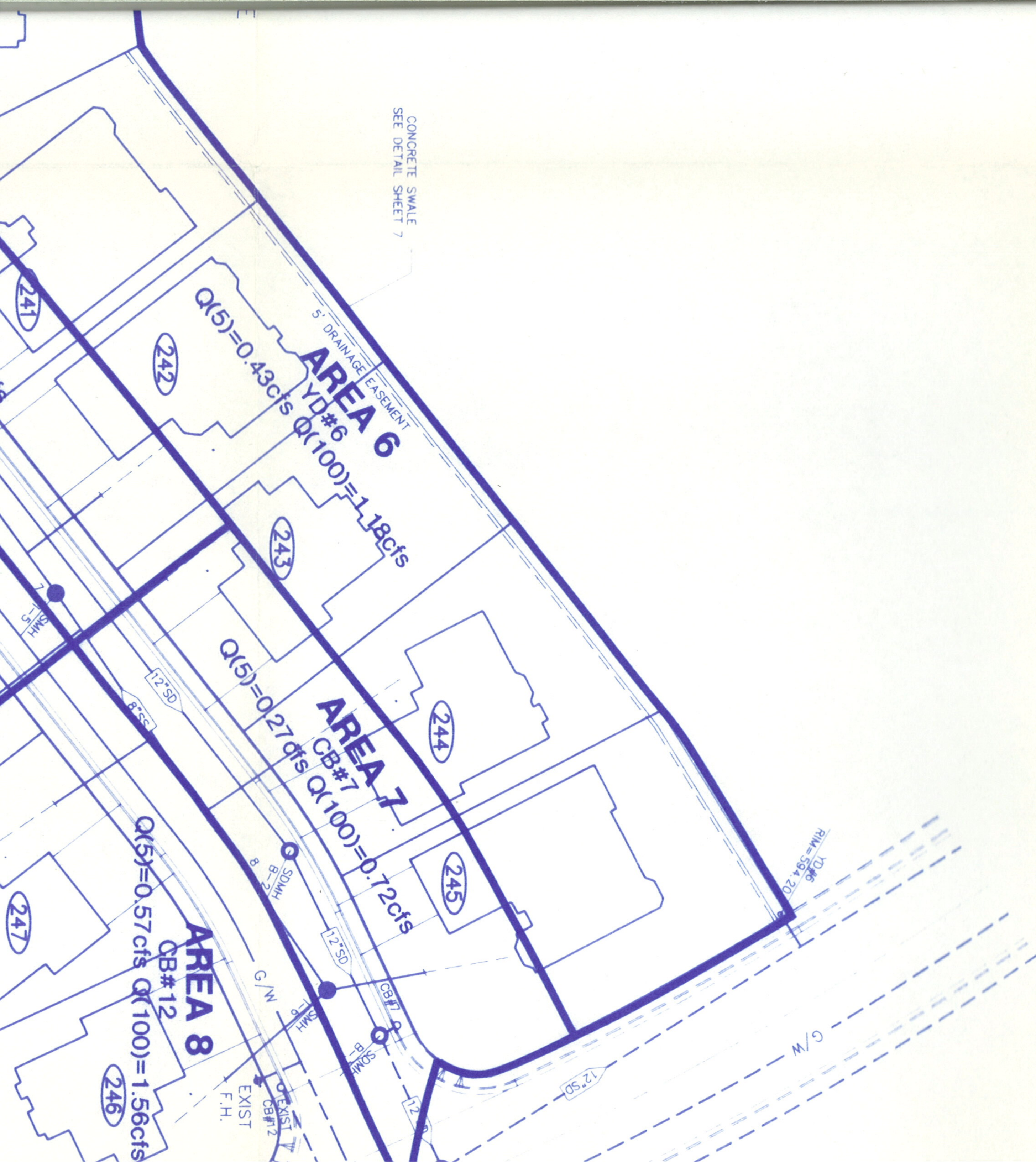
SCALE: 1"=40'

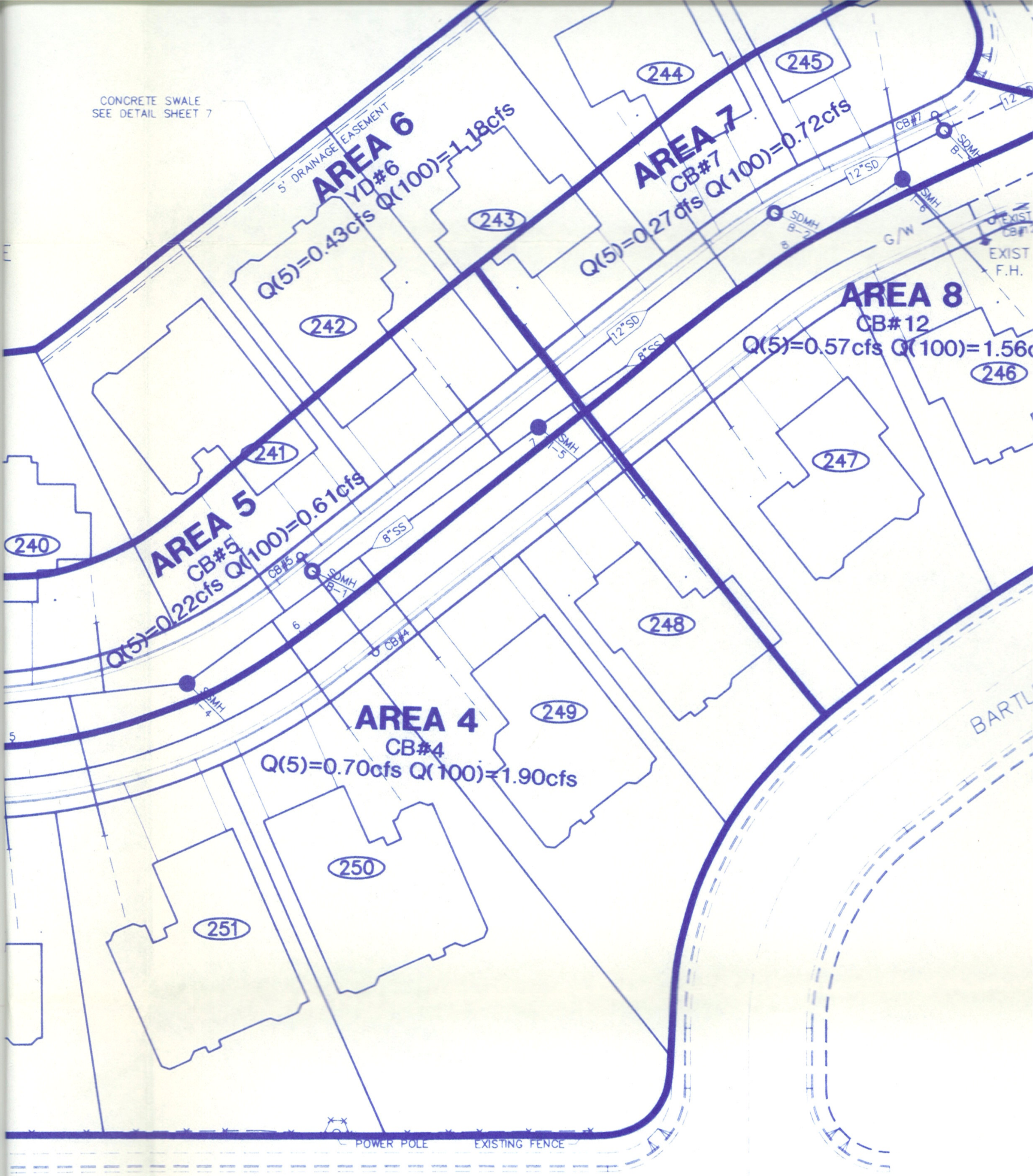

SCALE: 1"=40'
YD#3
RIM=592.55


LEWIS LAKESIDE UNIT ONE
RIDGEVIEW DRIVE (PUBLIC)
GREENBROOK DRIVE (PUBLIC)
EXIST SSMH A-1
EXIST SDMH H-1
SDMH C-2
EXIST SSMH A-2
12"SD
8"SS
G/W
EXIST F.H.
EXIST CB
CB#1
CB#2
( PROPOSED PER UNIT ONE PLANS )
( PROPOSED PER UNIT ONE PLANS )
EXISTING FENCE
POWER POLE
10' DRAINAGE EASEMENT
234
YD#3 RIM=592.55
CONCRETE SEE DETAIL



REDWOOD LANDSCAPE WALL
SEE DETAIL SHEET 7
LEWIS LAKESIDE UNIT THREE
5' DRAINAGE EASEMENT
AREA 3
YD#3
Q(5)=0.55cfs Q(100)=1.48cfs
235
236
237
238
239
240
AREA 1
CB#1
Q(5)=0.38cfs Q(100)=1.03cfs
8"SS
8"SS
8"SS
2
3
4
5
G/W
F.H.
AREA 2
CB#2
Q(5)=0.88cfs Q(100)=2.39cfs
256
255
254
253
252
POWER POLE
LAKESIDE DRIVE (PUBLIC)


CONCRETE SWALE
SEE DETAIL SHEET 7
5' DRAINAGE EASEMENT
AREA 6
YD#6
Q(5)=0.43cfs Q(100)=1.18cfs
241
242
243
244
245
246
247
AREA 7
CB#7
Q(5)=0.27cfs Q(100)=0.72cfs
AREA 8
CB#12
Q(5)=0.57cfs Q(100)=1.56cfs
12"SD
8"SS
SDMH
B-2
G/W
CB#7
EXIST
CB#12
EXIST
F.H.
YD#6
RIM=594.20



CONCRETE SWALE
SEE DETAIL SHEET 7
5' DRAINAGE EASEMENT
AREA 6
YD#6
Q(5)=0.43cfs Q(100)=1.18cfs
AREA 7
CB#7
Q(5)=0.27cfs Q(100)=0.72cfs
AREA 5
CB#5
Q(5)=0.22cfs Q(100)=0.61cfs
AREA 8
CB#12
Q(5)=0.57cfs Q(100)=1.56
AREA 4
CB#4
Q(5)=0.70cfs Q(100)=1.90cfs
240
241
242
243
244
245
246
247
248
249
250
251
12"SD
8"SS
SDMH
G/W
EXIST
F.H.
POWER POLE
EXISTING FENCE
BARTL

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AKER ELEMENTARY SCHOOL

| No | Revisions | By |
|---|---|---|
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| | | |
| | | |
| | | |
| | | |
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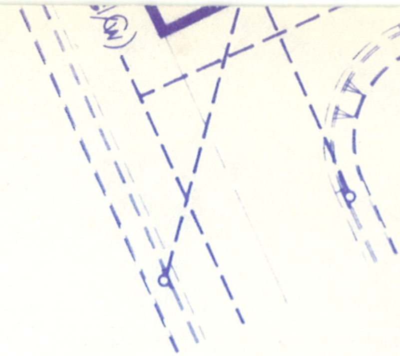
Codega & Fricke, inc.
engineers + planners
3690 Grant Drive Suite J • Reno Nevada 89509 • 702 827-8833

FIVE

NEVADA



AKER ELEMENTARY SCHOOL



DRAINAGE PLAN

# LEWIS LAKESIDE UNIT FIVE

LEWIS HOMES OF NEVADA

RENO WASHOE COUNTY NEVADA

Job No 1025.30
Designed KRK
Drawn HP
Comp
Checked
Date AUGUST 1990

1
OF 1 SHEETS

Co
eng
3690 Grant Drive, Suite J