CITY OF LEBANON
Storm Drainage Master Plan

CHAPTER 11

11.0 EXISTING FLOODPLAIN INFORMATION

Six primary open channel waterways drain the Lebanon Urban Growth Boundary (UGB): Cox Creek, Oak Creek, the South Santiam River, the Lebanon-Albany Canal, Mark's Slough, the Crown Creek and Little Oak Creek. Of these only Cox Creek, Oak Creek and the South Santiam River pose a significant flood hazard threat. The Lebanon-Albany Canal is primarily a water supply canal and receives very little storm drainage. The open channel segments of Mark's Slough, Crown Creek and Little Oak Creek originate at the outskirts of town and are not well developed within the UGB.

A flood plain study covering the portion of the South Santiam River within the Lebanon UGB was published in 1973 by the Federal Emergency Management Association (FEMA). Both Cox Creek and Oak Creek flow into the Willamette River and not the South Santiam River. The FEMA study includes only tributaries to the South Santiam and does not give any flood plain or flow information for Oak Creek or Cox Creek, both of which drain to the Willamette River.

This chapter will discuss the 100 year floodplain in Cox Creek and Oak Creek for existing conditions, future unimproved conditions, and future conditions after improvements. Only 1.5 square miles of the UGB drains to the South Santiam River, representing less than one percent of the total 687 square mile upstream drainage basin. Since any development in the UGB will have negligible effect on the South Santiam floodplain, a hydraulic analysis of this river was not conducted.

11.1 OAK CREEK

Oak Creek originates about 8 miles south of Lebanon, passes through the southeast corner of the UGB and eventually flows into the Willamette River. Oak Creek drains a total of 17.1 square miles upstream of the western edge of the UGB. Of this drainage, 2.3 square miles lies within the UGB, accounting for 13 percent of the total upstream area. The total flow in Oak Creek at the western edge of the UGB is 2440 cfs. After full buildout within the UGB, the total flow is 2500 cfs at this point.

Generally, Oak Creek is a well defined channel, approximately 7 feet deep with channel slopes of one-tenth to three-tenths of a percent in regions near the UGB. The overbank areas are extremely flat and have side slopes on the order of 1000 feet horizontal to one foot vertical. Bridges at Stotz Hill Road, Vaughn Lane, 5th Street and South Main Street cause minimal head loss at these road crossings. These roadways are typically one to two feet higher than the upstream overbanks. During the 100 year event, roadway

overtopping occurs only at the Vaughn Lane crossing. The 25 year event does not cause overtopping at any crossings.

Oak Creek adequately carries the future and existing 10 year flows within the channel throughout the modelled reach. East of Vaughn Lane, flooding 25 to 50 feet either side of the channel occurs during the 100 year event. West of Vaughn Lane, however, the 25 year, 50 year and 100 year all cause significant flooding of the overbank areas. West of Stoltz Hill Road, the 100 year floodplain varies in total width from 670 to 880 feet. Between Vaughn Lane and Stoltz Hill road backwater due to the Stoltz Hill crossing results in flood plain widths nearing 1000 feet. However, these flooded areas occupy only a small portion of the UGB and consist primarily of undeveloped pasture and agricultural lands. Flooding causes little to no damage under current conditions and flow increases due to expected future development have negligible impact on the creek capacity or the extent of flooding.

Figure 11.1 shows the existing 25 and 100 year floodplain for the portions of Oak Creek within the Urban Growth Boundary. Future flow increases will result in a negligible change in these boundaries and as discussed in Chapter 7, no improvements affecting the Oak Creek floodplain are scheduled within the next 20 years.

11.2 COX CREEK

Cox Creek originates in a system of poorly defined ditches draining open fields and the older, low density residential areas outside the existing city limits along the Santiam Highway. Cox Creek becomes a single, well defined channel in the vicinity of Walker Road. Below Walker Road, the creek is generally 3 to 5 feet deep with a channel slope of approximately two-tenths of a percent.

The creek channel lies in a shallow swale, with overbank areas extending on the order of a thousand feet, rising about one foot vertical for every 500 feet horizontal. Roadways crossing the creek are relatively flat for one to two thousand feet and force wide floodplains when flows exceeding the culvert capacities are reached. Generally, the road elevations are equivalent to the elevation of upstream lands and flooding is due to shallow sheet flow rather than deep backwater pools. The exception is the Lebanon Highway which is two to three feet higher than the upstream overbanks.

Peak flows in the mid-town area are in the 200 cfs to 400 cfs range and average 1 to 3 inches in depth when spread out over the roadways and floodplain areas. Due to the relatively small drainage basin contributing to Cox Creek's flows flooding during the 100 year event occurs over a one to three hour period with residual ponding in low lying areas.

A majority of the Cox Creek basin is within the city limits and consists of single and multi family residential areas. North of the Lebanon Highway, Cox Creek drains a portion of the Hansard Avenue industrial development. The drainage basin is about 70 percent developed. Future development is expected to occur south of Walker Road in the upper reaches of the basin as well as along the western edge of the UGB. The Hansard Avenue industrial development, currently under construction, in the northern portion of the UGB was treated as existing development for the purposes of the flood plain analysis.

The floodplain boundaries for Cox Creek were determined using the flow information given in chapter 6, and the hydraulic analysis presented in Chapter 7. These boundaries are shown in Figure 11.1, Floodplain Map.

11.2.1 Existing 100 Year Floodplain

All existing road crossings, with the exception of the large box culverts at Walker Road and Oak Street, have insufficient capacity to convey existing 100 year flows. Insufficient storage is available in the overbank areas to prevent overtopping of roadways and downstream properties are subject to shallow sheet flow.

Between Sixth Street and Airport Road water surface levels are forced to elevation 150 by undersized culverts at Sixth Street, Kees Street and Seventh Street. The excessively flat overbank in this region causes flow to spread out and travel overland through residential areas and the Cascades School property until higher elevations at Airport Road force flow back to a defined shallow swale.

Undersized culverts at Airport Road, F Street and 12th Street result in roadway overtopping and flooding of the residential areas between Airport Road and Oak Street. At Oak Street sufficient capacity is available in the existing box culvert, and flow is confined to the channel area.

Low lying residential areas below Sherman Street are flooded by shallow sheet flow due to overtopping. Upstream of the Lebanon Highway, backwater floods residential property with depths averaging 6 inches to 1 foot.

Downstream of the Lebanon Highway, Cox Creek floods undeveloped land zoned for industrial use.

11.2.2 Future Unimproved 100 Year Floodplain

Development in the Cox Creek basin has little effect on the floodplain in those areas where the roadway overtops for existing flows. Large flow widths over roadways allow the excess flow to be carried with a minimal increase in depth. However, the box

culverts at Oak Street and Walker Road do not have sufficient capacity to carry the excess flow due to development which is results in flooding where the existing flows were contained in the channel.

The creek channel is within a well defined swale at the point where Walker Road crosses. Consequently, overtopping of Walker Road results in only minor flooding downstream. Overtopping of Oak Street, however, causes sheet flow to flood the fire station as well as the large residential area upstream of Sherman Street. Downstream of the Lebanon Highway, increased flows result in a greater flow depth through the undeveloped land.

11.2.3 Future Improved 100 Year Floodplain

Chapter 7 recommends the improvements to Cox Creek necessary to ensure limited flooding after future development. The recommended improvements reduce flows by diverting upstream basins and providing detention upstream of F Street, replace necessary culverts, and reditch inadequate sections of the Creek. As a result of the improvements, the flood plain is confined to undeveloped portions of the overbanks throughout a majority of the UGB. Flooding occurs, however, during the 100 year event at both 12th Street and Sherman Street. In each case, overtopping results in shallow sheet flow over the roadways for a two hour period during the 100 year event.

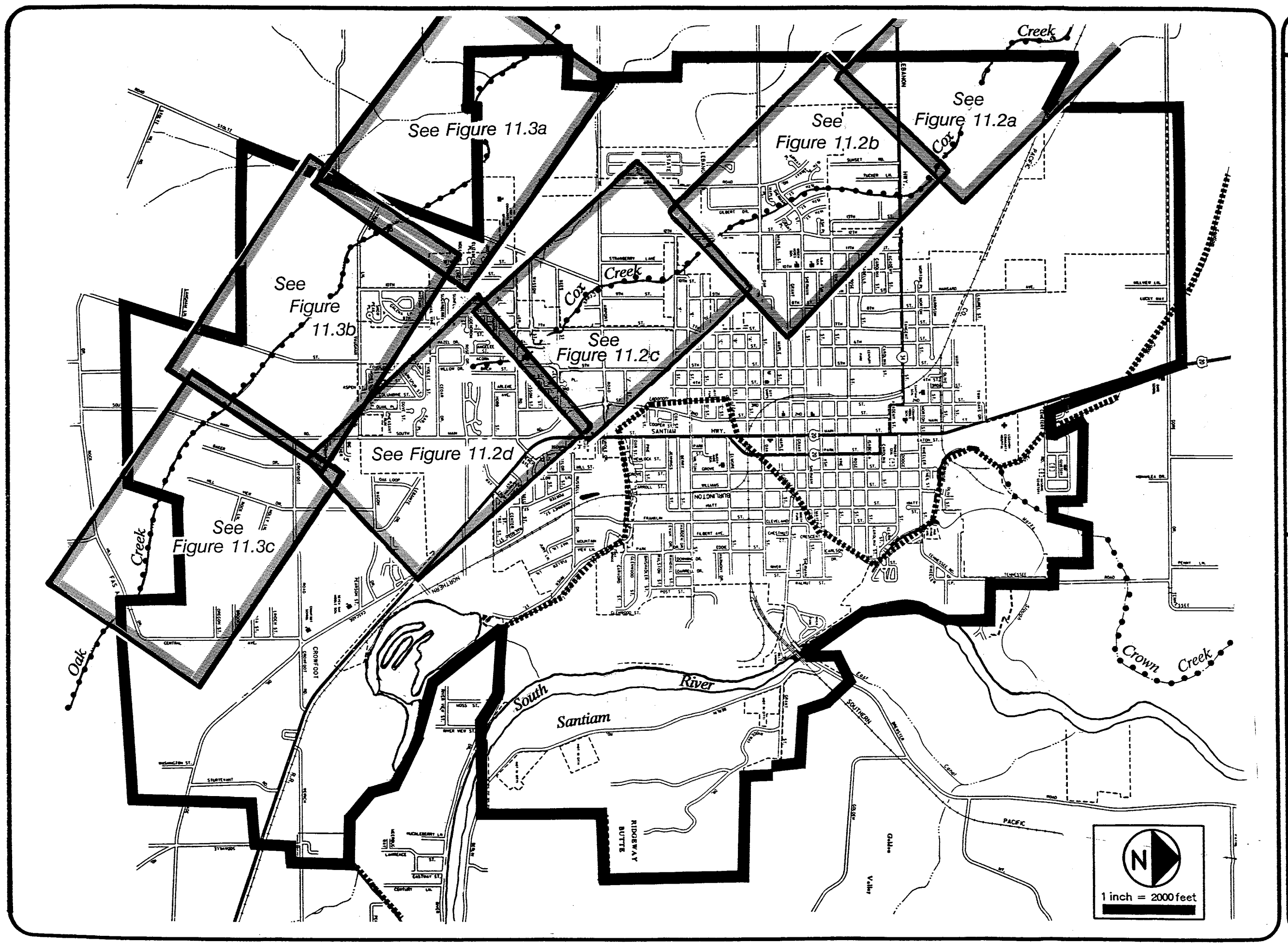


FIGURE 11.1

FLOOD PLAIN MAP
REFERENCE SHEET

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

DATE
MAR 1991

PROJECT NO.
292 DP 11

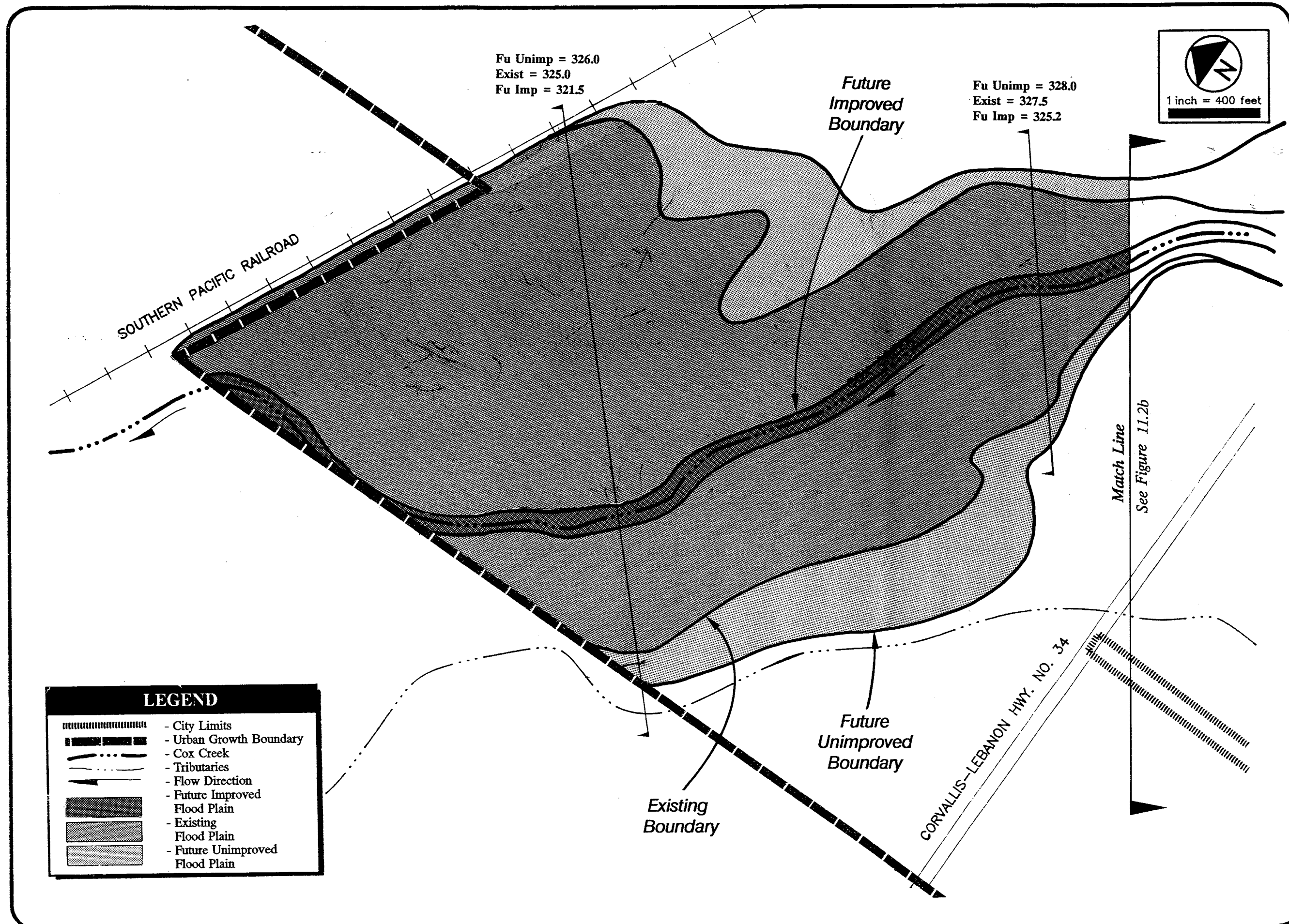


FIGURE 11.2a

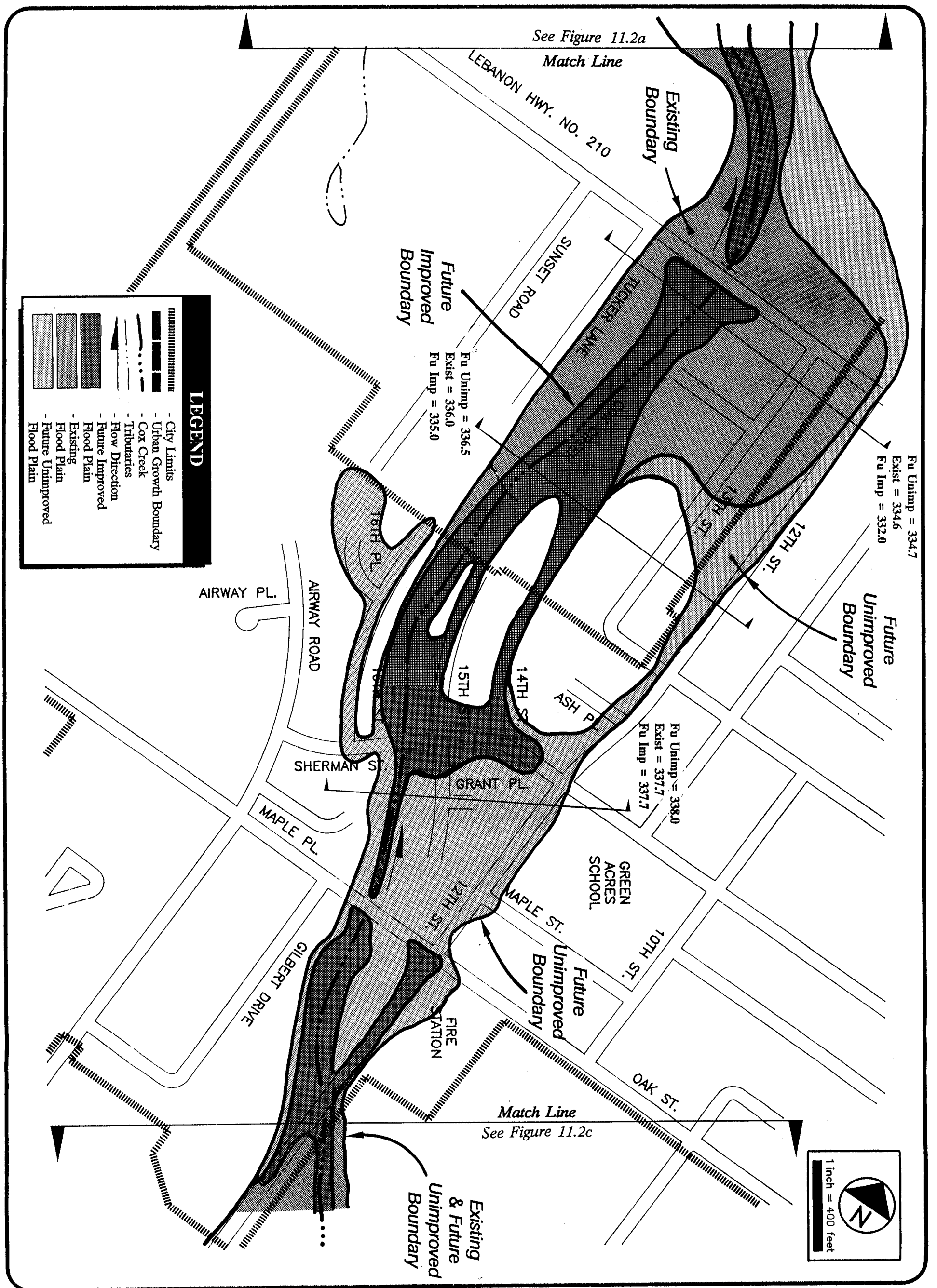
COX CREEK 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

DATE
MAR 1991

PROJECT NO.
292 DP 11 DO



DATE MAR 1991
PROJECT NO. 292 DP 11 DO

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

COX CREEK 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

FIGURE 11.2b

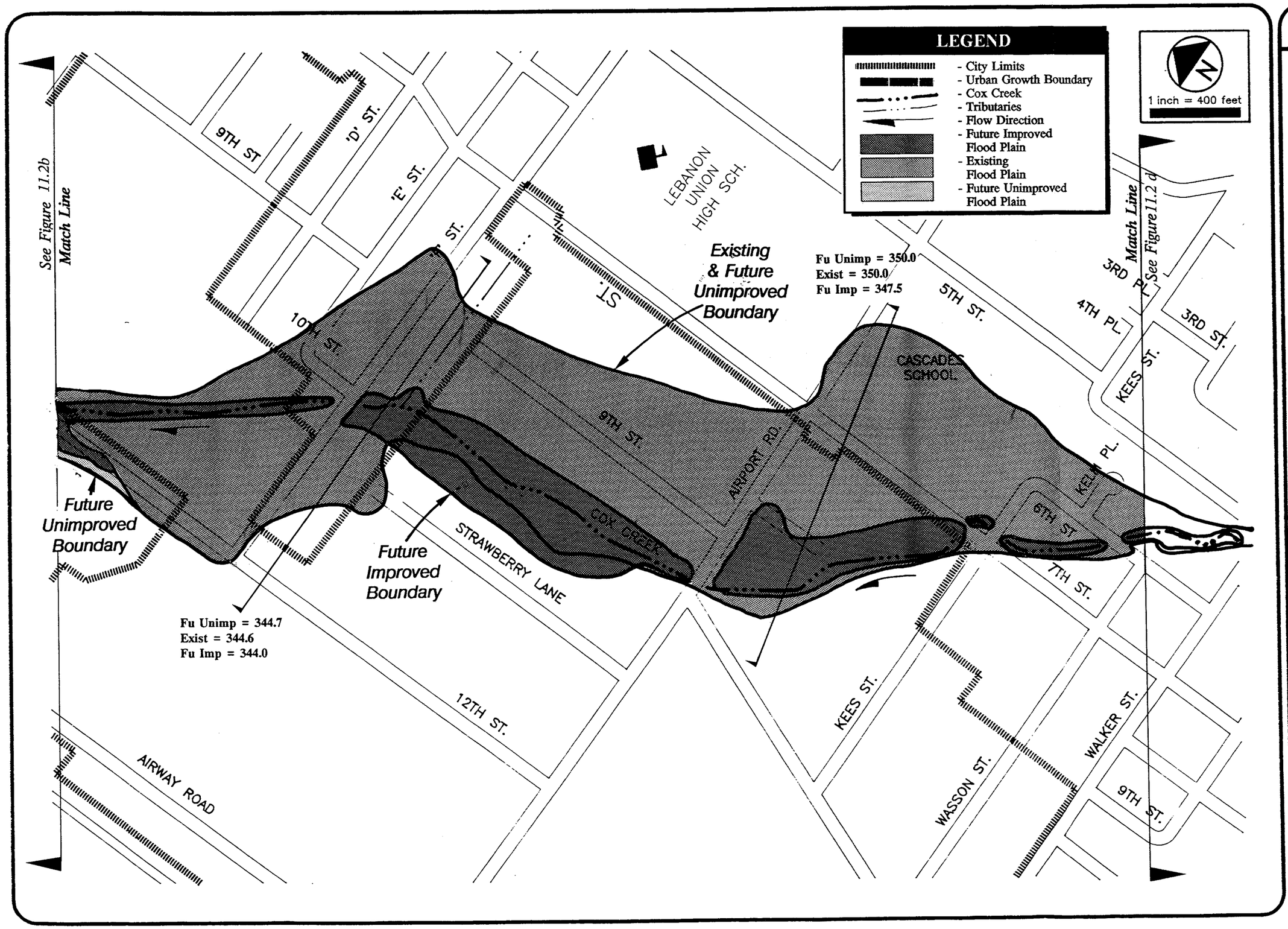


FIGURE **11.2c**

COX CREEK 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

DATE
MAR 1991

PROJECT NO.
292 DP 11 00

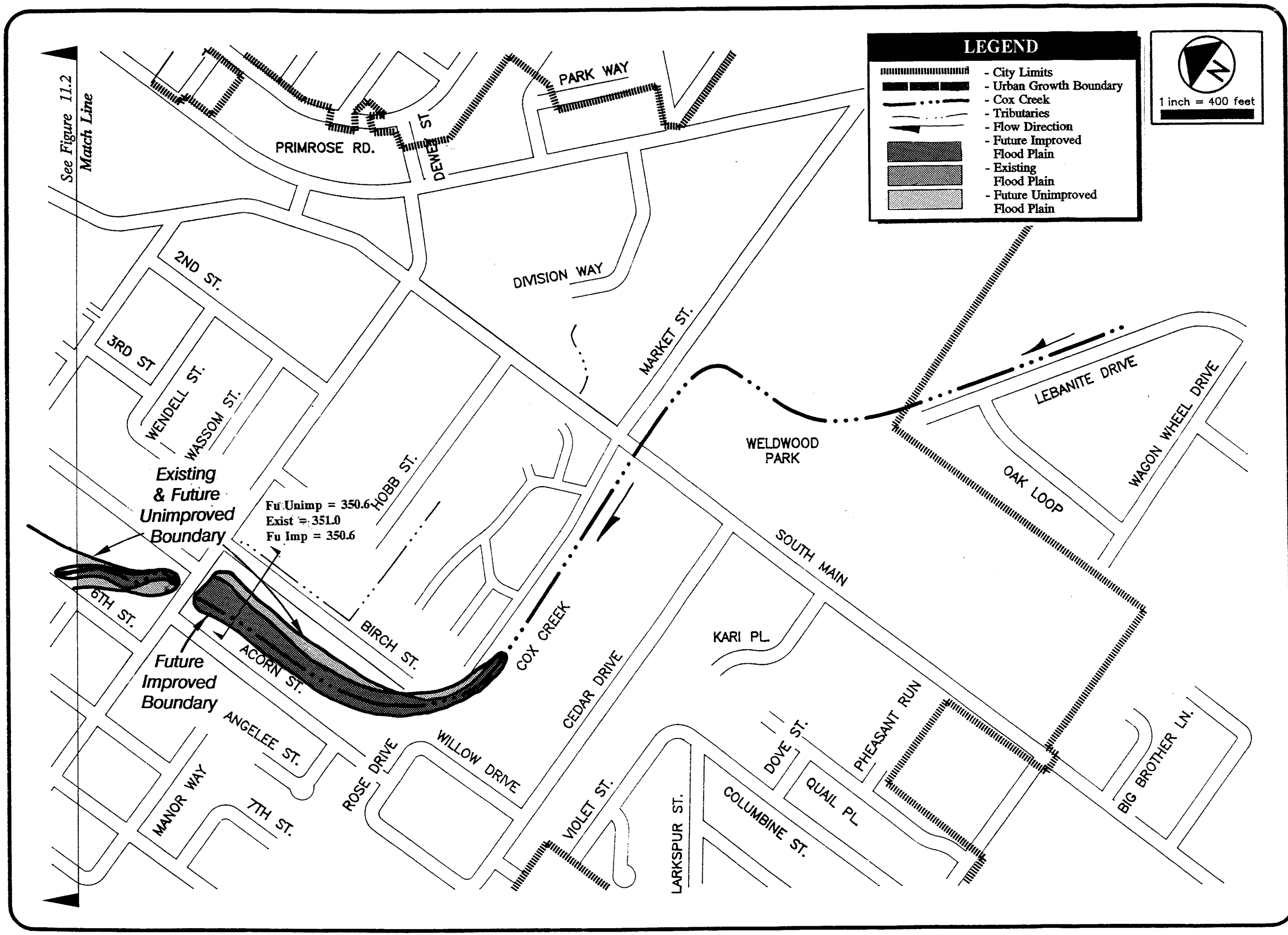


FIGURE 11.2d

COX CREEK 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON
(503) 228-7718

DATE
MAR 1991

PROJECT NO.
292 DP 11 DO

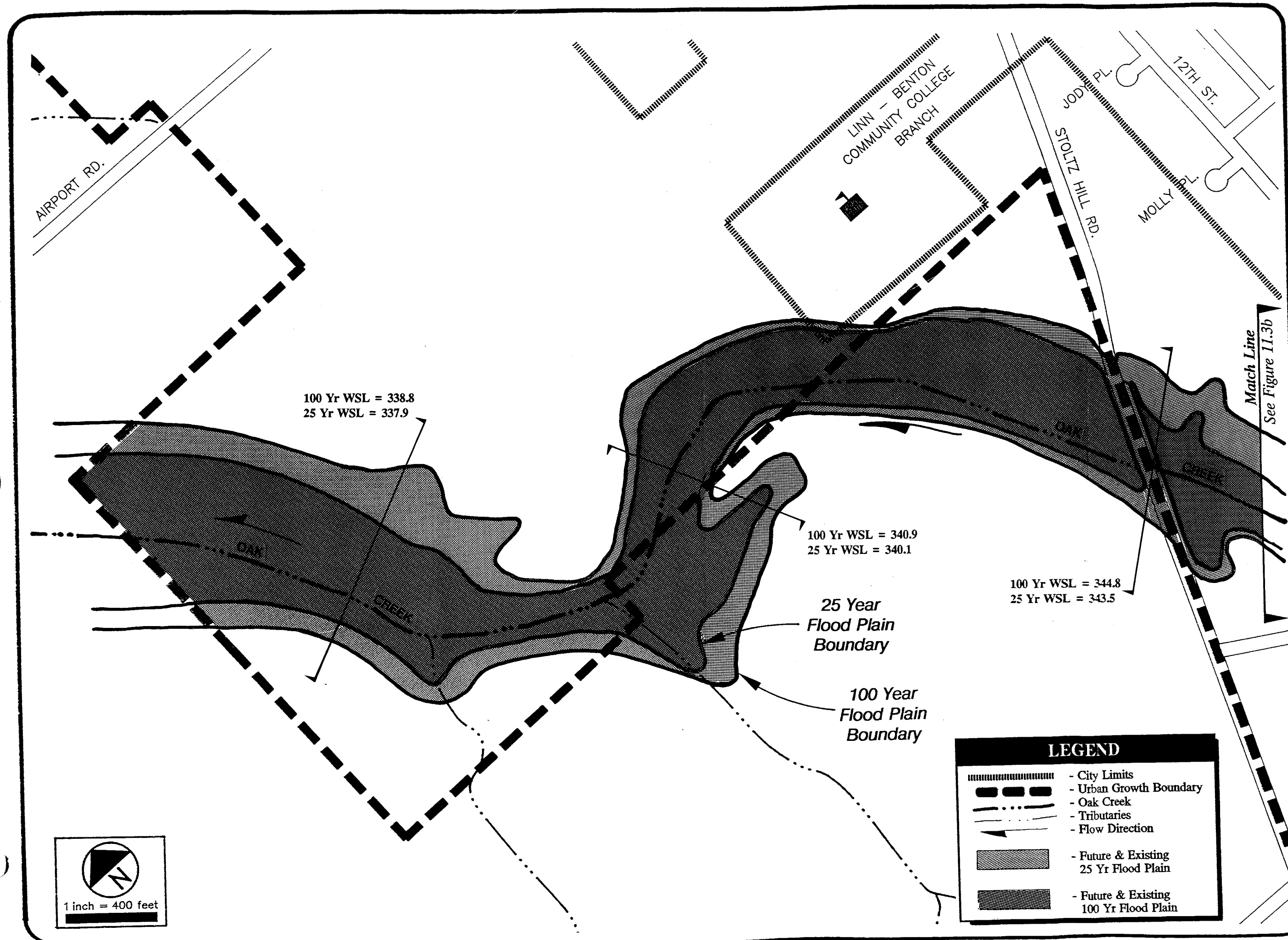


FIGURE 11.3a

OAK CREEK 25-YEAR & 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON
(503) 228-7718

DATE
MAR 1991

PROJECT NO.

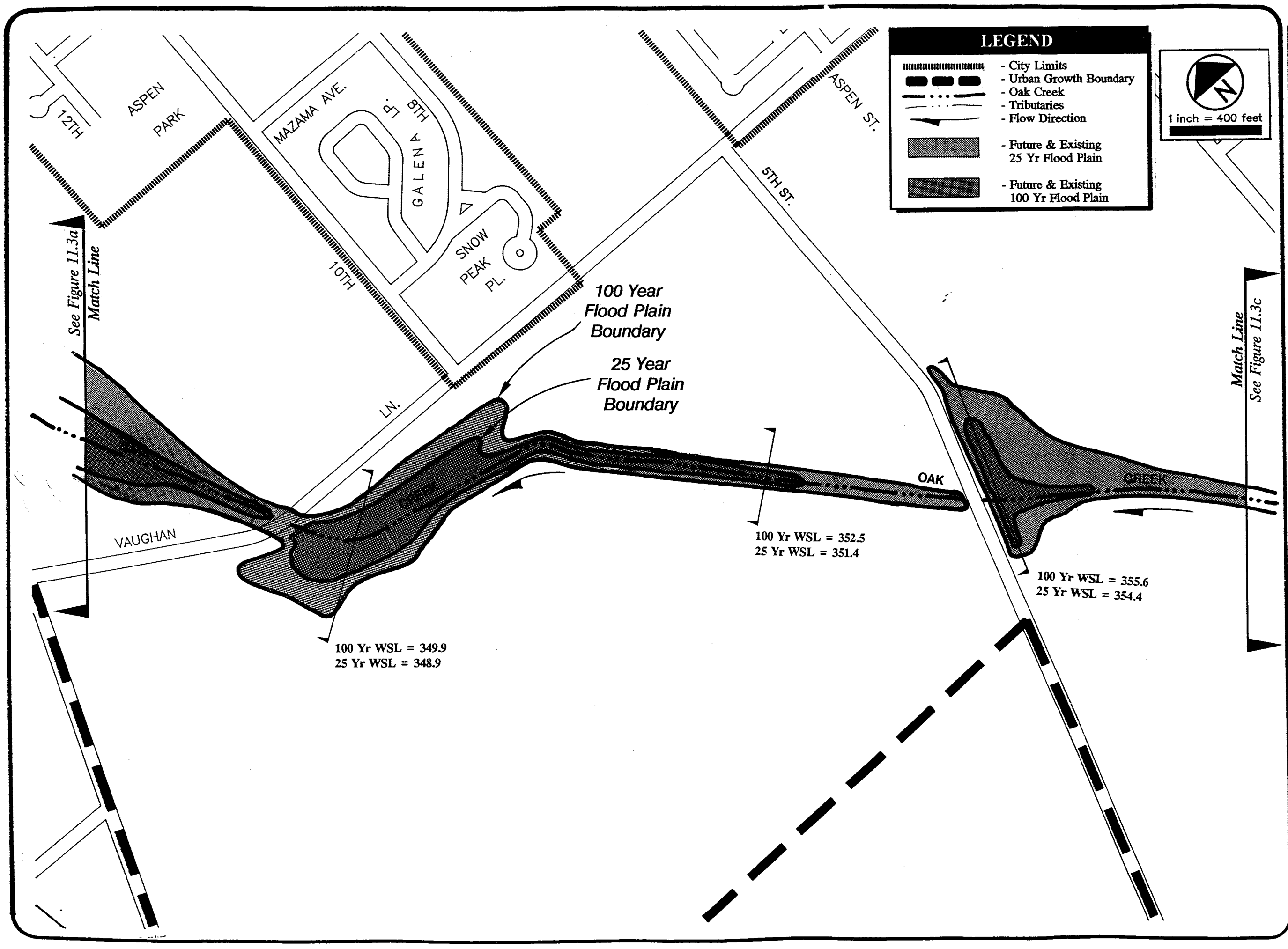


FIGURE 11.3b

OAK CREEK 25-YEAR & 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

DATE MAR 1991

PROJECT NO.

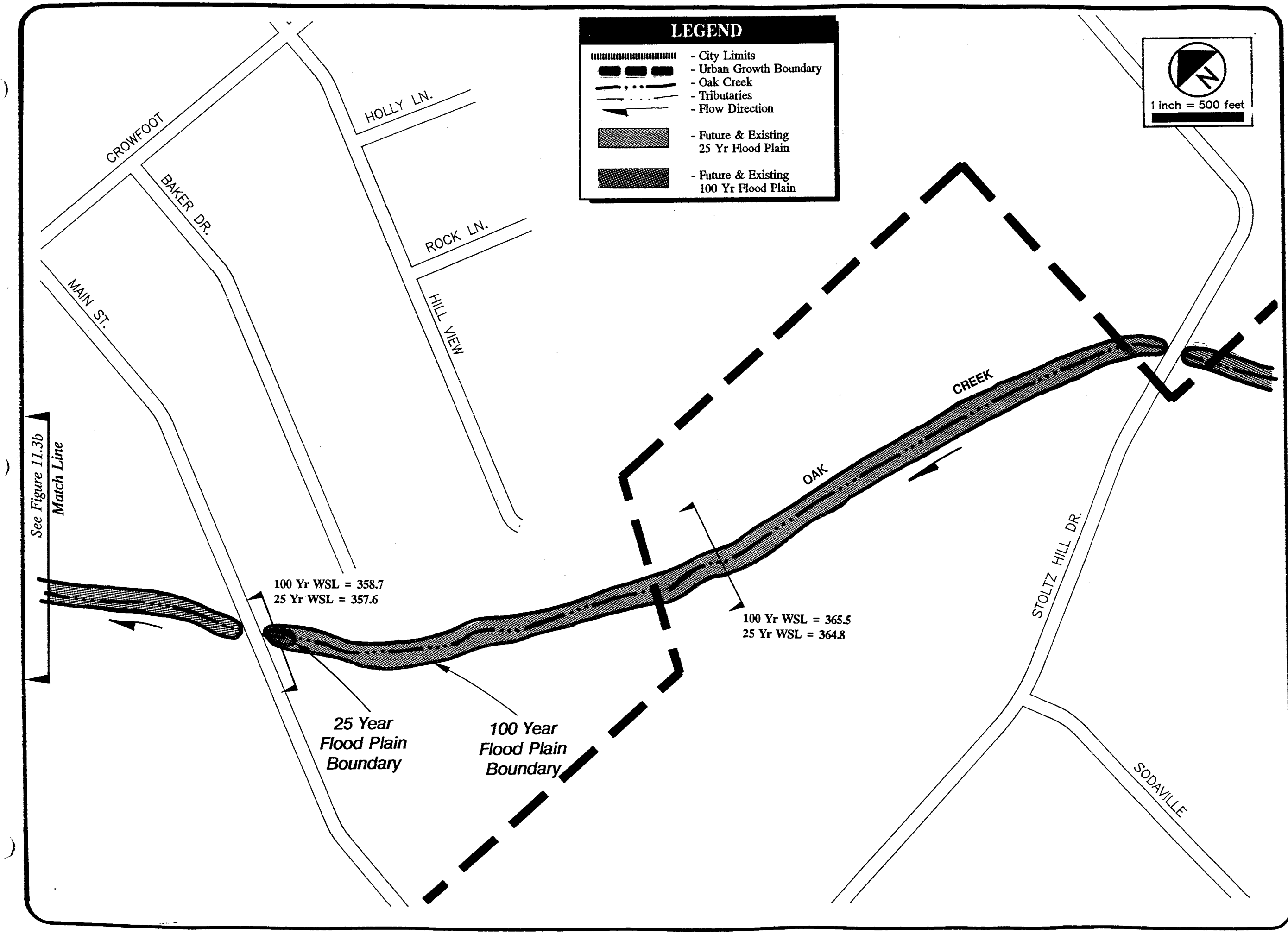


FIGURE 11.3c

OAK CREEK 25-YEAR & 100-YEAR FLOOD PLAIN MAP

CITY OF LEBANON
Storm Drainage Master Plan

DAVID J. NEWTON ASSOCIATES INCORPORATED
CIVIL & GEOLOGICAL ENGINEERING
1201 SW 12TH AVENUE SUITE 620
PORTLAND, OREGON (503) 228-7718

DATE
MAR 1991

PROJECT NO.