PROPOSED MASTER STORM DRAINAGE PLAN - 'FULL DEVELOPMENT'

Creeks, Pipes and Open Channels

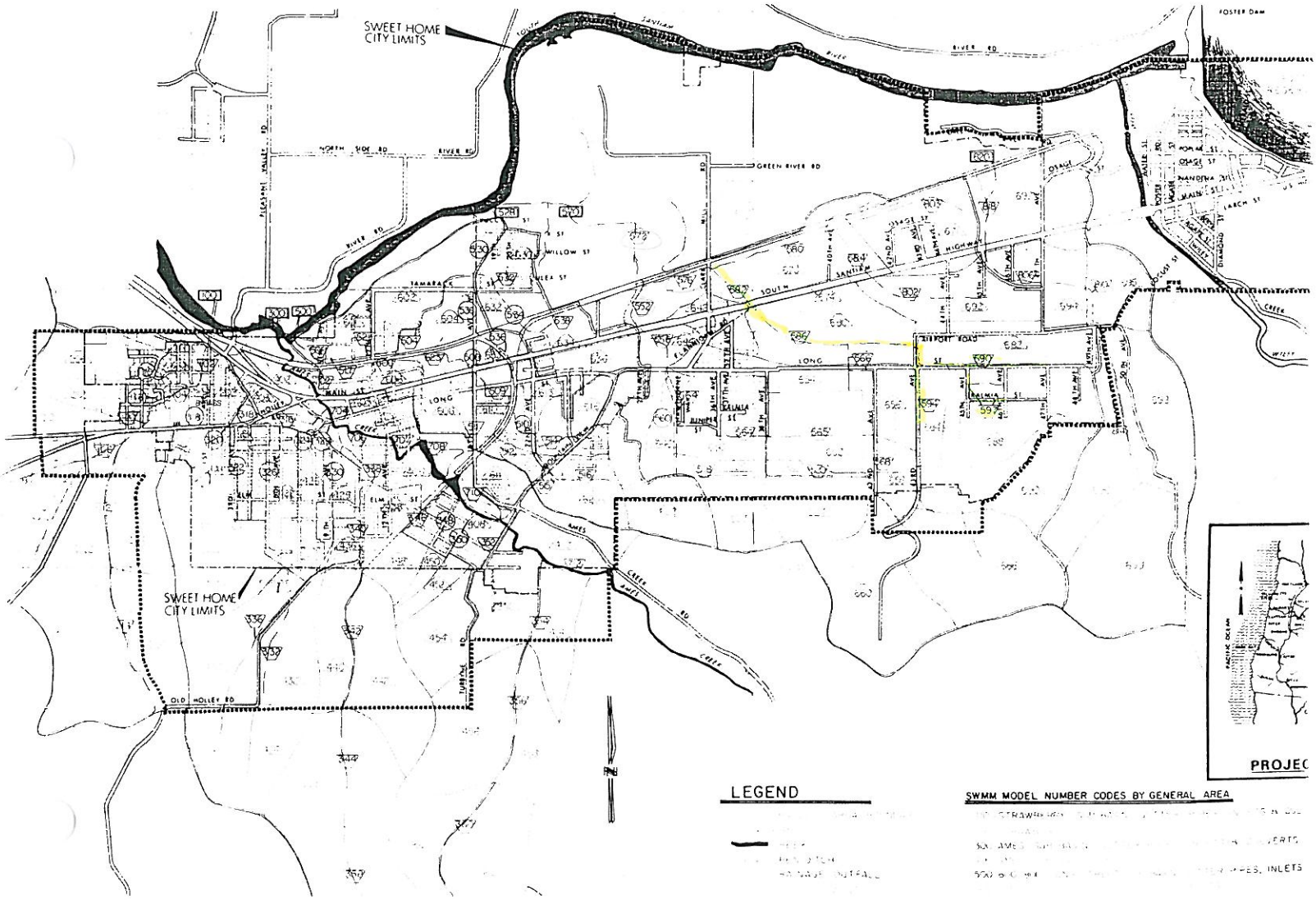
Map IV-1 shows the Proposed Master Storm Drainage Plan discretized into model subcatchments, pipe segments and open channels. Appendix D gives the proposed sizing of all conduits in the Proposed Master Plan as well as a complete list of SWMM input parameters for the Proposed Master Plan. Map IV-3 is the index to 1" = 100' City topographic maps overlaid with the Proposed Master Plan and showing the following:

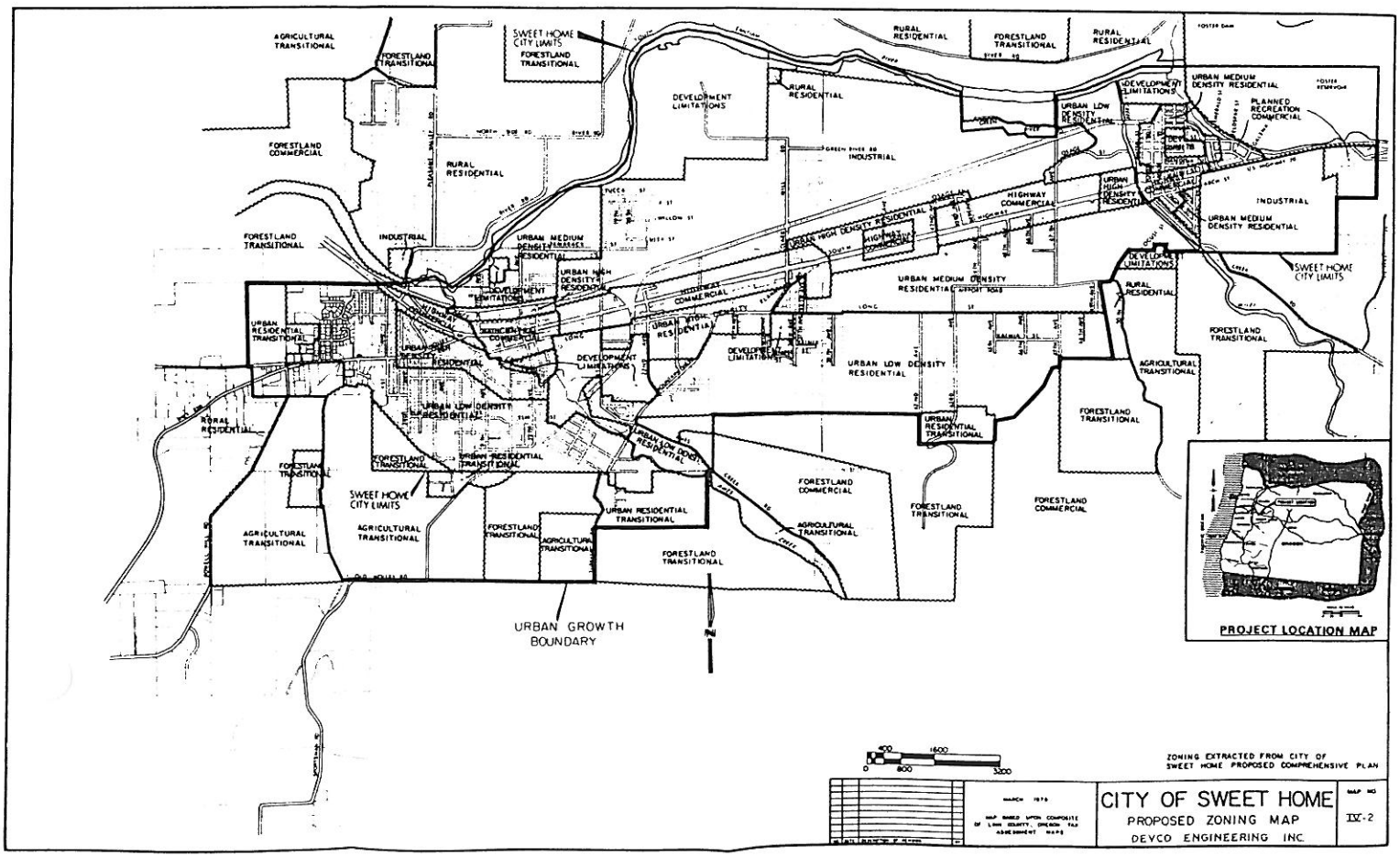
1. Design flow.
2. Typical conduit cross-sections at 'full development'.
3. Approximate alignment and suggested easements or dedications.
4. Indication of existing conduit cross-sections (if not shown existing cross-section is comparable with cross-section at 'full development').

Runoff for the Proposed Master Plan is based on land use as shown in Sweet Home's Proposed Comprehensive Plan, Map IV-2. This means that this study presumes that the land uses will be completely occupied to the densities shown in the Proposed Comprehensive Plan. 'Full development' of the City's Proposed Comprehensive Plan will accommodate a population of roughly 17,000 and if a compound growth rate of 1½ per cent[11] per year is assumed, 'full development' would occur

---

[11] Source: Proposed Sanitary Sewer and Water Plan by Extension of City Services to the Foster-Midway Area, CH2M, 1973


SWEET HOME CITY LIMITS
SWEET HOME CITY LIMITS
FOSTER DAM
RIVER RD
NORTH SIDE RD
GREEN RIVER RD
WILLOW ST
MAIN ST
LONG
ELM ST
OLD HOLLEY RD
PACIFIC OCEAN
PROJEC
LEGEND
SWMM MODEL NUMBER CODES BY GENERAL AREA


AGRICULTURAL TRANSITIONAL
FORESTLAND TRANSITIONAL
SWEET HOME CITY LIMITS
FORESTLAND TRANSITIONAL
RURAL RESIDENTIAL
FORESTLAND TRANSITIONAL
RURAL RESIDENTIAL
FOSTER DAM
DEVELOPMENT LIMITATIONS
RURAL RESIDENTIAL
URBAN MEDIUM DENSITY RESIDENTIAL
PLANNED RECREATION COMMERCIAL
URBAN LOW DENSITY RESIDENTIAL
FORESTLAND COMMERCIAL
RURAL RESIDENTIAL
INDUSTRIAL
HIGHWAY COMMERCIAL
INDUSTRIAL
URBAN MEDIUM DENSITY RESIDENTIAL
FORESTLAND TRANSITIONAL
INDUSTRIAL
URBAN MEDIUM DENSITY RESIDENTIAL
URBAN HIGH DENSITY RESIDENTIAL
HIGHWAY COMMERCIAL
URBAN MEDIUM DENSITY RESIDENTIAL
SWEET HOME CITY LIMITS
RURAL RESIDENTIAL
URBAN RESIDENTIAL TRANSITIONAL
URBAN HIGH DENSITY RESIDENTIAL
DEVELOPMENT LIMITATIONS
URBAN LOW DENSITY RESIDENTIAL
FORESTLAND TRANSITIONAL
AGRICULTURAL TRANSITIONAL
RURAL RESIDENTIAL
URBAN LOW DENSITY RESIDENTIAL
URBAN RESIDENTIAL TRANSITIONAL
FORESTLAND TRANSITIONAL
FORESTLAND TRANSITIONAL
SWEET HOME CITY LIMITS
URBAN RESIDENTIAL TRANSITIONAL
FORESTLAND COMMERCIAL
FORESTLAND TRANSITIONAL
FORESTLAND COMMERCIAL
AGRICULTURAL TRANSITIONAL
AGRICULTURAL TRANSITIONAL
FORESTLAND TRANSITIONAL
AGRICULTURAL TRANSITIONAL
FORESTLAND TRANSITIONAL
AGRICULTURAL TRANSITIONAL
URBAN GROWTH BOUNDARY
PROJECT LOCATION MAP
400 1600
0 800 3200
ZONING EXTRACTED FROM CITY OF SWEET HOME PROPOSED COMPREHENSIVE PLAN
MARCH 1979
MAP BASED UPON COMPOSITE OF LINN COUNTY, OREGON TAX ASSESSMENT MAPS
CITY OF SWEET HOME
PROPOSED ZONING MAP
DEVCO ENGINEERING INC
MAP NO.
IV-2

somewhere around the year 2035. If, however, future growth over the next decades actually approximates a 3 per cent annual compound rate, 'full development' will occur about the year 2010. Obviously, assigning a design year for 'full development' is highly speculative and this study does not do so. This study provides for the 'full development' of the City as currently envisioned in its Proposed Comprehensive Plan whenever that 'full development' may occur.

To focus the City's implementation of the Proposed Storm Drainage Plan, it is recommended that the following capital improvements in the priority shown. These improvements more than any others will firmly establish the fundamental aspects of the Proposed Plan. They bring attention to the major sub-basins and their outfalls, they improve the outfall reaches to provide for upstream growth, they provide the greatest public vs. local benefit, and they deal with the higher design flows, hence higher risks first.

PRIORITY NO.	MODEL I.D. NO.	LOCATION	DESCRIPTION
1	552,572,576	U.S. 20 @ 27th Avenue thru Willamette Industries	Willamette Industries between Clark Mill Road and 18th St. sits on top of three important drainages (552,576,534). One of these (552) is blocked by land fill and the log pond. This is the drainage flowing north from Ashbrook Subdivision which will carry every higher storm runoff in the near future. This will compound Willamette Industries problems with control of the quantity and quality of its pond discharge. During periods of high storm runoff, this drainage must pass thru the porous

PRIORITY NO.	MODEL I.D. NO.	LOCATION	DESCRIPTION
			land fill, thence into the pond and out its overflow, finally outfalling into the "Old Santiam Channel" immediately north of Willamette Industries. It is proposed to realign this drainage beginning at U.S. 20, thence eastward to join the existing westerly drainage at the railroad tracks, thence thru a new culvert under the railroad tracks and continue in the existing alignment thru the log stacks and outfall in the "Old Santiam Channel". This realignment outlet reach will drain the City south of the railroad between Mountain View Road and approximately 47th Street.
2	518,520,564	Midway area south of Long Street	Future population growth will concentrate here. Storm drainage decisions for this area are needed now if not yesterday. The fundamental solution proposed is to divert as much of the existing westerly flow to the north along the east edge of Ashbrook and avoid the restrictions in the older downtown area. The major drainage (518,520,564) alignment in this Midway area coincides with future collector streets shown in the City's Proposed Comprehensive Plan. It is expected that most of the improvements in the Midway area will be funded and constructed by future subdivision developments.
3	530	18th Ave. north of Tamarack St.	The general area north of the railroad and west of Willamette Industries is poorly drained. The natural topography is a large shallow depression with surface outlet to the southwest. The major drainages entering this depression are a 48" pipe from

PRIORITY NO.	MODEL I.D. NO.	LOCATION	DESCRIPTION
			under Willamette Industries' finished laydown yard and a 24" pipe flowing north under 18th. These come together at a flow diversion structure on 18th 200' north of Tamarack. From here one 30" pipe continues north to the Santiam. Excess water overflows into a flat undersized surface ditch to the southwest. Frequent flooding characterizes this area north of the railroad. It is proposed to redesign the flow diversion and construct a 48" pipe parallel to the existing 30" pipe north under 18th and eliminate all diverted surface flow to the southwest except for the water rights of Lester Shingle Mills (½ cfs to maintain 25.8 ac-ft. long pond).
4	316	Holley Road north of 4th Avenue east to Ames Creek	Storm drainage comes down Holley Road into this swale area at the base of the hill between Long St. and Main St. and backs up as surface flooding because of inadequate major drainage to the northwest under Main St. and along Holliday Mobile Park. It is proposed to reverse the flow direction from northwest to east by constructing 700' of open channel and 500' of 48" pipe under Long St. extending to Ames Creek. Some of the swale can be filled and reclaimed.
5	118,104, 102	Hwy 228 @ Evergreen to US 20 @ 1st Ave.	A) Remove the short length of 42" culvert below culvert #105 at Nandina Street. B) Enlarge open channels and replace culverts as noted in Proposed Plan. C) The 36" pipe under Pine Street is inadequate. It is proposed to construct a bypass under Pine St beginning at Hwy 228, culvert #105, thence eastward within the Hwy 228 right-of-way 1000' thence northward 500' to join the existing drainage.

PRIORITY NO.	MODEL I.D. NO.	LOCATION	DESCRIPTION
6	806	49th Ave. to U.S. 20	Most of this reach is a siphon which appears to perform well for low flows. The overflow channel above this siphon, however, has been encroached on and blocked. This overflow channel must be reconstructed to help eliminate the periodic flooding which occurs between 47th and 49th Aves.

Runoff hydrographs resulting from the 10, 25, and 100 year synthetic design storms were computed for every pipe and channel modeled. These are Appendix D. The peak design flows from these 'full development' runoff hydrographs are tabulated in Table IV-2. It is recommended that all design of major drainage open channel and pipe segments be based on the design flows shown in Table IV-2.

CULVERTS

Map III-3 and Table III-4 locate and list respectively the 49 most significant culverts in the modeled area. Table III-4 compares existing capacities with proposed design flows, identifying the existing culverts which are shown to be inadequate. It can be seen that 28 of the existing culverts are inadequate for 'full development'.

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOW(cfs)
102	Main St. south to W. Nandina	25	309
104	W. Nandina southwest to Pine St.	25	282
106	Hwy 228 southwest to Rowell Hill Road	25	233
108	Rowell Hill Road southwest to Hwy 228	10	53
110	Parallel southwest along Rowell Hill Road	10	10
112	Hwy 228 south towards Sportsmans Road	25	108
114	North of Old Holley Road as it turns south into Sportsman Road	10	32
115	West and east along W. Nandina St.	10	16
118	Pine Street southwest to Hwy 228	25	245
120	Old Holley Road to Pine Street	25	240
300	Ames Creek-Railroad tracks north to South Santiam River	100	2455
316	Between Main Street and railroad tracks at Holley Road	25	114
318	Under Holley Road at 45th Ave.	10	65
320	Along Hwy 228 at 1st Ave. east to Oak Terrace	10	21
322	South on 4th Avenue from Oak Terrace to Ironwood then west to 3rd Ave.	10	38
324	From Holley Road to Oak Terrace south of Long Street	25	54
326	South along 6th Ave. from Oak Terrace to Ironwood, then west on Ironwood to 5th Avenue	10	37

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS
Continued

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOW(cfs)
328	Southeast from Oak Terrace south of Ames Creek	25	36
330	South on 9th Avenue to Old Holley Road	10	51
332	East of Old Holley Road and southwest of 9th Avenue	10	18
336	Southwest on Old Holley Road from Alder St.	10	28
338	Northwest at base of bench from 10th & Elm to Ames Creek	25	232
340	Taylor Creek-south just north of Elm to Old Holley Rd. west of 12th Avenue	25	145
342	South from end of 10th Avenue-Taylor Creek	10	90
344	South of 342 - Taylor Creek	10	66
346	Southwest along 16th Avenue from Ames Creek to Cedar Street	10	11
348	17th Avenue from Cedar Street to Ames Creek	10	4
350	Southwest along 18th Avenue from Ames Creek to Cedar Street	10	4
352	South along Mountain View Road from Ames Creek to Cedar Street	10	16
354	South from Ames Creek east of Turbyne Road	10	119
356	South of 354 east of Turbyne Road	10	98
358	South of 344 - Taylor Creek	10	33
360	South of 356 near Turbyne Road	10	47
501	Northwest of 9th Avenue and railroad intersection to South Santiam River	25	185

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS
Continued

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOW(cfs)
504	Southwest from 18th Avenue across Tamarack St, south to railroad tracks and west to 12th Avenue	10	40
506	Between railroad track and Main Street west from 15th Avenue to 12th Avenue	25	150
508	Northwest from Main and 18th to north of 15th Avenue and south of railroad tracks	25	108
509	Southeast of intersection Main and 18th to Long Street and east of railroad tracks	25	116
510	South of Kalmia Street and railroad tracks to 22nd Avenue	10	49
511	South along 18th Avenue from Main Street to railroad	10	15
512	Southeast from railroad to 22nd Ave.	10	36
514	West from 22nd Ave. to 23rd just north of Mountain View Road	10	44
515	South along 22nd Avenue to across Mountain View Road	10	29
516	East along 22nd Avenue south of Mountain View Road	10	30
517	South of railroad tracks at 9th Avenue east of 12th Avenue	25	146
518	North of Foothills Blvd. south of Hawthorne Way and east along Foothills Blvd.	10	26
520	South of 38th Avenue to Foothills Blvd. then east to 42nd Ave.	10	23

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS
Continued

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOWS(cfs)
521	North of railroad right-of-way from 12th Avenue west to 9th Avenue	10	42
523	North of Main Street west of 18th Avenue	25	121
530	South from South Santiam River along 18th Avenue to "U" Street	10	103
532	Southeast from "U" Street to Tamarack Street	10	73
534	South from Tamarack to railroad tracks, east of 18th Avenue	10	58
536	South from Tamarack along 18th Avenue to railroad tracks, southeast to Main Street	10	20
538	East of railroad track intersection, north of Nandina Street, east towards 24th Avenue	10	45
540	South from Nandina Street across Main Street to Long Street	10	22
552	East of 24th Avenue, south from railroad tracks to Main Street	25	172
556	South of Main Street, west of Flannigan Road, southeast from Main to Long Street	25	157
560	East of 27th Avenue, south of Long Street, from Long Street to Foothills Blvd.	10	23
564	South along Hawthorne Way, then east to 38th Avenue	25	127
565	South of Long Street, 38th Avenue east to 42nd Avenue	10	37

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS
Continued

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOW (cfs)
566	North of Long Street and east along Long Street to 42nd Ave.	10	40
568	Along west side of 42nd Avenue south then east to 43rd Avenue	10	40
572	North thru Willamette Industries	25	522
576	South of railroad tracks, east along tracks between Clark Mill Road and 24th Avenue	25	360
580	South of railroad track, east along tracks between Clark Mill Road and 40th Avenue	25	102
582	Northwest of South Santiam Hwy to Clark Mill Road at railroad	25	269
584	South of railroad track, south-east between 40th Avenue and 42nd Avenue	10	29
586	South of South Santiam Hwy, south-east between 37th Avenue to 43rd Avenue	25	292
590	North along Long Street from 43rd Avenue to 47th Avenue	25	100
594	South on 43rd Avenue from Long St. to future Foothills Blvd.	10	97
597	South to Long St. on 45th Avenue	10	52
702	Ames Creek, Main Street north to railroad tracks	100	2463
704	Ames Creek, Long Street north to Main Street	100	2362
706	Ames Creek, Long Street south to 12th Avenue	100	1972
707	Ames Creek, 12th Avenue east to 13th Avenue	100	1964

TABLE IV-2

'FULL DEVELOPMENT' DESIGN FLOWS
Continued

MODEL NO. GUTTER OR PIPE	LOCATION	DESIGN FREQUENCY	DESIGN FLOW(cfs)
708	Ames Creek, 13th Avenue southeast to railroad tracks right-of-way	100	1972
710	Ames Creek, railroad track right-of-way southeast to Turbyne Road	100	1914
712	Ames Creek, Turbyne Road southeast to where Ames Creek nearly meets Ames Creek Road	100	1657
802	Southeast from South Santiam Hwy south of 42nd Avenue across 44th Avenue to 47th Avenue	10	35
803	South of railroad tracks north of Osage Street	10	56
806	South of South Santiam Hwy, 45th Avenue across 46th, 47th to 49th Avenue	25	117
810	South of Santiam Hwy along 49th Avenue to Airport Road	25	110
814	East end of Airport Road, south past end of 49th Avenue	10	68
818	East of 44th Avenue, west of 47th Avenue, south of railroad tracks to South Santiam Hwy	25	129

DISCUSSION

This study has produced a planning model of the City's major storm drainage.

Modeling of the City's watershed involves necessary averaging of drainage conduit parameters such as slope, width, overflow depths, etc. A consequence is that detail design of particular drainage segments may differ from the average drainage cross-sections used in the model. Channel changes may result from variable slopes within a reach, energy dissipators to control velocity and erosion, site specific decisions to change open channels to pipes, freeboard added to flow depths shown, etc. The cross-sections shown as overlays on the City topographic maps (see Map IV-3) are only typical of what is necessary to pass the design runoffs.

The design runoffs, Table IV-2 and Appendix D are the most important element of the Proposed Master Storm Drainage Plan. Drainage improvements are to be based on these runoff rates.

DRAINAGEWAY ACCESS

A Master Storm Drainage Plan is of limited value if it cannot be maintained. Something has to be done to reserve to the City the right of access to all major drainages modeled. These drainages are important to the public welfare and safety, and the City's growth. Initially this 'something' could be a policy committing the City to an opportunistic program of acquiring drainage access. It is the right of access that is paramount, the legal form of access, whether

dedication or easement is secondary. However, dedication is favored over easement. Such a program could be based on the example future right-of-way needs shown. Existing recorded access rights could be researched and plotted against these example future needs; then public strategies could be formulated to assure the City's ability to reach and care for all the major drainages.

It it clear that, nationwide, litigation resulting from increased storm water runoff is on the rise. Within Oregon the 'civil law rule' doctrine prevails in storm runoff judgements, but court decisions in these cases are not predictable. If there is any trend in these decisions it is towards 'equity' or 'reasonableness'. In this legal climate, possible exposure to a potential liability suit for damages is quite real.

RECOMMENDED ADDITIONAL STUDY

1. Calibrate and Verify SWMM. Why?

   Because the application of SWMM is somewhat more art than science. Calibration and verification permit refinement and checking of the SWMM parameters used to describe the Sweet Home watershed, thereby increasing the confidence in the design flows. A recorded rainfall is input into the SWMM and the SWMM output flows are compared with measured flows in several of the major drainages around town. Differences are minimized by adjusting the model

parameters. Three periods of rainfall-runoff are used. This is calibration! To increase the model reliability still further, another set of three rainfall-runoff periods is run through the SWMM, and the SWMM and measured flows are again compared. Good correlation would be expected. This is verification! To do this in Sweet Home, several drainages must be gauged and recorded. Locations must be chosen, as well as the type of gauge, and a gauge rating curve prepared. The easiest locations (control sections) may be found at culverts or at uniform reaches of open channels, but each site must be investigated carefully.

Peak flow and time-of-peak (versus the complete hydrograph) are all that is needed. The U.S. Geological Survey will lend crest chart recorders (if available) to the City at no cost.

Gauge height discharges or rating curves can be compiled theoretically from published culvert capacity tables or if an open channel reach is used for the control section, the Manning equation may be used to define the reaches hydraulic properties.

2. Investigate the feasibility of a large municipal detention on Ames Creek behind 14th Avenue on the site of the Old Mill Pond. Work with the SWMM suggests that a detention basin sufficient to regulate a 100 year runoff is possible. Some of this area is currently designated as City Park which is a very compatible land use with a detention basin. The old pond outlet structure would be useful in the detention design. Regulation of Ames

Creek at this point would reduce the need for downstream improvements. The 100 year flood impact shown in the pending Federal Insurance Agency Flood Insurance Rate Map (FIRM)[12] could be reduced saving 'x' amount of insurance dollars over the life of the structure. Most notably the wide-spread shallow flooding (FIRM Zone B) throughout the downtown area might possibly be eliminated. (The Federal Flood Insurance program does not require mandatory insurance in Zone B.) A careful economic analysis of the alternatives is required. It is recommended that these alternatives be explored before the City approves this land for other uses. The area in question is 400 feet either side of Ames Creek from Carla Place Subdivision downstream to the old pond outlet structure.

---

[12] 'Preliminary' copy made available by the Public Works Department, City of Sweet Home