RENO ~ NEVADA

A
REPORT
ON

• STORM DRAINAGE
• SANITARY SEWERAGE

OCTOBER 1957

ENGINEERING OFFICE OF CLYDE C. KENNEDY • SAN FRANCISCO

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

RECOMMENDING A PROGRAM OF CONSTRUCTION TO MEET EMERGENCY, ESSENTIAL AND ULTIMATE NEEDS

CITY OFFICIALS

LEN HARRIS	MAYOR	CHARLES COWEN	COUNCILMAN
C. B. KINNISON	CITY MANAGER	WILLIAM L. FOSTER	COUNCILMAN
SAMUEL B. FRANCOVICH	CITY ATTORNEY	BEN MAFFI	COUNCILMAN
BRUCE D. ROBERTS	ASS'T CITY ATTORNEY	JOSEPH MASTROIANNI	COUNCILMAN
ELLIOTT R. CANN	CITY ENGINEER	H. A. MATHISEN	COUNCILMAN
ELLIOTT GILL	CITY CLERK	RUSSELL MILLS	COUNCILMAN

ENGINEERING OFFICE OF CLYDE C. KENNEDY • SAN FRANCISCO

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INTRODUCTION

The flooding of areas of the City of Reno has been a problem of serious consequence for many years. Recent severe floods of 1950, 1952 and 1955 have focused attention on the problem of flood control and storm drainage.

The Truckee River basin has experienced disastrous floods from torrential rainfall, storms of long duration and relatively low intensity, and from rapid spring melting of mountain snow packs. The Peavine Area northwest of Reno and the area southwest of Reno contribute storm flow generally resulting from short duration storms of high intensity. Storm waters from these sources must pass through the City of Reno because of the topography of the area. Inadequate capacity of channels and drainage structures in the Truckee River basin cause the storm waters to leave the normal channels of flow and spread out over extensive areas, causing flood damage to public works and private property.

The problem of storm drainage in Reno is complicated by the existence of a combined system of sewers. Both domestic sewage and storm waters from a large portion of the city are collected and conveyed in a common network of pipes to the sewage treatment plant. During periods of heavy storm water runoff the capacity of the pipe system is exceeded. In some low areas of the city the surcharge of the sewers causes overflow through the manholes, flooding large areas. As a consequence, extensive damage to public works and private property and interruption of public and private transportation results. Even more serious is the severe public health hazard created by the overflow of domestic sewage. An added burden is placed on sewage pumping facilities and sewage treatment works.

Recognizing the seriousness of the problem, the City of Reno retained the Engineering Office of Clyde C. Kennedy in February 1957 to make an engineering study and report on storm drainage and sanitary sewerage requirements for the existing City of Reno and the designated metropolitan Reno area. The metropolitan Reno area is shown on Plate 16.

The scope of the study and report in accordance with the contract includes:

1. Determination of existing domestic sewerage trunk line and storm drainage trunk line facilities.

2. Determination of requirements for adequate domestic sewerage and storm drainage for the existing City of Reno and the metropolitan Reno area.

3. Development of a Master Plan for domestic sewerage and storm drainage to meet requirements determined for the existing City of Reno and the metropolitan Reno area.

4. Preparation of a report and cost estimate for Master Plan for domestic sewerage and storm drainage divided by classification of importance into emergency, essential, and ultimate work.

Emergency construction includes the construction of storm drainage or domestic sewerage facilities critically needed now to reduce major storm water damage and to eliminate damage and public health hazard resulting from the overflow of sanitary sewers. Essential construction includes the construction of storm drainage or domestic sewerage facilities needed in addition to those classed as emergency construction. This construction will alleviate less critical storm water damage and provide additional sanitary sewerage capacity where needed for present flow or where imminent increase in flow can be foreseen. Ultimate construction includes the construction of storm drainage and domestic sewerage facilities needed in addition to those classed as emergency and essential construction to provide adequate capacity for storm drainage and domestic sewerage facilities by the year 1975.

The study and report are limited to a consideration of the trunk line facilities needed for the domestic sewerage and storm drainage systems. No detail study has been made of the present collection systems for domestic sewerage or storm drainage, or of the collection systems required to serve future areas of development. However, capacity has been reserved in the trunk line facilities of the domestic sewerage and storm drainage systems to permit development of the metropolitan Reno area.

No study has been made of the capacity of or the functional adequacy of the existing sewage treatment plant facilities. Domestic sewage from areas within the metropolitan Reno area can be conveyed to the present sewage treatment plant site. However, before present facilities are enlarged or expanded a critical evaluation of the units in the treatment plant should be made and some consideration should be given to a sewage treatment plant to be located at the east end of Truckee Meadows.

Parallel study of the major flood control problems on the Truckee River and in the Peavine Area, now being completed by governmental agencies is considered beyond the scope of this report.

It should be understood that the construction of the necessary flood control works on the Truckee River and in the Peavine Area must be completed before a proper functioning integrated storm drainage system can be provided.

SANITARY SEWERS

1. The separation of storm drainage waters from the sanitary sewers is necessary to the proper functioning of the sanitary sewerage system.

2. Existing trunk sanitary sewers are adequate, with minor exceptions, to carry present sanitary sewage flow.

3. Existing trunk sanitary sewers, with minor exceptions, are fully usable and can be integrated into the Master Plan for Sanitary Sewerage.

4. The recommended construction of Master Plan for sanitary sewers can be completed in logical steps based on priority of need.

5. The project estimate of cost of recommended construction of Master Plan, Sanitary Sewers, is:

EMERGENCY CONSTRUCTION	$ 60,000
ESSENTIAL CONSTRUCTION	117,000
ULTIMATE CONSTRUCTION	478,000
Total	$655,000
Plans and Specifications and Supervision of Construction	65,000
TOTAL PROJECT COST	$720,000

Costs of right-of-way, if required for the sanitary sewerage system, and financing costs have not been included in the project cost.

STORM DRAINAGE

1. The proper functioning of any storm drainage system for Reno and the metropolitan Reno area is dependent upon the prior construction of adequate flood control works on the Truckee River and in the Peavine Area.

2. There is no adequate storm drainage system in Reno or the metropolitan Reno area.

3. The construction of an integrated storm drainage system and the concurrent separation of storm drainage connections to the sanitary sewerage system is necessary to prevent recurrent damage to public works and private property and serious public health hazard resulting from overflow of combined sewers.

4. Existing storm drains are usable and can be integrated into the Master Plan for Storm Drainage.

5. The recommended construction of Master Plan for Storm Drainage can be completed in logical steps based on priority of need.

6. The project estimate of cost of recommended construction of Master Plan, Storm Drainage, is:

EMERGENCY CONSTRUCTION	$2,497,000
ESSENTIAL CONSTRUCTION	4,201,000
ULTIMATE CONSTRUCTION	1,472,000
Total	$8,170,000
Plans and Specifications and Supervision of Construction	654,000
TOTAL PROJECT COST	$8,824,000

It is estimated that a total of 88 acres of right-of-way will be required for the construction of the storm drainage system, 19 acres for emergency construction, 29 acres for essential construction and 40 acres for ultimate construction. Costs of right-of-way and financing costs have not been included in the project cost.

SANITARY SEWERS MASTER PLAN

Plate 1 shows the Master Plan of Sanitary Sewers for the City of Reno and the metropolitan Reno area.

The system of trunk sanitary sewers shown consists of existing trunk sewers which are adequate, and trunk sewers required under a priority program including emergency construction, essential construction and ultimate construction. All trunk sewers required to serve the area outside of the present city limits of Reno but within the metropolitan Reno area are not shown, but capacity is provided in the system of trunk sewers to serve this area.

In order to provide an adequate trunk sewer system for sanitary sewage it is necessary to construct a separate storm drainage system concurrently. The flow of storm water in the sanitary sewers can then be eliminated. After the elimination of storm water many of the existing sanitary sewers will be adequate to carry the ultimate flow.

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SCALE IN FEET

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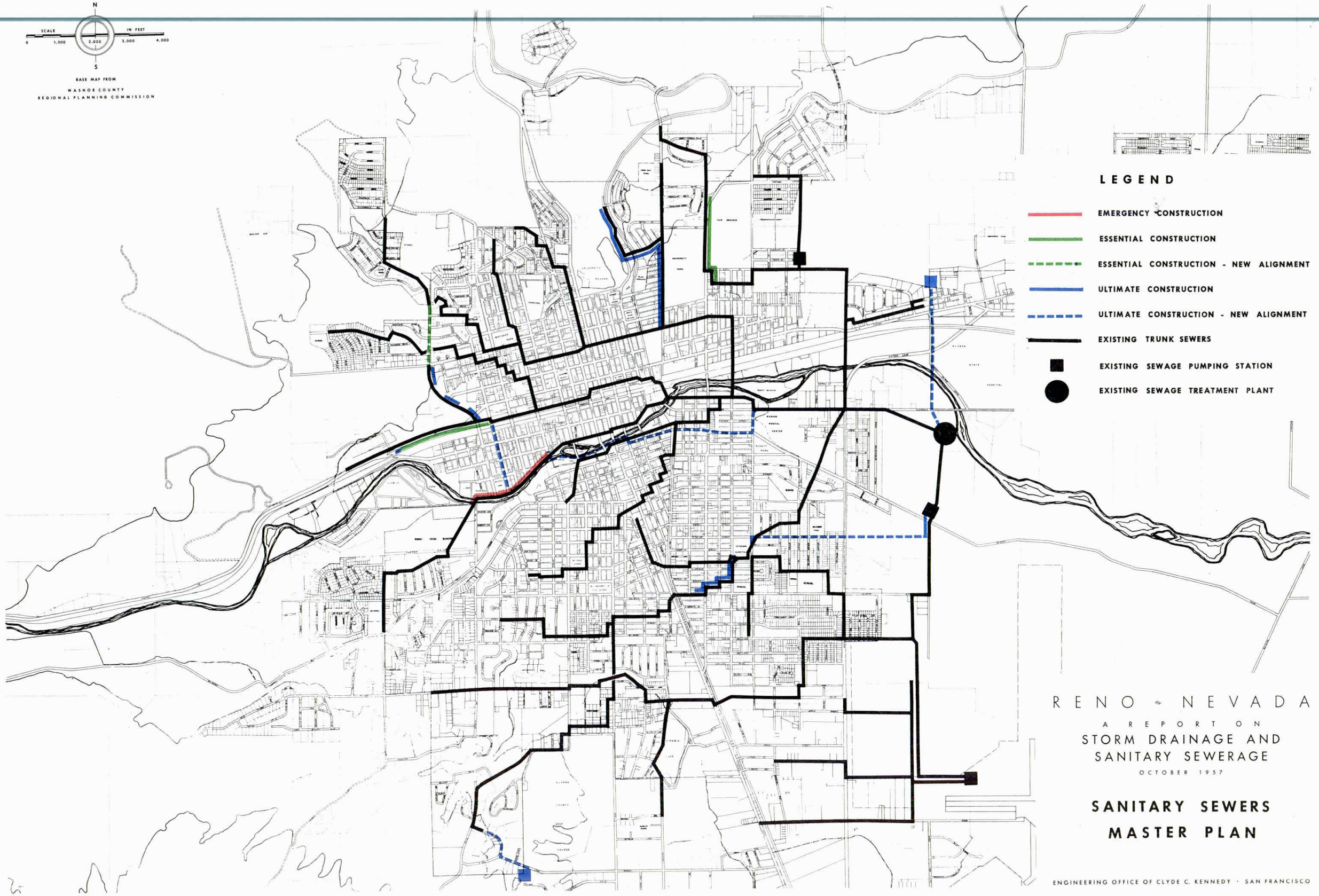
BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ESSENTIAL CONSTRUCTION - NEW ALIGNMENT
- ULTIMATE CONSTRUCTION
- ULTIMATE CONSTRUCTION - NEW ALIGNMENT
- EXISTING TRUNK SEWERS
- EXISTING SEWAGE PUMPING STATION
- EXISTING SEWAGE TREATMENT PLANT

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SANITARY SEWERS MASTER PLAN

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 1

N

SCALE IN FEET

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BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DRAINAGE DITCH

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STORM DRAINAGE MASTER PLAN

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CRITERIA FOR SANITARY SEWERAGE

To determine the requirements for sanitary trunk sewer facilities for the City of Reno and the metropolitan Reno area criteria for establishing the adequacy of existing trunk sewers and the need for future trunk sewers were studied.

Maps showing existing sanitary sewers were furnished by the city and locations were confirmed by field investigation. An intensive field check was carried out to complete the plan where information was inadequate.

A complete field investigation was made to determine the areas of the city where there are storm drainage connections from catch basins or gutter drains to sanitary sewers.

A contour map of Reno was furnished by the city and supplemented by the U.S. Geological Survey map to aid in determining the sanitary sewer requirements in areas of future development.

A study of present population and population trend in Reno was based on the U.S. Census Bureau Reports, Reno voter registration by wards, Reno public school enrollment, fire insurance underwriters' maps, aerial photographs, and population studies by the Reno Chamber of Commerce and the Western Nevada Industrial Development Commission.

A thorough field investigation of undeveloped areas adjacent to built-up areas in the city was made to determine the most probable areas of future growth.

Measurements of existing sanitary sewage flow were made throughout the system to determine the character and amount of flow.

After careful consideration the criteria for determination of sanitary sewerage facilities was set as follows:

1. The separation of existing storm drainage facilities from the existing sanitary sewerage system is required for proper functioning of the sanitary sewerage system. Analysis of the sanitary sewerage system was made on this basis.

2. The present population of the City of Reno is considered to be 50,000, based on analysis of available population data.

3. The population of the metropolitan Reno area in 1975 is predicted to be 110,000, based on present population and predicted future growth.

4. The average daily per capita domestic sewage flow in residential areas is approximately 150 gallons. This quantity is used to estimate domestic sewage flow in areas of residential development.

5. An evaluation of flow quantities contributed by transient population, industries and commercial development has been made. These flow quantities have been considered where applicable.

6. Infiltration of ground water into sanitary sewers is based on study of measured sanitary sewage flow and estimated tributary population.

7. Population density for existing sewered areas in 1975 are considered to be:

Description	Zone	Persons/Acre
Estates Residence	E	3
Single Family Residence	R-1	12
Two Family Residence	R-2	14
Multiple Family Residence	R-3	14
Residence-Commercial Transition District	R-C	15
Neighborhood Commercial	C-1	6
Local Commercial	C-2	6
General Commercial	C-3	15
Light Manufacturing	M-1	1
Industrial Estates	M-E	1
Tourist and Trailer	T-T	30
Agriculture	A-1	4.5

8. Future areas will be developed in accordance with the Land Use Plan of the City of Reno and Washoe County zoning ordinance.

AREAS SERVED BY EXISTING SANITARY SEWERS

Plate 3 shows areas served by existing sanitary sewers. Colored areas indicate the areas that are tributary to the main trunk sewers. Key numbers for sewer districts refer to areas which are shown in more detail on Plates 6 to 13. Also shown is the existing trunk sewer system.

The present developed area within the City of Reno is served by a system of trunk sewers which terminate at the sewage treatment plant located south of Glendale Road adjacent to the Truckee River.

The trunk sewer system is chiefly a gravity system, with only three pump lift stations. Where the trunk sewers cross the Truckee River, there are two crossings under the river and two bridge crossings. Small sewers up to 15-inch diameter are generally vitrified clay or concrete. Sewers over 15-inch diameter are generally concrete. Manholes are spaced to promote reasonable maintenance. The sewage treatment plant is a secondary treatment plant with high rate trickling filters and separate sludge digestion. The plant has a stated nominal capacity of 20 million gallons per day.

The existing trunk sanitary sewers generally are adequate to serve the present requirements during the seasons of the year when surface storm drainage does not enter the system.

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SCALE IN FEET

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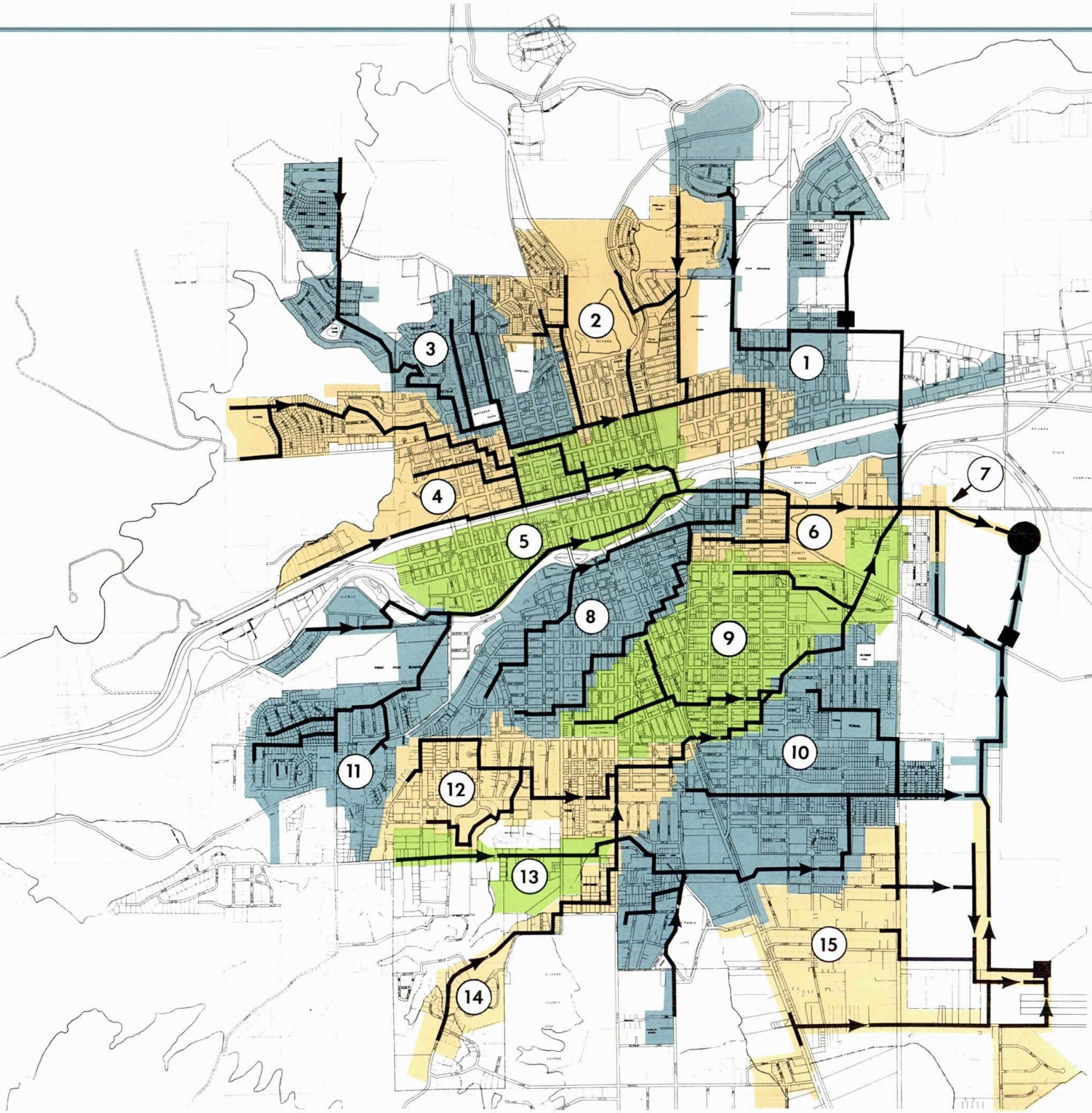
BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION



LEGEND

ALTERNATE COLORS INDICATE AREAS SERVED BY SANITARY SEWERS

EXISTING SANITARY SEWER AND DIRECTION OF FLOW

SEWAGE PUMPING STATION

SEWAGE TREATMENT PLANT

10 KEY NUMBER FOR EXISTING SEWER DISTRICTS

SOURCE - OFFICE OF CITY ENGINEER AND FIELD INVESTIGATIONS

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AREAS SERVED BY EXISTING SANITARY SEWERS

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

LAND USE DISTRICTS

Plate 4 shows the Land Use Plan for the City of Reno and the Reno metropolitan area. The Land Use Plan of the City of Reno was adopted on March 11, 1957 as a part of the Master Plan of Reno, Nevada. Zoning of areas outside the City of Reno is in accordance with the County of Washoe zoning ordinance.

For the purpose of this study and report some land use classifications have been combined for simplicity. For example, all commercial districts are shown under the same color.

For the study of sanitary sewers the Land Use Plan was used to estimate the population density for areas of future development.

For the study of storm drainage the Land Use Plan was used to estimate the percent of runoff of storm water from areas of present and future development.

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SCALE IN FEET

0 1,000 2,000 3,000 4,000

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BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

SOURCE - ZONING MAP FURNISHED BY THE REGIONAL PLANNING COMMISSION

LAND USE DISTRICTS

E1 - FIRST ESTATES RESIDENTIAL DISTRICT

R1 A, R1 - SINGLE-FAMILY RESIDENTIAL DISTRICTS

R2,R3,RC - TWO-FAMILY, MULTIPLE-FAMILY AND TOURIST DISTRICTS

C1,C2,C3 - COMMERCIAL DISTRICTS

M1,ME -INDUSTRIAL DISTRICTS

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LAND USE DISTRICTS

UNDER PRESENT ZONING REGULATIONS

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 4

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SCALE IN FEET
0 500 1,000 1,500 2,000

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BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

NOTE: FLOOD AREAS SHOWN ARE BASED ON RECORDS COMPILED BY THE CITY OF RENO ENGINEERING DEPARTMENT.

LEGEND

- TRUCKEE RIVER FLOOD PLAIN
- LOCAL DRAINAGE FLOOD AREAS
- AREAS SUBJECT TO SANITARY SEWER BACKWATER CAUSED BY STORM DRAINAGE

RENO NEVADA

ADDENDUM REPORT

STORM DRAINAGE

AUGUST- 1963

MAJOR FLOOD AREAS

FEBRUARY 1963 FLOOD

CITY OF RENO - DEPARTMENT OF ENGINEERING
KENNEDY ENGINEERS - CONSULTING ENGINEER

PLATE

AREAS WHERE EXISTING SANITARY SEWERS COLLECT SURFACE DRAINAGE

Plate 5 shows areas of the city where surface storm drainage is collected in the sanitary sewers. The drainage water is collected through many direct connections of catch basins to sanitary sewers. The areas where the sewers serve as combined storm and sanitary sewers are extensive.

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SCALE IN FEET

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BASE MAP FROM
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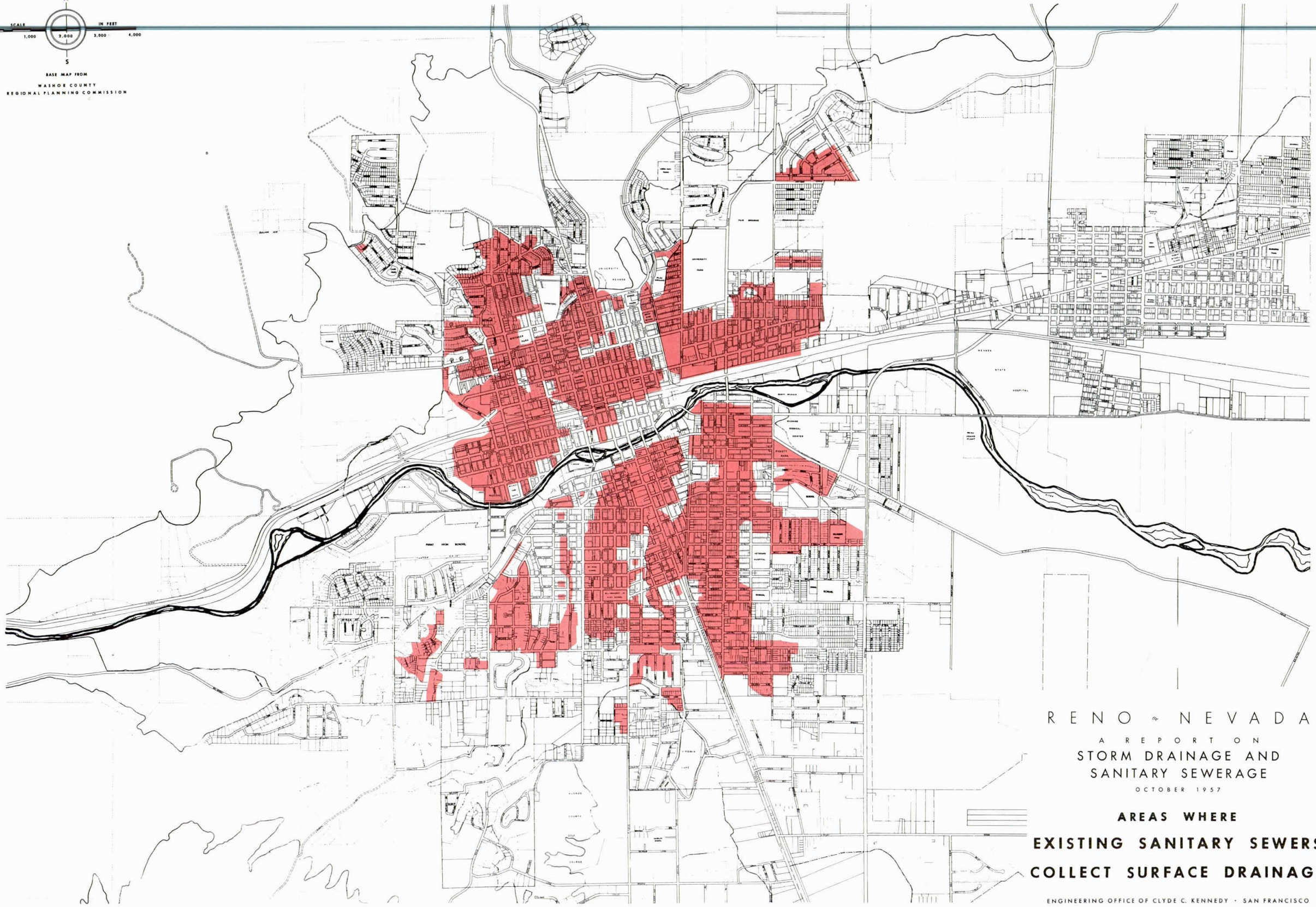
REGIONAL PLANNING COMMISSION



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AREAS WHERE

EXISTING SANITARY SEWERS COLLECT SURFACE DRAINAGE

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 5

SANITARY SEWERS MASTER PLAN

AREA 1

1. Description. Area 1 includes residential areas and a small light manufacturing area. The land use map indicates that the area is zoned for residential and light manufacturing use and that the adjacent area to the north and east is zoned for light manufacturing and residential use. Part of the present sewered area is served by gravity sewers; the balance of the area is served by a pump lift station.

2. Problem. Approximately 30 percent of the area surface storm water is carried to the sanitary sewers. During periods of snow melt or rainfall the trunk sewers cannot carry the additional storm water and are surcharged.

The Sewage Lift Station on East Ninth Street has only one pump and no standby power.

The trunk sewer along Wells Avenue from Winston Drive to East Ninth Street becomes surcharged during hours of peak dry weather flow of sanitary sewage.

The trunk sewer between East Fifth Street and U.S. Highway 40 from the Reno-Sparks city limits to Kietske Lane has no capacity for additional flow.

The trunk sewer on Kietske Lane from East Fifth Street to Glendale Road has no capacity for additional flow.

Future development northeasterly to the Sparks city limits and Sullivan Lane cannot be adequately served by existing sanitary trunk sewers.

3. Recommended construction.

a. Essential construction.

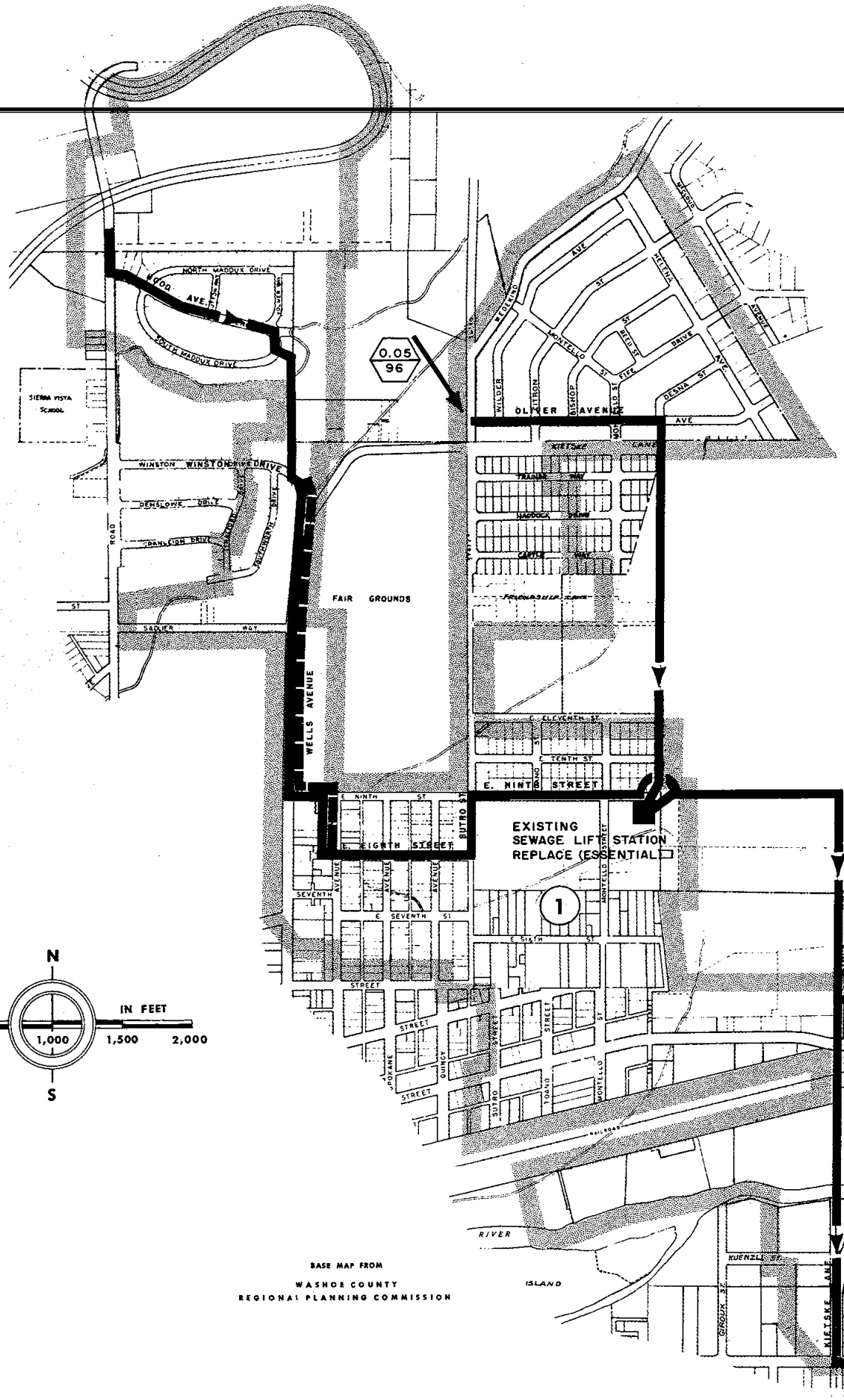
(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

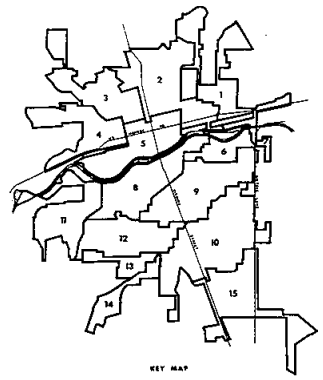
(2) Construct Sewage Lift Station on East Ninth Street to replace existing inadequate Sewage Lift Station.

(3) Construct a relief trunk sewer along Wells Avenue from Winston Drive to East Ninth Street, along East Ninth Street from Wells Avenue to the first alley east of Wells Avenue, south in this alley to East Eighth Street.

b. Ultimate construction.

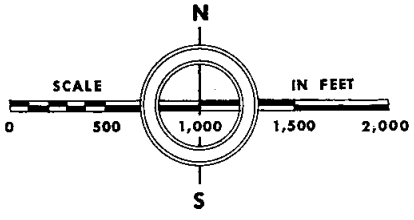
(1) Construct a Pump Lift Station near East Fifth Street and the Reno-Sparks city limits to serve the area northeasterly to the Sparks city limits and Sullivan Lane. Construct a force main and trunk sewer from the Pump Lift Station to the existing Sewage Treatment Plant.





LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
- 0.90 / 170 — PEAK FLOW FROM NEW DEVELOPMENT IN MILLION GALLONS PER DAY, YEAR 1975; TRIBUTARY AREA OF NEW DEVELOPMENT IN ACRES
- EXISTING SEWERED AREA BOUNDARY



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OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREA 1

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 6

SANITARY SEWERS MASTER PLAN

AREA 2

1. Description. Area 2 is primarily residential but includes some light manufacturing and commercial areas and the University of Nevada. The land use map indicates that the area is zoned for residential, light manufacturing and commercial use and the adjacent area to the north is primarily zoned for residential use, with a small light manufacturing area in the northeast. The present sewered area is served by gravity sewers.

2. Problem. Approximately 30 percent of the area surface storm water is carried to the sanitary sewers. During wet weather the trunk sewers cannot carry the additional storm water and are surcharged.

The sewer on Evans Avenue from Brooks Street to Highland Avenue and on Highland Avenue from Evans Avenue to Valley Road has insufficient capacity to carry the sanitary sewage flow from future development areas.

The sewer along Valley Road from Highland Avenue to East Sixth Street has insufficient capacity to carry the flow of sanitary sewage from future development areas.

Future development areas can be adequately served by existing sewers except as noted above.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

b. Ultimate construction.

(1) Construct a relief trunk sewer on Evans Avenue from Brooks Street to Highland Avenue and on Highland Avenue from Evans Avenue to Valley Road. Construct a relief trunk sewer on Valley Road from Highland Avenue to East Sixth Street.

AREA 3

1. Description. Area 3 includes residential areas only. The land use map indicates that the area and the adjacent area to the north and west is zoned for residential use. The present sewered area is served by a gravity system.

2. Problem. Approximately 50 percent of the area surface storm water is carried to the sanitary sewers. During periods of wet weather flow the trunk sewers cannot carry the additional storm drainage, and are surcharged.

The sewer on Sycamore Way southerly from University Terrace and in an easement southerly from Sycamore Way to West Seventh Street becomes surcharged during hours of peak dry weather flow of sanitary sewage.

Future development cannot be adequately served by existing trunk sewers.

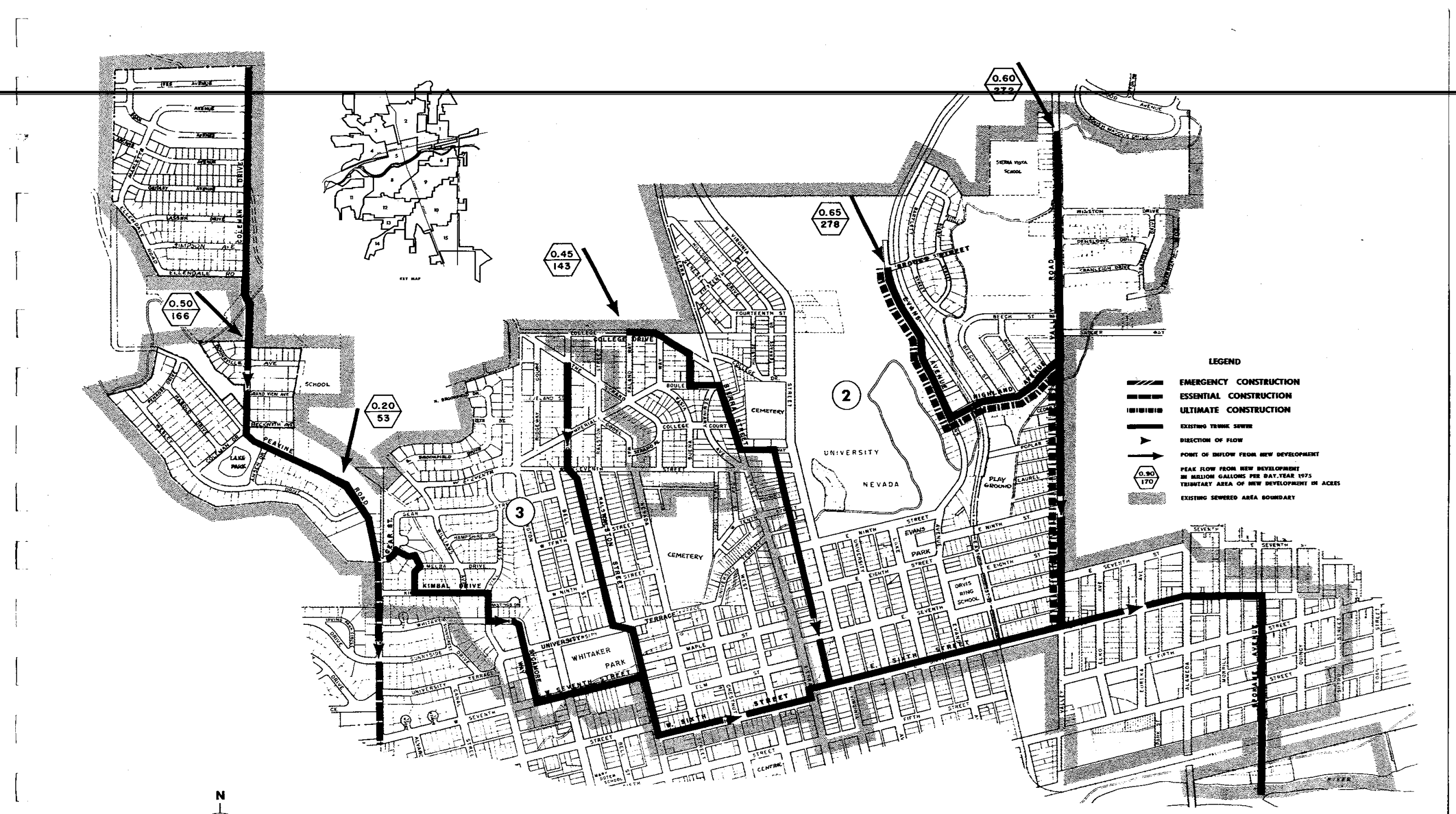
3. Recommended construction.

a. Emergency construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers. Some temporary facilities may be required until program of Master Plan for Storm Drainage is completed.

b. Essential construction.

(1) Construct a sanitary trunk sewer on Peavine Road from Gear Street to West Seventh Street. This sewer will relieve the existing trunk sewer between the intersection of Peavine Road and Gear Street and the intersection of West Seventh Street and Ralston Street and provide capacity for future development. Although the major portion of the relief trunk sewer is within Area 4, it is required to provide sufficient capacity in Area 3 and areas adjacent to Area 3.



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SANITARY SEWERS
MASTER PLAN
AREAS 2, 3

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PLATE 7

AREA 4

1. Description. Area 4 includes primarily residential areas and a light manufacturing and commercial area along U.S. Highway 40. The land use map indicates that the adjacent area to the west is zoned primarily for residential use, with the area along U.S. Highway 40 zoned for commercial and light manufacturing use. The present sewered area is served by a gravity system.

2. Problem. Approximately 50 percent of the area surface storm water is carried to the sanitary sewers. During periods of wet weather flow the trunk sewers cannot carry the additional storm drainage and are surcharged.

The existing trunk sewer on U.S. Highway 40 from 2500 feet west of Keystone Avenue to the intersection of West Third and Vine Streets becomes surcharged during hours of peak dry weather flow of sanitary sewage.

Future development cannot be adequately served by existing trunk sewers.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

b. Essential construction.

(1) Construct a relief trunk sewer on U.S. Highway 40 from a point 1900 feet west of Keystone Avenue to the intersection of West Third and Vine Street.

(2) Construction of a trunk sewer on Peavine Road from Gear Street to West Seventh Street is included in Area 3 construction program.

c. Ultimate construction.

(1) Construct three sections of relief trunk sewer totaling approximately 800 feet on Keystone Avenue between West Seventh Street and West Third Street.

(2) Construct approximately 600 feet of relief trunk sewer on U.S. Highway 40 easterly from Cemetery Road.

AREA 5

1. Description. Area 5 includes large, highly developed, commercial areas as well as a residential area. Future development in the area will be limited because of the advanced stage of present development. The present sewered area is served by gravity.

2. Problem. Approximately 80 percent of the area surface storm water is carried in the sanitary sewers. During periods of wet weather flow the trunk sewers cannot carry the additional storm drainage and are surcharged.

The existing trunk sewer on Riverside Drive from Booth Street Bridge to Ralston Street has a reduced capacity because of root growth and infiltration. The sewer is surcharged during hours of peak dry weather flow of sanitary sewage.

Future development cannot be adequately served by existing trunk sewers.

3. Recommended construction.

a. Emergency construction.

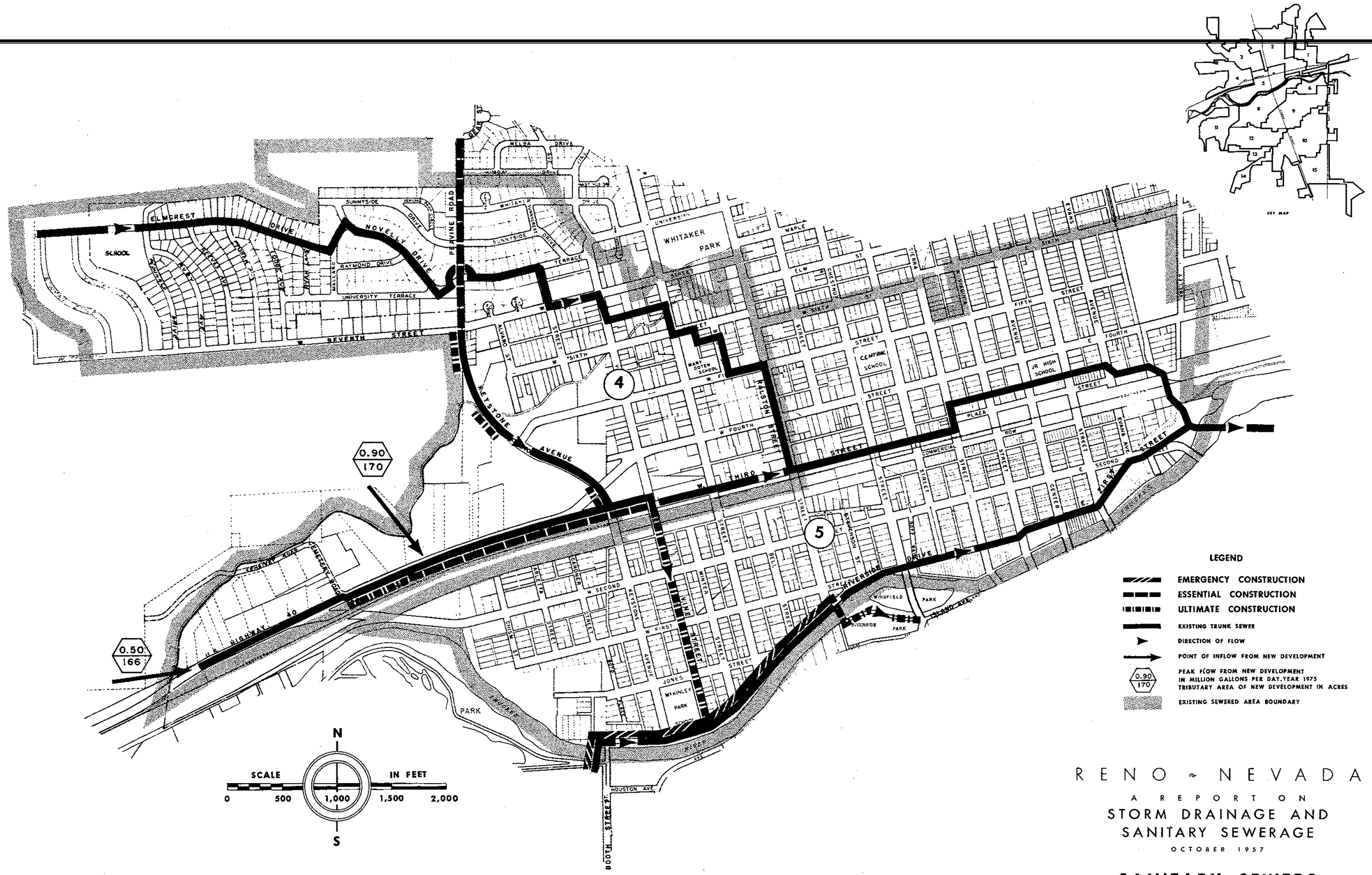
(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

(2) Construct a trunk sewer on Riverside Drive from Booth Street Bridge (siphon crossing described in Area 11) to Ralston Street to replace existing trunk sewer.

b. Ultimate construction.

(1) Construct a siphon crossing from the intersection of Riverside Drive and Ralston Street across the Truckee River to the edge of Riverside Park on the south side of the Truckee River, connecting the Island Avenue trunk sewer described in Area 8 and the Riverside Drive trunk sewer described above.

(2) Construct a sanitary trunk sewer on Vine Street from West Third Street to Riverside Drive. This construction is required to serve ultimate development of area adjacent to Area 4 and Area 3 and to provide relief for the West Third Street trunk sewer.



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SANITARY SEWERS MASTER PLAN AREAS 4, 5

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 8

AREA 6

1. Description. Area 6 includes residential area, commercial area and the Washoe Medical Center. The land use map indicates that future development will be residential and commercial. The present sewered area is served by gravity.

2. Problem. Approximately 50 percent of the area surface storm water is carried to the sanitary sewers. During periods of wet weather flow, the trunk sewers cannot carry the additional storm drainage and are surcharged.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

b. Ultimate construction.

(1) Construct a trunk sewer on Mill Street from approximately 150 feet east of Wells Avenue to Kirman Avenue, on Kirman Avenue from Mill Street to East Second Street. Connect at upper end to trunk sewer described in Area 8. The construction is required to carry ultimate flow from areas to the west.

AREA 7

1. Description. Area 7 includes residential and manufacturing areas. The land use zoning map indicates that the adjacent areas are zoned for manufacturing use. Existing trunk sewers are adequate to carry the flow from ultimate development.

2. Problem. None.

3. Recommended construction. None.

AREA 9

1. Description. Area 9 includes primarily residential areas and some commercial area on South Virginia Street and Wells Avenue. The land use map indicates that future development will be residential and commercial. The present sewered area is served by gravity sewers.

2. Problem. Approximately 80 percent of the area surface storm water is carried to the sanitary sewers. During periods of wet weather flow the sewers cannot carry the additional storm drainage and are surcharged. Overflow of sewage into the streets occurs near the Veterans Memorial Hospital.

Future development cannot be adequately served by existing trunk sewers.

3. Recommended construction.

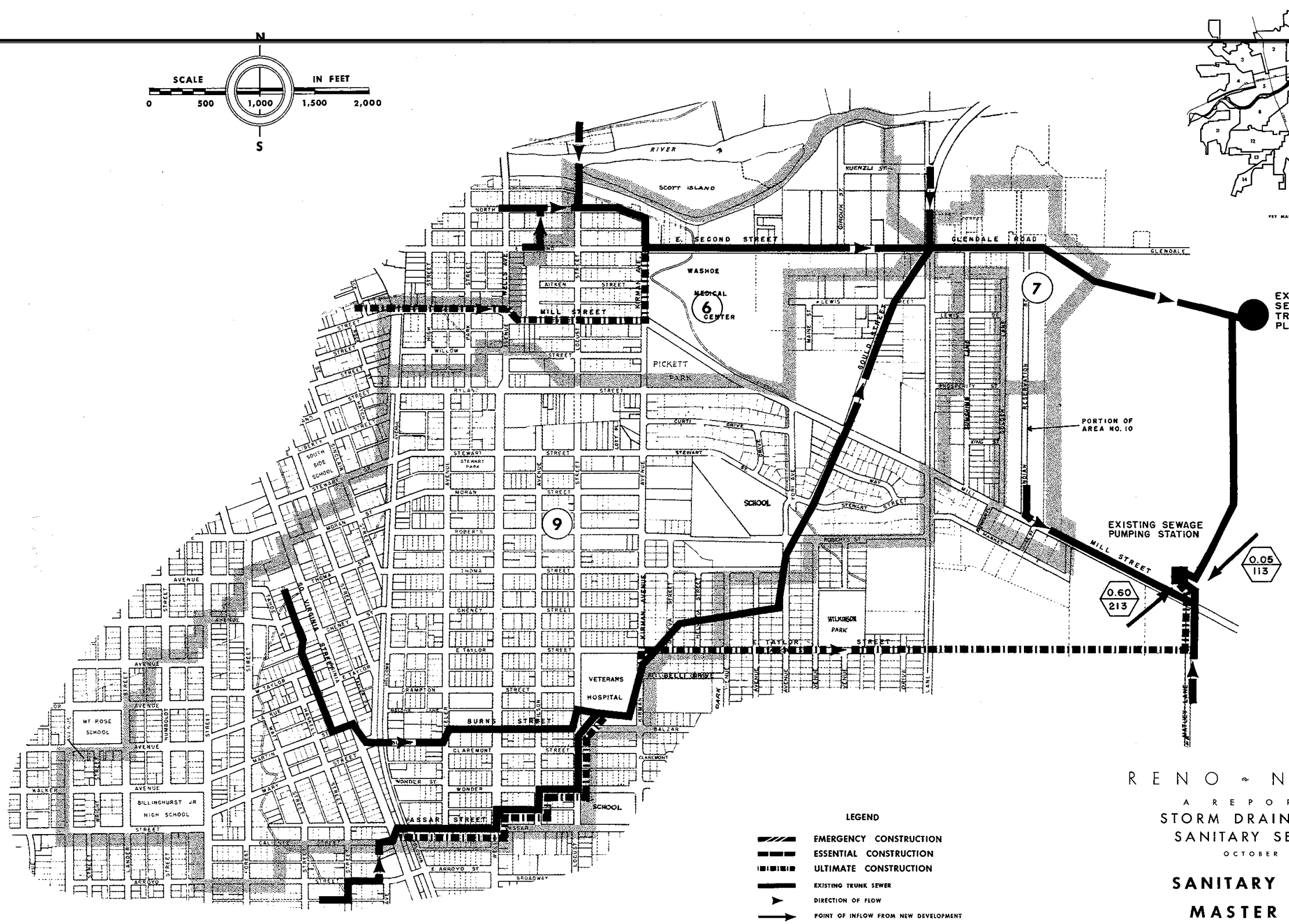
a. Emergency construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers. Some temporary facilities may be required until program of Master Plan for Storm Drainage is completed.

b. Ultimate construction.

(1) Construct a relief trunk sewer from the intersection of South Virginia Street and Vassar Street to the southwest corner of the Veterans Memorial Hospital.

(2) Construct a trunk sewer from near the intersection of Kirman Avenue and Belli Drive to the intersection of Kirman Avenue and East Taylor Street, east on East Taylor Street and its projection to Matley Lane, along Matley Lane to the Sewage Pumping Station at Mill Street and Matley Lane.



BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
- 0.90 / 170 — PEAK FLOW FROM NEW DEVELOPMENT IN MILLION GALLONS PER DAY, YEAR 1975 / TRIBUTARY AREA OF NEW DEVELOPMENT IN ACRES
- EXISTING SEWERED AREA BOUNDARY

RENO ~ NEVADA

A REPORT ON
STORM DRAINAGE AND
SANITARY SEWERAGE
OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREAS 6, 7, 9

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 8

1. Description. Area 8 includes primarily residential areas and a highly developed commercial area. Future growth in the area will be limited because of the advanced stage of present development. The present sewered area is served by gravity sewers.

2. Problem. Approximately 60 percent of the area surface storm water is carried to the sanitary sewers. During periods of wet weather flow the trunk sewers cannot carry the additional storm drainage and are surcharged.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers. Some temporary facilities may be required until program of Master Plan for Storm Drainage is completed.

b. Ultimate construction.

(1) Construct a trunk sewer from the siphon crossing (described in Area 5) at Riverside Park on the following alignment: On Island Avenue from Riverside Park to South Virginia Street, along the Truckee River to Center Street, on Center Street to Mill Street, on Mill Street to approximately 150 feet east of Wells Avenue (connecting to sewer described in Area 6). The construction is required to carry ultimate flow from areas to the west and to relieve the trunk sewer on Riverside Drive.

AREA 11

1. Description. Area 11 includes residential areas. The land use map indicates that adjacent areas to the west and south are zoned for residential use. The sewered area is served by a gravity sewer.

2. Problem. A small part of the area surface storm water is carried to the sanitary sewers. Existing sewers are adequate to handle the additional flow from future development, except the siphon crossing at the Truckee River west of Booth Street and the sewer from Idlewild Drive to the siphon crossing.

3. Recommended construction.

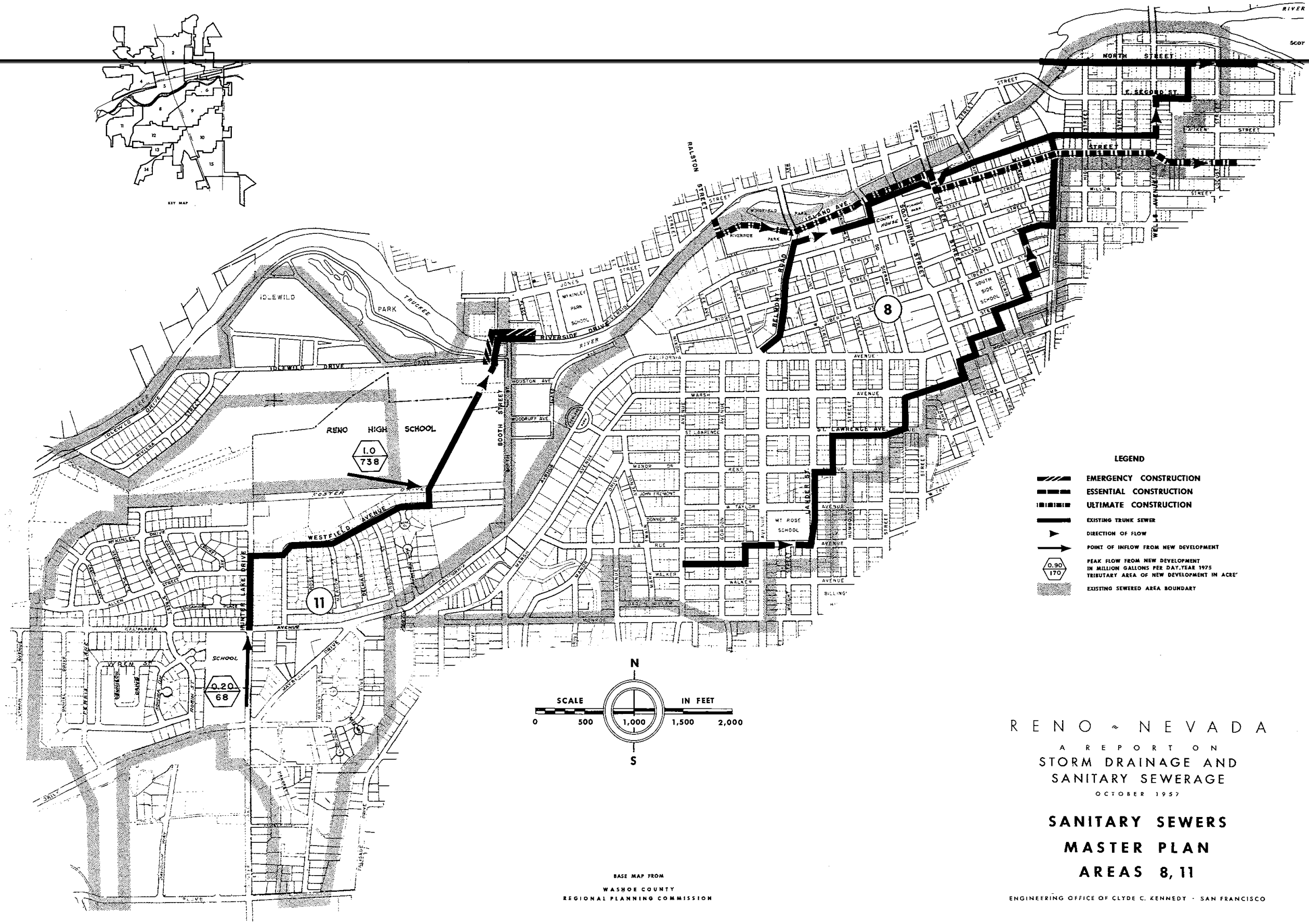
a. Emergency construction.

(1) Construct a siphon crossing across the Truckee River west of Booth Street Bridge (to replace existing inadequate siphon crossing), connecting to the sewer along Riverside Drive described in Area 5.

(2) Construct trunk sewer from the south side of Idlewild Drive to the siphon crossing, to replace existing inadequate trunk sewer.

b. Ultimate construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
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- EXISTING SEWERED AREA BOUNDARY

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREAS 8, 11

ENGINEERING OFFICE OF CLYDE C. KENNEDY - SAN FRANCISCO

SANITARY SEWERS MASTER PLAN

AREA 10

1. Description. Area 10 includes primarily residential areas and a limited amount of commercial area on South Virginia Street and Wells Avenue. The land use map indicates that future development should be residential and commercial. The sewered area is served by a Sewage Pumping Station located at Mill Street and Matley Lane.

2. Problem. Approximately 20 percent of the area surface storm water is carried to the trunk sewers. During wet weather flow the trunk sewers cannot carry the additional storm drainage and are surcharged.

The Sewage Pumping Station does not have automatic control for existing standby equipment to operate in the event of power failure. Pumping capacity is not adequate for ultimate development.

3. Recommended construction.

a. Essential construction.

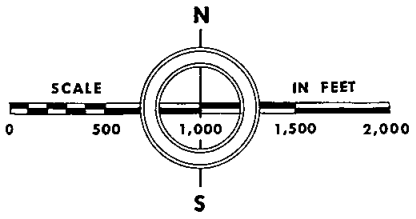
(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

(2) Modify standby pump controls at Sewage Pumping Station to assure automatic operation of existing standby pumping equipment.

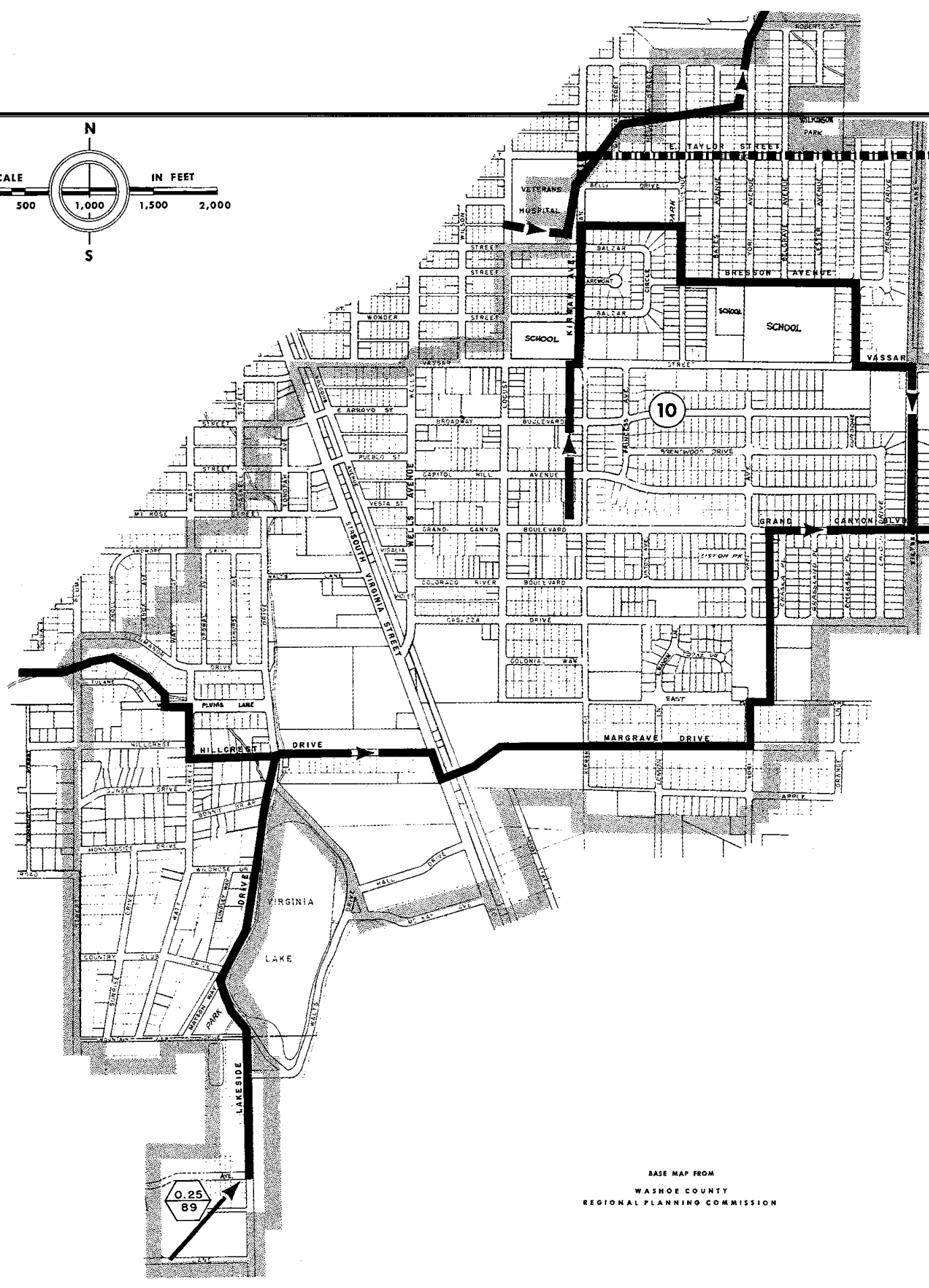
b. Ultimate construction.

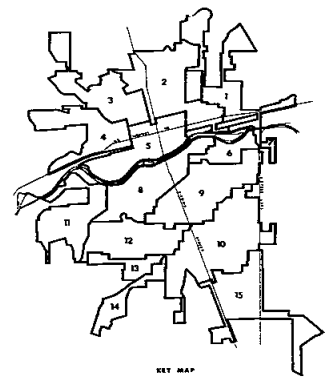
(1) Install one additional pump and appurtenances at the Sewage Pumping Station.

(2) Construction of trunk sewer on East Taylor Street is described under Area 3.



EXISTING SEWAGE PUMPING STATION. MODIFY PUMP CONTROLS (ESSENTIAL). ADD 1-8" PUMP. (ULTIMATE).





LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
- 0.90 / 170 — PEAK FLOW FROM NEW DEVELOPMENT IN MILLION GALLONS PER DAY, YEAR 1975; TRIBUTARY AREA OF NEW DEVELOPMENT IN ACRES
- EXISTING SEWERED AREA BOUNDARY

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREA 10

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 12

1. Description. Area 12 includes residential areas. The land use map indicates that future development in the area will be residential. The sewered area is served by a gravity system.

2. Problem. Approximately 50 percent of the area surface drainage is carried to the sanitary sewers. During wet weather flow the sewers cannot carry the additional storm drainage and are surcharged. Existing sanitary trunk sewers are adequate for ultimate development after storm drainage separation.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

AREA 13

1. Description. Area 13 includes residential areas. The land use map indicates that future development of the adjacent area to the west and southwest will be residential. The capacity of existing trunk sewers is adequate to serve future development in the area and the adjacent areas to the west and southwest.

2. Problem. None.

3. Recommended construction. None.

AREA 14

1. Description. Area 14 includes residential areas. The land use map indicates that the adjacent areas to the west and south are zoned for residential use.

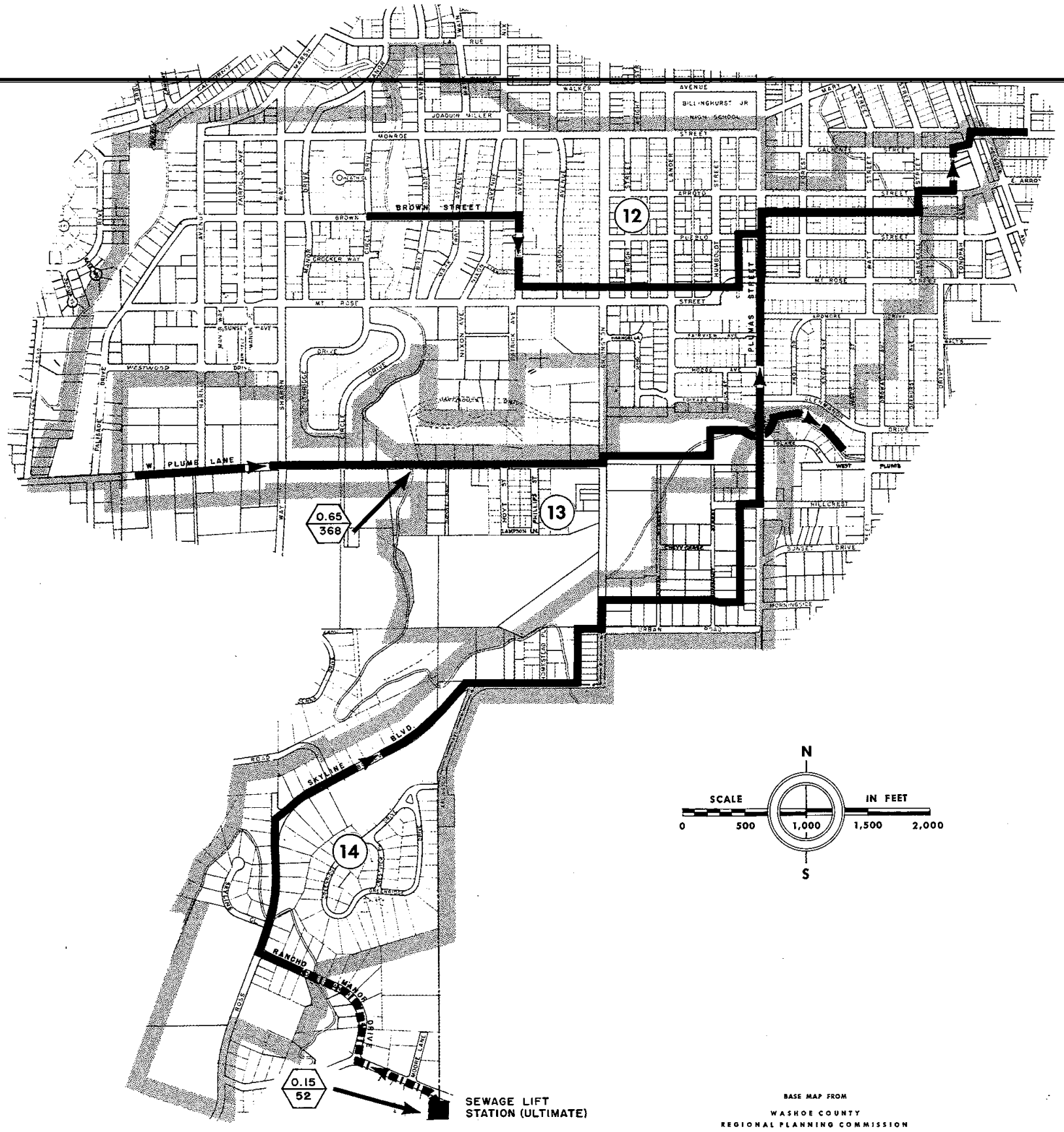
2. Problem. In the northeast part of the area the surface storm water is carried to the sanitary sewers. During wet weather flow the sewers cannot carry the additional storm drainage and are surcharged. Flow from the adjacent area to the south will require pumping.

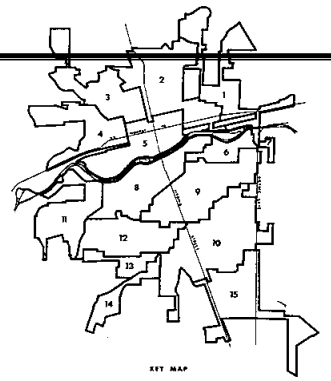
3. Recommended construction.

a. Ultimate construction.

(1) Construct storm drainage system required to separate area surface storm drainage from sanitary sewers.

(2) Construct Sewage Lift Station to serve adjacent area to the south. Construct a force main and trunk sewer from Lift Station to Rancho Manor Drive sewer.





KEY MAP

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
- 0.90 / 170 — PEAK FLOW FROM NEW DEVELOPMENT IN MILLION GALLONS PER DAY.YEAR 1975; TRIBUTARY AREA OF NEW DEVELOPMENT IN ACRES
- EXISTING SEWERED AREA BOUNDARY

N

SCALE IN FEET

0 500 1,000 1,500 2,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND
SANITARY SEWERAGE

OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREAS 12, 13, 14

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 12

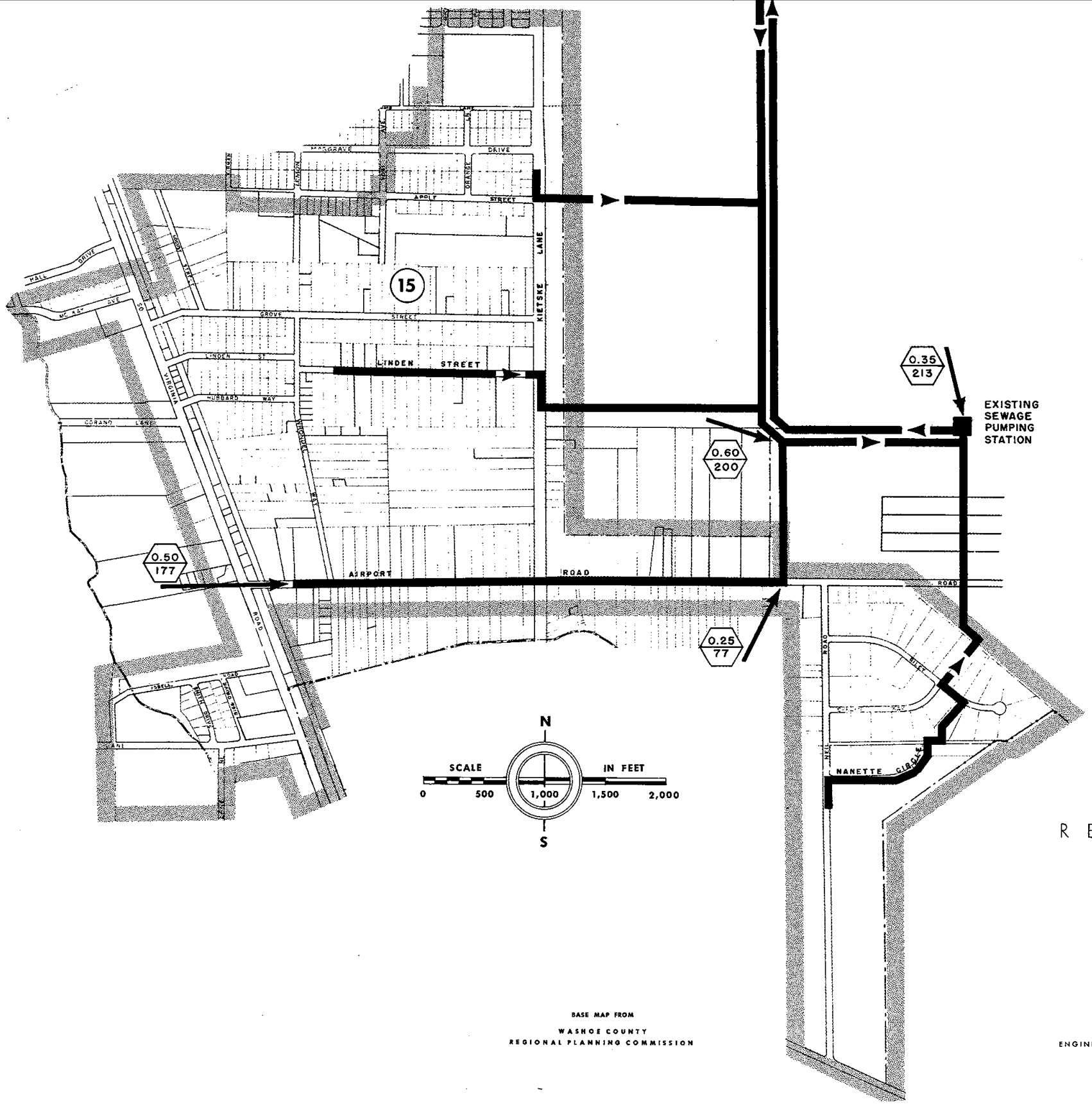
SANITARY SEWERS MASTER PLAN

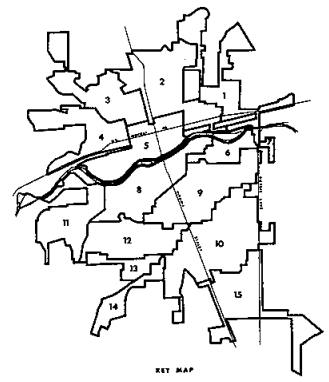
AREA 15

1. Description. Area 15 includes residential and commercial areas. The land use map indicates that the adjoining areas are zoned for residential, commercial and light manufacturing use. The area is served by a Sewage Pumping Station located at the Reno Airport. The capacity of existing sewers and pumping facilities is adequate to serve future development.

2. Problem. None.

3. Recommended construction. None.





LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING TRUNK SEWER
- DIRECTION OF FLOW
- POINT OF INFLOW FROM NEW DEVELOPMENT
- 0.90 / 170 — PEAK FLOW FROM NEW DEVELOPMENT IN MILLION GALLONS PER DAY, YEAR 1975; TRIBUTARY AREA OF NEW DEVELOPMENT IN ACRES
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BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON
STORM DRAINAGE AND
SANITARY SEWERAGE
OCTOBER 1957

SANITARY SEWERS MASTER PLAN AREA 15

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 13

To determine the requirements for storm drainage facilities for the City of Reno and the metropolitan Reno area criteria for establishing the adequacy of existing trunk storm drains and the requirements for future trunk storm drains were studied.

Maps were furnished by the city from which an overall contour map was made. The complete drainage map of the city was compiled from maps furnished by the city and included an extensive field check.

Contour maps of the U.S. Geological Survey were used to determine the contours and drainage characteristics for the watershed areas outside the metropolitan Reno area that would influence the storm drainage plan.

Land Use Plan maps for the City of Reno and Washoe County were furnished by the city and were used in determining the characteristics of runoff for storm drainage requirements.

The studies and reports of governmental agencies which affect storm drainage requirements were considered and evaluated.

The United States Department of Agriculture Soil Conservation Service study on the Peavine Area indicates that the construction of check dams to reduce peak flood flows from this watershed area northwest of Reno is the most feasible method of flood control in this area.

The United States Bureau of Reclamation feasibility report on the Washoe Project in 1954 included a suggested method of draining the southeast and east area of Truckee Meadows.

The United States Corps of Engineers is completing a study of flood control on the Truckee River.

The prior construction of adequate flood control works on the Truckee River and in the Peavine Area is essential to the proper functioning of a storm drainage system for the City of Reno.

After careful consideration the criteria for determination of storm drainage facilities were set as follows:

1. It is considered that adequate flood control measures will be taken on the Truckee River and in the Peavine Area.
2. Rainfall intensity-duration-frequency curves developed for this study from records of the United States Weather Bureau are utilized.
3. The Land Use Plan of the City of Reno and zoning ordinance of Washoe County will control future development in the area.
4. The Rational Method and the Basic Hydrograph method of defining hydrograph shape are used in computing storm water quantities.
5. Standard methods of reservoir storage routing are considered.
6. Flood flows established by other agencies from some watershed areas are modified as necessary by storm transposition.
7. Flood waters from some watershed areas south of the Truckee River will be routed through Virginia Lake to reduce peak runoff rates.
8. The average return period for the downtown and residential areas in the city and the adjacent relatively flat agricultural areas is five years.
9. The average return period for watershed areas south of the Truckee River and watershed areas north of the Truckee River expected to discharge into existing or future intensive development is ten years.
10. The average return period for Virginia Lake outlet and watershed areas expected to discharge into existing or future intensive development is fifty years.

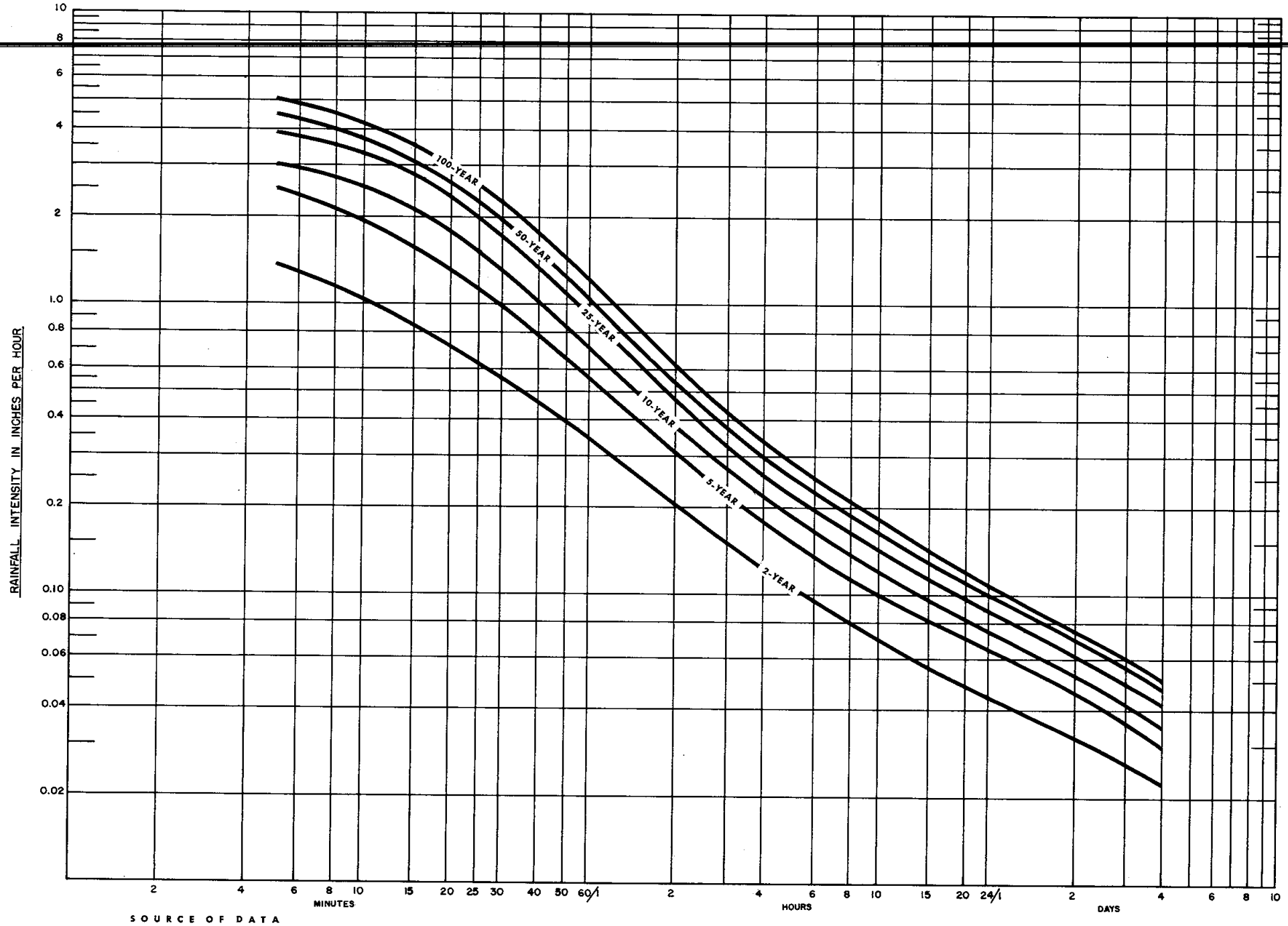
RAINFALL CURVES, INTENSITY - DURATION - FREQUENCY

Plate 14 shows the relation between intensity of rainfall and duration of storm for various return periods. The curves were developed for this study from rainfall data collected in Reno since 1906 by the United States Weather Bureau.

Rainfall intensity is the rate of rainfall in inches per hour. The rainfall intensity varies inversely with the length of time or duration of the rainstorm, with rainfall intensities for short time intervals being higher than those for longer time intervals.

Rainfall in this area is of two general types, winter storms of long duration and relatively low intensity and summer storms of short duration and high intensity. The summer storm is critical in the determination of storm drainage requirements.

A detailed discussion of criteria for determining the requirements of storm drainage facilities is given under the discussion of Criteria for Storm Drainage.



SOURCE OF DATA

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

PERIOD OF RECORD:

5 MIN. DURATION	1906 TO 1939
10 MIN. DURATION	1906 TO 1939
15 MIN. DURATION	1906 TO 1939
30 MIN. DURATION	1906 TO 1939
60 MIN. DURATION	1906 TO 1957
120 MIN. DURATION	1906 TO 1957
24 HR. DURATION	1906 TO 1957
MONTHLY DURATION	1906 TO 1957

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STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

RAINFALL CURVES

INTENSITY-DURATION-FREQUENCY

ENGINEERING OFFICE OF CLYDE C. KENNEDY - SAN FRANCISCO

PLATE 14

DRAINAGE AREAS AND EXISTING STORM DRAINS

Plate 15 shows surface drainage areas within the City of Reno which must be considered in determining a proper storm drainage system. Key numbers for drainage areas refer to areas of study shown in more detail on Plates 17 to 30. Existing storm drains and drainage ditches are shown.

There is no existing integrated storm drainage system in the City of Reno; however, some areas are served by existing storm drains.

N

SCALE
0 1,000 2,000 3,000 4,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

ALTERNATE COLORS INDICATE DRAINAGE AREAS

EXISTING STORM DRAIN AND DIRECTION OF FLOW

EXISTING DRAINAGE DITCH AND DIRECTION OF FLOW

16 KEY NUMBER FOR DRAINAGE AREAS

SOURCES - OFFICE OF CITY ENGINEER,
NEVADA DEPT. OF HIGHWAYS,
U. S. GEOLOGICAL SURVEY,
AND FIELD INVESTIGATIONS

RENO ~ NEVADA

A REPORT ON
STORM DRAINAGE AND
SANITARY SEWERAGE
OCTOBER 1957

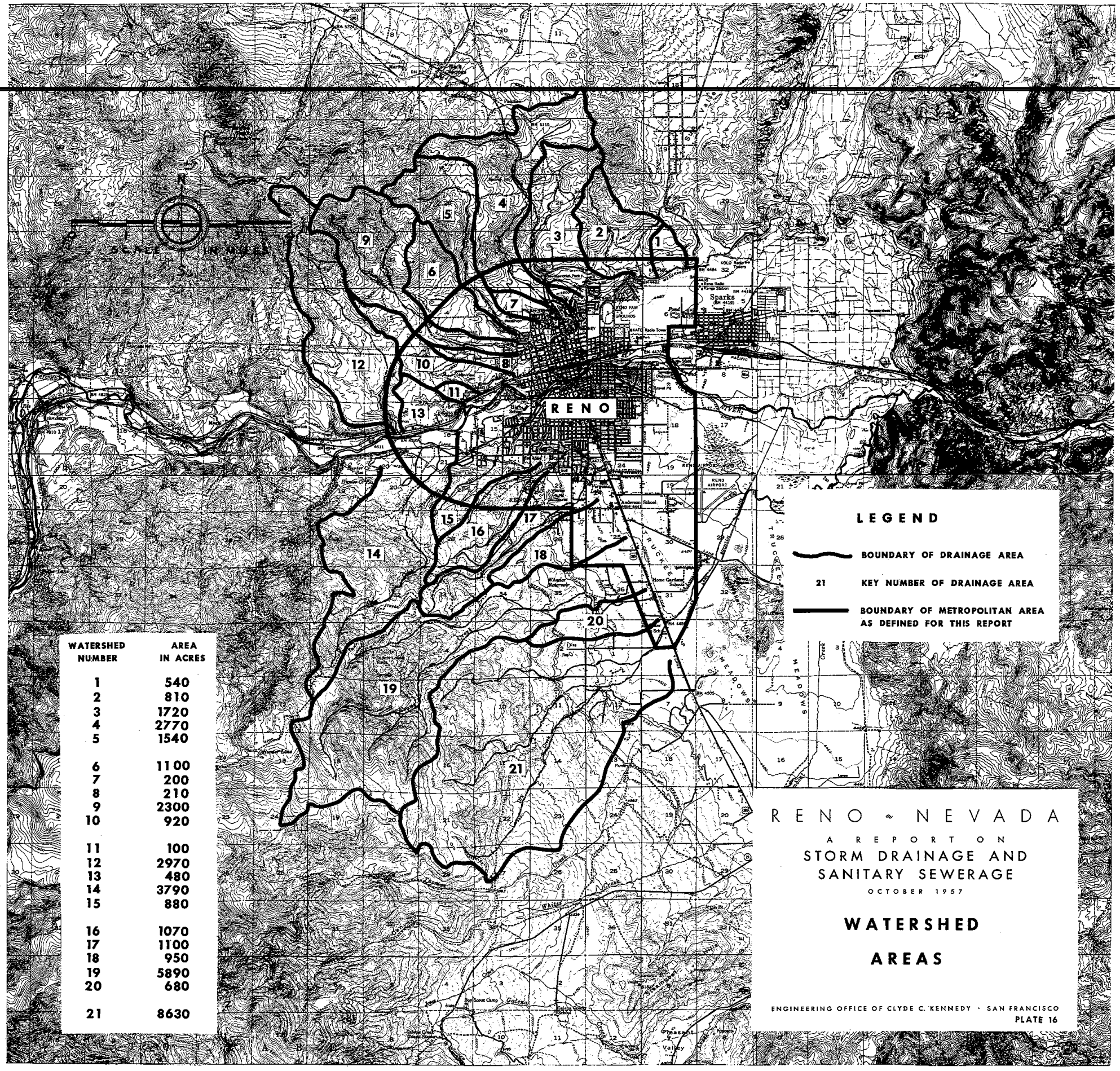
DRAINAGE AREAS AND EXISTING STORM DRAINS

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

WATERSHED AREAS, RENO AND VICINITY

Plate 16 shows the boundaries of the watershed areas that are tributary to the City of Reno, that is, the areas whose surface storm drainage must pass through natural or artificial channels in the area under study. The drainage area of each watershed is tabulated. The boundary of the designated metropolitan Reno area is also shown.

Reno lies in the central portion of the Truckee River Basin in the Reno Valley or Truckee Meadows. The upper portion of the basin consists of rugged watershed on the eastern slope of the Sierra Nevada Mountains where peaks rise to elevations of more than 10,000 feet. The Truckee River rises at Lake Tahoe, flows through the center of Reno and terminates at Pyramid Lake. The watershed areas shown on this plate have sparse vegetation and considerable slope.



WATERSHED NUMBER	AREA IN ACRES
1	540
2	810
3	1720
4	2770
5	1540
6	1100
7	200
8	210
9	2300
10	920
11	100
12	2970
13	480
14	3790
15	880
16	1070
17	1100
18	950
19	5890
20	680
21	8630

RENO ~ NEVADA

A REPORT ON

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OCTOBER 1957

WATERSHED AREAS

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 16

STORM DRAINAGE MASTER PLAN

AREA 1

1. Description. There is a small amount of residential development in the area now. The land use map indicates that the area is zoned for residential and agricultural use. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area. There is no existing storm drainage system in the area.

2. Problem. Existing dulverts are inadequate to carry storm drainage from this area and from the watershed area.

3. Recommended construction.

a. Ultimate construction.

(1) Construct culverts of adequate capacity at Wedekind Road.

AREA 2

1. Description. There is little development in the area at present. The land use map indicates that the area is zoned for residentail, light manufacturing and agricultural use. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area. There is no existing storm drainage system in the area.

2. Problem. Existing culverts are inadequate to carry storm drainage from this area and the watershed area.

3. Recommended construction. Construct culverts of adequate capacity at Wedekind Road.

AREA 4

1. Description. There is some residential, commercial and light manufacturing development in the area. The land use map indicates that the area is zoned for residential use in the north and light manufacturing use in the south. There is no existing storm drainage system in the area. There are no connections of storm drains to sanitary sewers in the area.

2. Problem. Storm drainage facilities are needed in the area to collect and convey drainage from this area to the Truckee River.

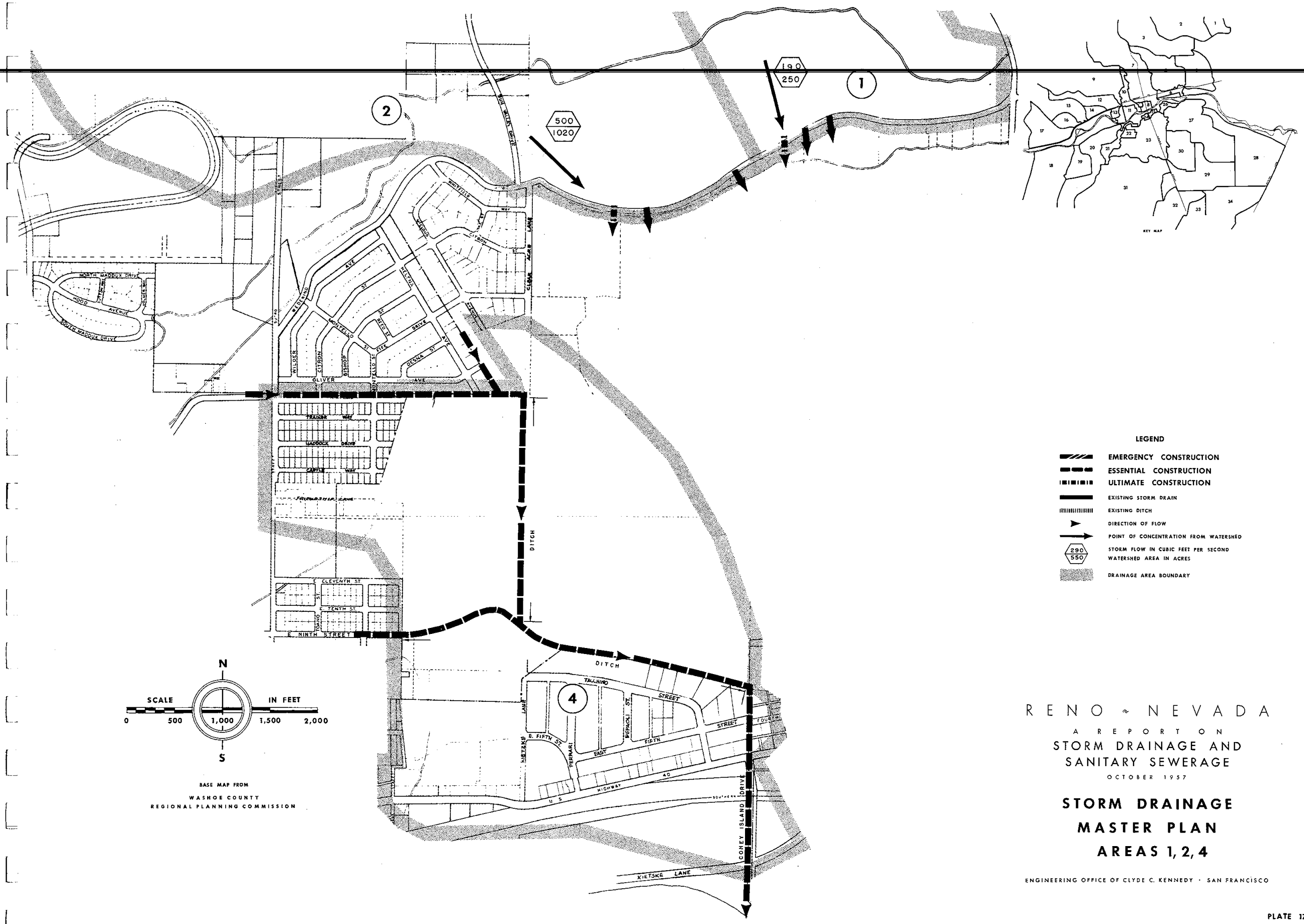
3. Recommended construction.

a. Essential construction.

(1) Construct a drainage ditch easterly, generally along East Ninth Street (extended) to Coney Island Drive (extended).

(2) Construct a drainage ditch along the line of Clear Acre Lane(extended)south, from Wells Avenue (extended) to the ditch described above.

(3) Construct a storm drain on Coney Island Drive (extended) and Coney Island Drive from the ditch system described above to the Truckee River.



N

SCALE IN FEET

0 500 1,000 1,500 2,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

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STORM DRAINAGE MASTER PLAN AREAS 1, 2, 4

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 17

STORM DRAINAGE MASTER PLAN

AREA 3

1. Description. There is some residential and light manufacturing development in the area now. The land use map indicates that the area is zoned primarily for residential use with a small area zoned for light manufacturing use. There is no existing storm drainage system in the area. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect the existing and future development.

3. Recommended construction.

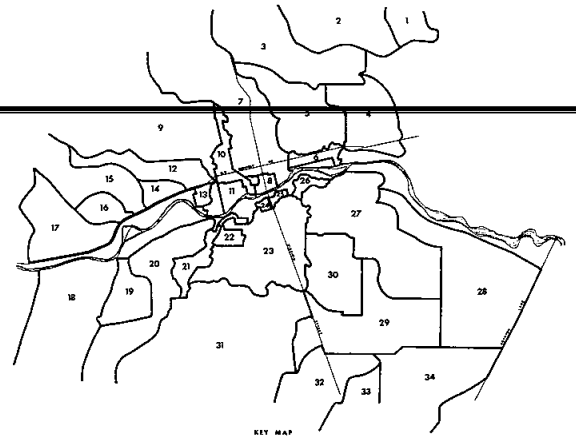
a. Essential construction.

(1) Construct a storm drain on Wells Avenue (extended) from Valley Road on the west to Kietske Lane (extended) on the east. Connect with line described in Area 4.

(2) Construct storm drain between Helena Avenue and McCloud Avenue to serve residential area.

b. Ultimate construction.

(1) Construct adequate culverts on the existing ditch alignment at the Western Pacific Railroad crossing and at Comstock Drive.



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
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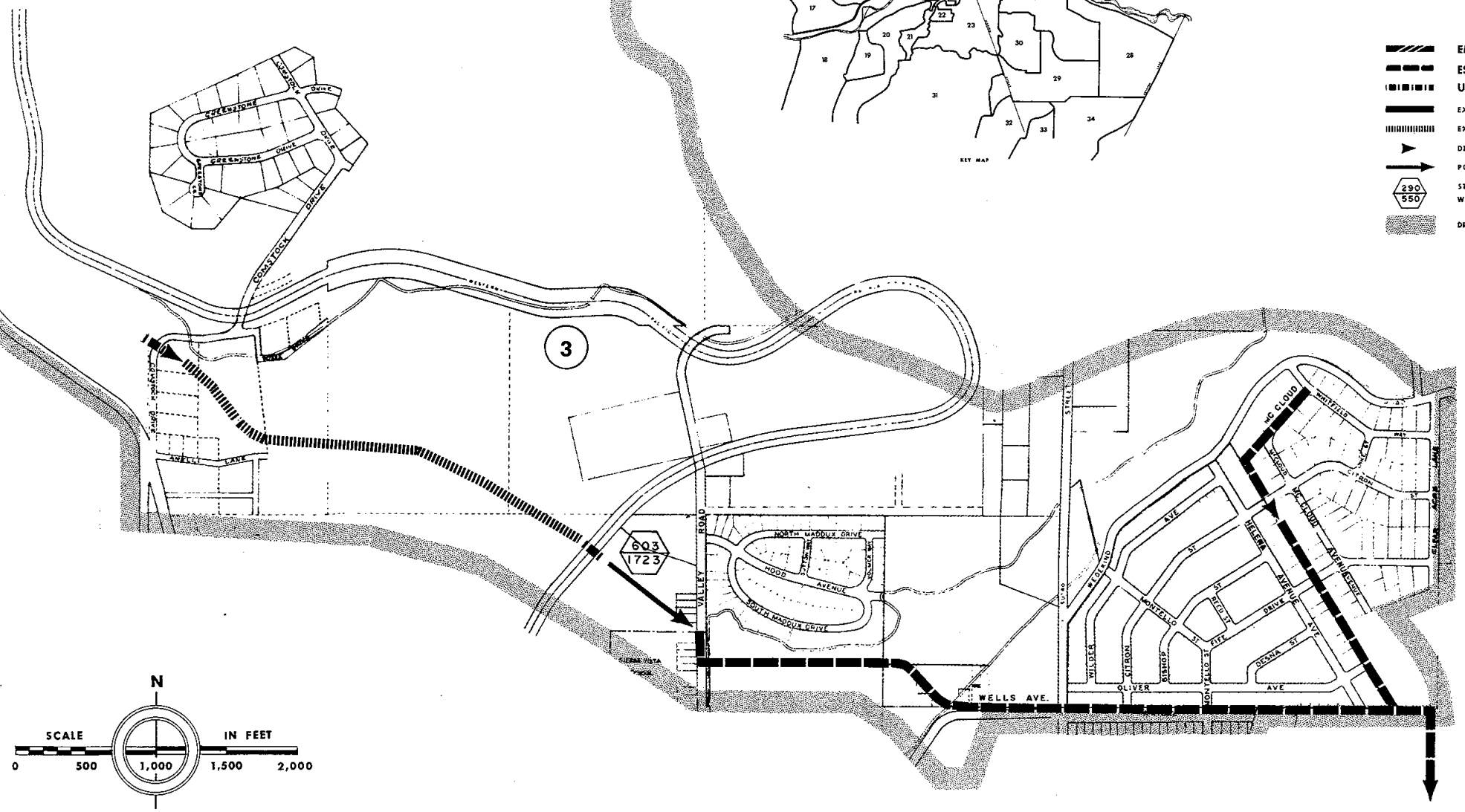
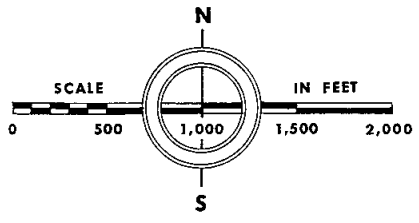




BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND
SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREA 3

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 18

AREA 5

1. Description. The area is primarily a residential area, except for the University Farm and the Fair Grounds and some commercial development in the south. The land use map indicates that the area is zoned for residential use in the north and light manufacturing and commercial use in the south. There is no storm drainage system in the area. Storm drainage from some of the area is carried into the sanitary sewers. There is a natural watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Essential construction.

(1) Construct a storm drainage system as shown.

AREA 6

1. Description. The area is primarily developed as a commercial and light manufacturing area and future development will be similar. There is no storm drainage system in the area. Storm drainage is carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drainage system as shown, discharging into the Truckee River.

AREA 10

1. Description. The area is highly developed for residential use in the north and commercial use in the south. The existing Peavine drainage ditch extends diagonally through the area and connects to an existing storm drain on Chestnut Street extending to the Truckee River. Storm drainage from most of the area is carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

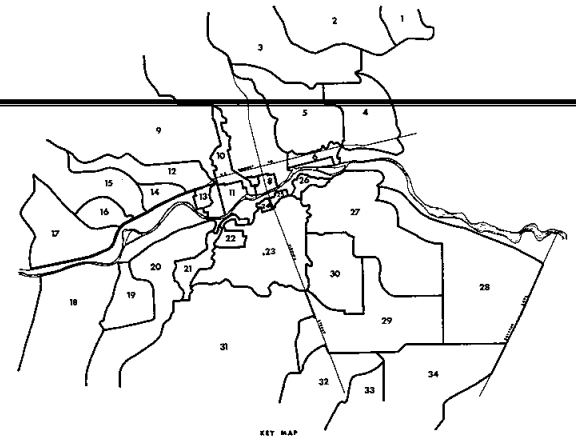
3. Recommended construction.

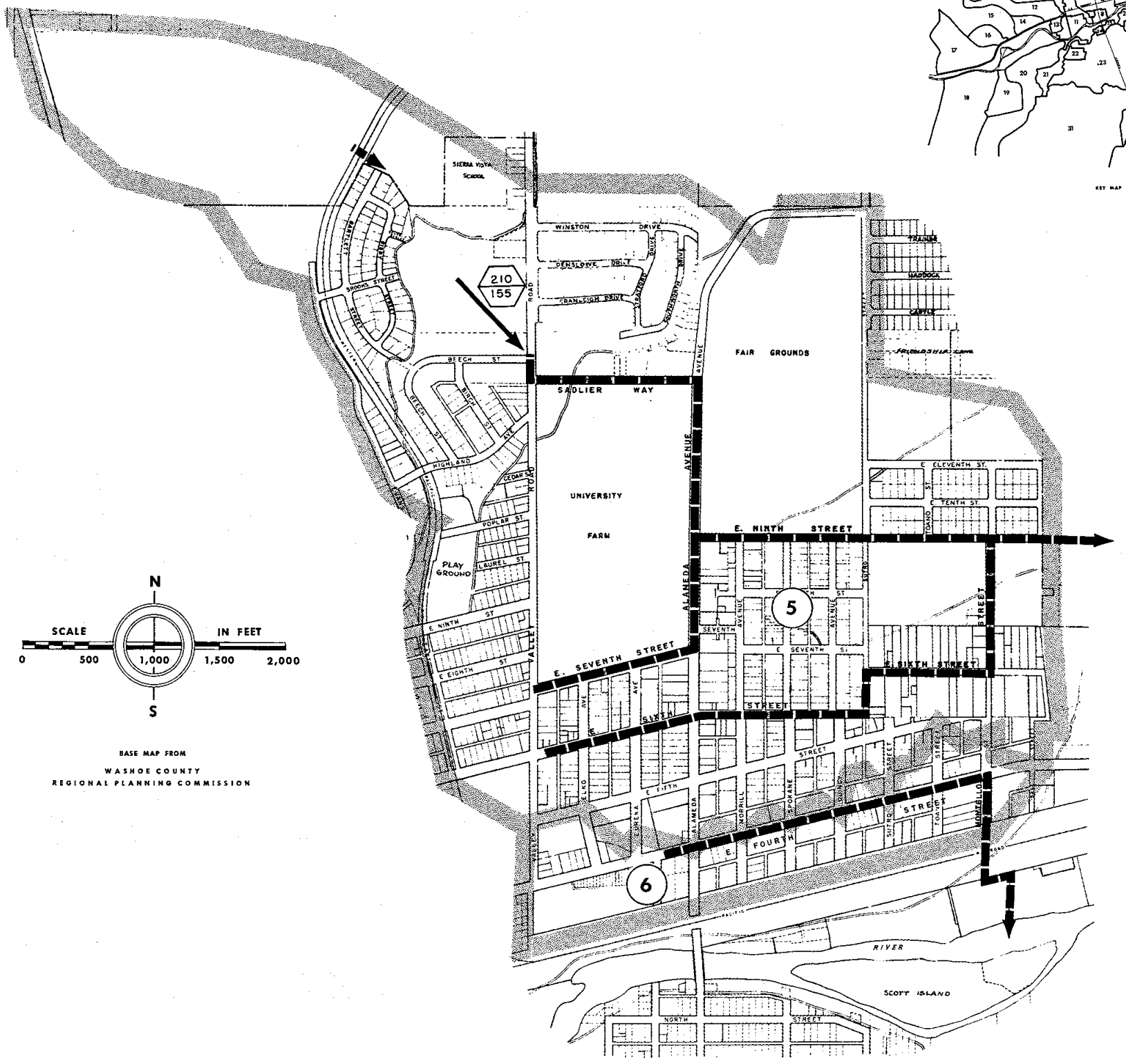
a. Emergency construction.

(1) Construct a storm drain on Ralston Street from West Eleventh Street to north of West Fourth Street, then southeast on the alignment of the existing ditch and connecting to the existing Chestnut Street storm drain.

b. Essential construction.

(1) Construct a storm drain on alignment of existing ditch from West Sixth Street southeast and connecting to the drain described above on Ralston Street, to replace existing ditch.





BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 5, 6

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 7

1. Description. The area is highly developed, except for the most northerly part, as a commercial and light manufacturing area in the south and residential area in the north. There are some existing storm drainage facilities but these must be augmented and integrated into a workable drainage plan. Storm drainage from some of the area is carried into the sanitary sewers. There are two watersheds extending beyond the designated metropolitan Reno area which, because of natural topography, drain through this area.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development. The construction of a proper check dam to reduce peak storm flows from the watershed areas is necessary to the proper functioning of the storm drainage system.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drainage system as shown, discharging into the Truckee River.

b. Ultimate construction.

(1) Construct an adequate culvert under Sierra Street to carry storm flow from watershed area.

AREA 8

1. Description. The area is a highly developed commercial area. There is an existing storm drainage system in the area. A small amount of storm drainage is carried into sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers by construction of storm drain laterals.

3. Recommended construction. None.

AREA 10

1. Description. The area is highly developed for residential use in the north and commercial use in the south. The existing Peavine drainage ditch extends diagonally through the area and connects to an existing storm drain on Chestnut Street extending to the Truckee River. Storm drainage from most of the area is carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

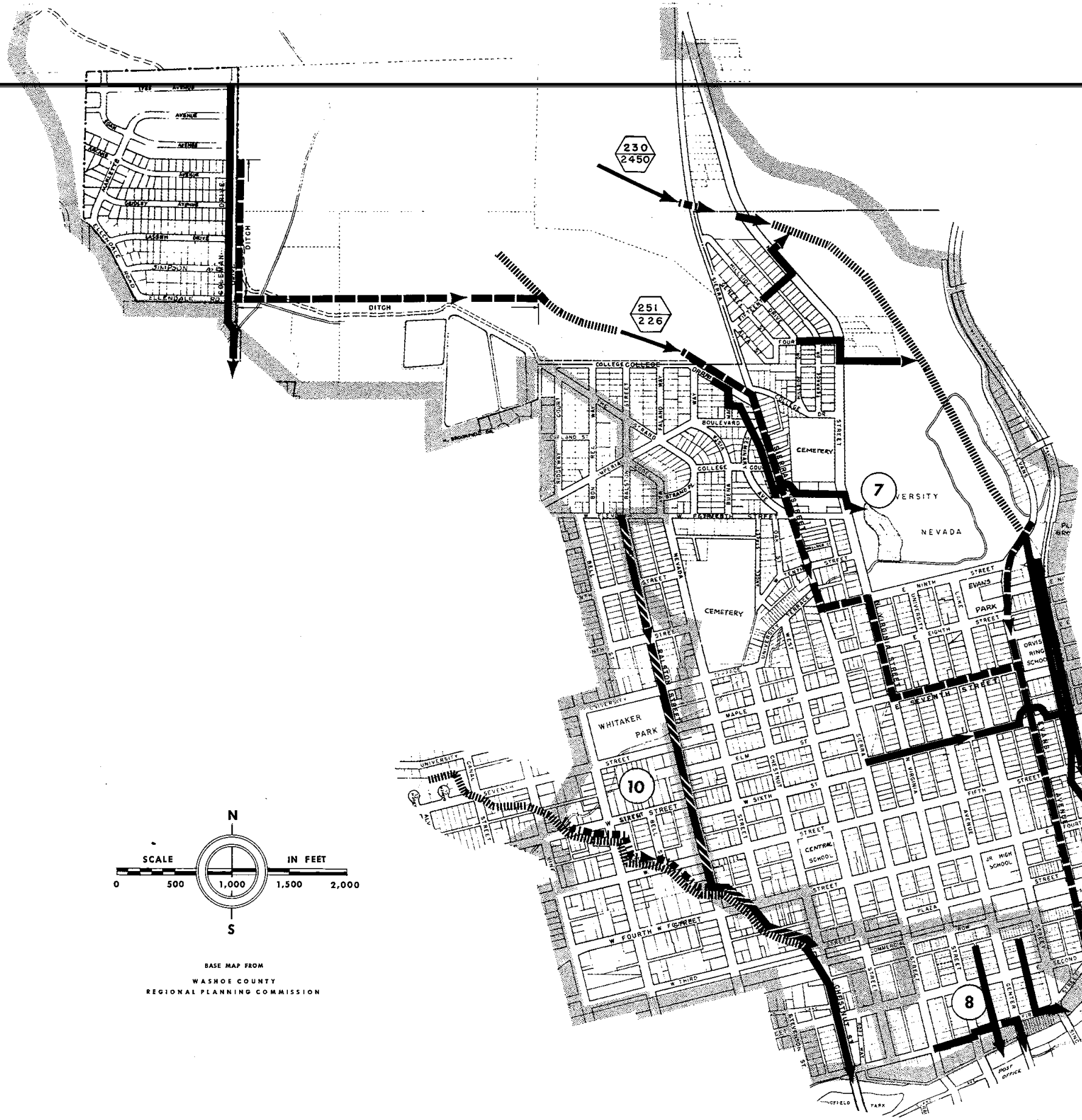
3. Recommended construction.

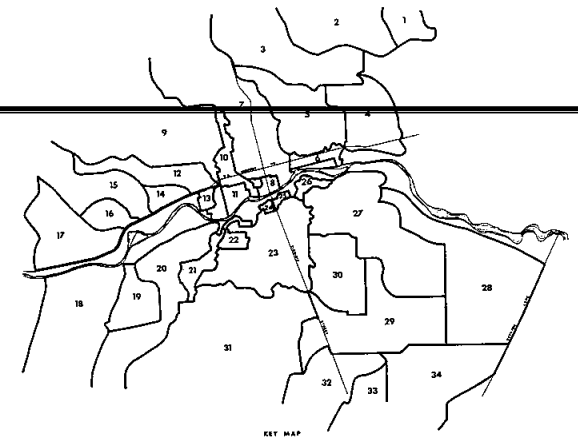
a. Emergency construction.

(1) Construct a storm drain on Ralston Street from West Eleventh Street to north of West Fourth Street, then southeast on the alignment of the existing ditch and connecting to the existing Chestnut Street storm drain.

b. Essential construction.

(1) Construct a storm drain on alignment of existing ditch from West Sixth Street southeast and connecting to the drain described above on Ralston Street, to replace existing ditch.





LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

N

SCALE IN FEET

0 500 1,000 1,500 2,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON
STORM DRAINAGE AND
SANITARY SEWERAGE
OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 7, 8, 10

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 9

1. Description. Part of the area is well developed for residential use but substantial areas in the northwest are undeveloped. There are some existing storm drainage facilities but these must be augmented and integrated into a workable drainage plan. Storm drainage from some of the area is carried into the sanitary sewers. There are three watershed areas extending beyond the designated metropolitan Reno area which, because of natural topography, drain through this area.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development. The construction of proper check dams to reduce peak storm flows from the three watershed areas is necessary to the proper functioning of the storm drainage system.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drain on Vine Street extending from University Terrace to the Truckee River.

(2) Construct storm drain on Elmcrest Drive from Bowman Drive to Peavine Road, on Peavine Road to West Seventh Street, on West Seventh Street to Vine Street.

AREA 11

1. Description. The area is highly developed for residential, commercial and light manufacturing. The land use map indicates that the area is zoned for residential use on the south and commercial and light manufacturing use on the north. There is no storm drainage system in the area. Storm drainage from most of the area is carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect commercial and residential property.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drains as shown from West Second Street to the Truckee River.

AREA 12

1. Description. The area has a small amount of light manufacturing and commercial development now. The land use map indicates that the area is zoned for light manufacturing use in the east and residential use in the west. There are some existing storm drains on U.S. Highway 40. Some storm drainage from the area is carried into the sanitary sewers.

2. Problem. Storm drains should be separated from the sanitary sewers. An adequate drainage system from U.S. Highway 40 to the Truckee River should be constructed to protect existing and future development.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drain from U.S. Highway 40 to the Truckee River.

AREA 13

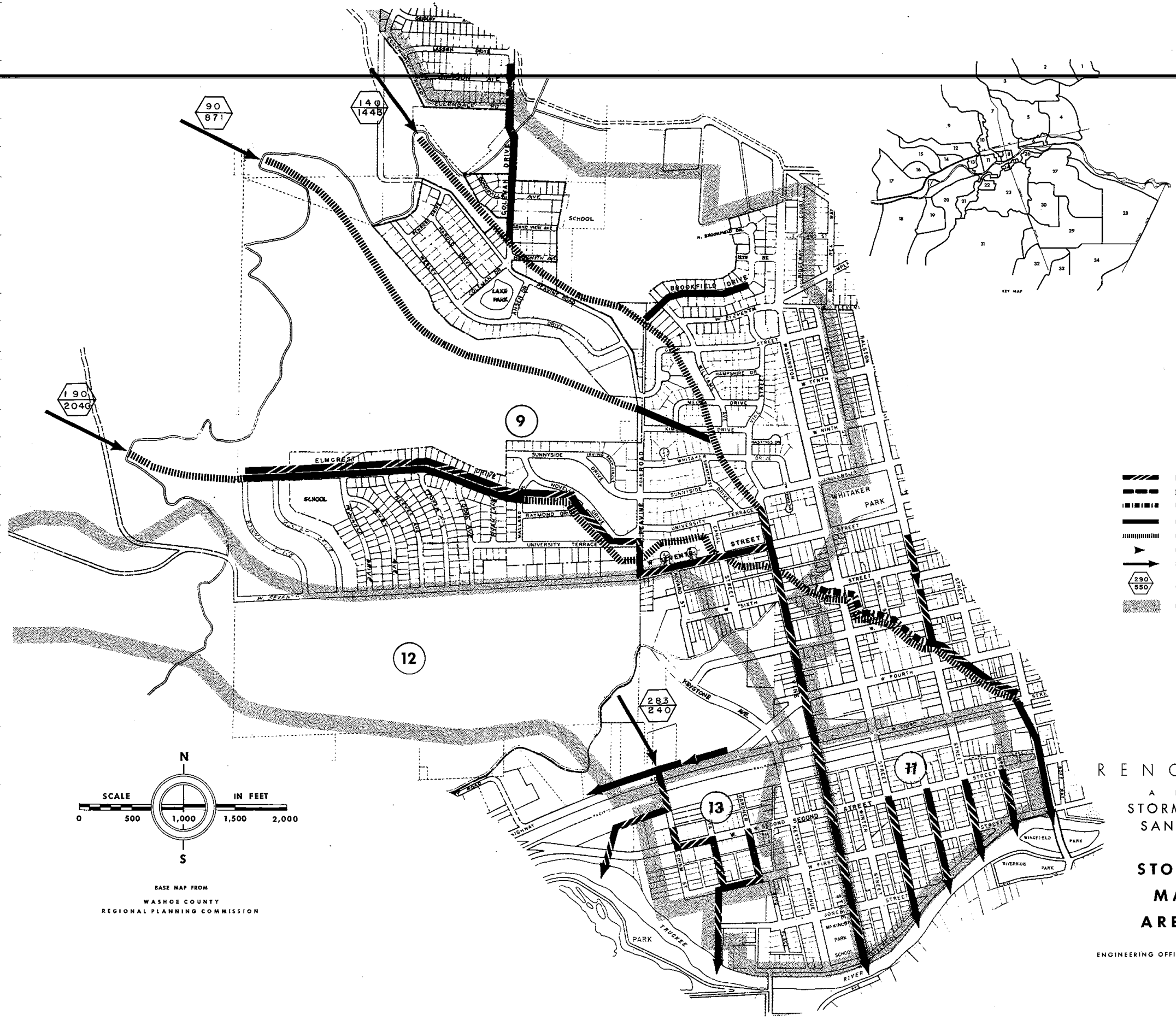
1. Description. The area is developed primarily for light manufacturing and commercial use. The land use map indicates that the area is zoned primarily for light manufacturing and commercial use. There is no storm drainage system in the area. Storm drainage is carried into the sanitary sewers.

2. Problem. Storm drains should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drainage system as shown with outfall to the Truckee River.



RENO - NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 9, 11, 12, 13

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 14

1. Description. The area is developed as a light manufacturing area and a cemetery. The land use map indicates that the area is zoned for commercial and light manufacturing use. There is an existing storm drainage system in the area which is adequate.

2. Problem. None.

3. Recommended construction. None.

AREA 15

1. Description. There is little development now in the area except for a cemetery on the east. The land use map indicates that the area is zoned for light manufacturing and residential use. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through the area. There are some existing storm drains in the area.

2. Problem. None.

3. Recommended construction. None.

AREA 16

1. Description. The area has a small amount of development and a quarry adjacent to U.S. Highway 40. The land use map indicates that the area is zoned for commercial, light manufacturing and residential use. There are existing drainage culverts at U.S. Highway 40 and the railroad.

2. Problem. None.

3. Recommended construction. None.

AREA 17

1. Description. There is little development now in the area. The land use map indicates that the area is zoned for commercial use adjacent to the highway, residential use in the rest of the area. Existing culverts extend under the highway and railroad.

2. Problem. None.

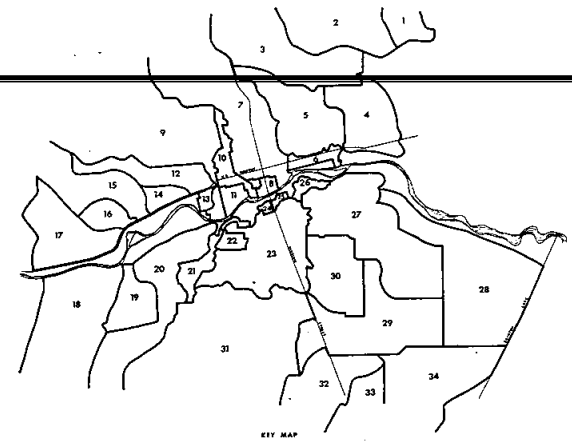
3. Recommended construction. None.

N

SCALE IN FEET

0 500 1,000 1,500 2,000

S



15

16

17

14

386
919

82
96

360
479

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 14, 15, 16, 17

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 22

AREA 18

1. Description. There is little development in the area at present. The land use map indicates that the area is zoned for residential and agricultural use. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area. There are existing culverts under Mayberry Drive.

2. Problem. Existing culverts are inadequate to carry the storm drainage and flood flow from the watershed area.

3. Recommended construction.

a. Ultimate construction.

(1) Construct adequate culverts at Mayberry Drive.

AREA 19

1. Description. Part of the area is developed for residential use. The land use map indicates that the area is zoned for residential use. There is no storm drainage system in the area.

2. Problem. An adequate storm drainage system is required to protect the existing and future development.

3. Recommended construction.

a. Ultimate construction.

(1) Construct storm drain northerly from West Plumb Lane to Mayberry Drive.

(2) Construct ditch from Mayberry Drive to the Truckee River.

AREA 20

1. Description. There are existing storm drains in the area, which will be usable in the Master Plan. The area is primarily developed as a residential area. The land use map indicates that the area is zoned for residential and agricultural use with a small commercial zone. There is a watershed extending beyond the designated metropolitan Reno area which, because of natural topography, drains through this area.

2. Problem. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Ultimate construction.

(1) Construct ditch from West Plumb Lane to Mayberry Drive along existing drainage alignment. Construct storm drain on Hunter Lake Drive from Mayberry Drive to Foster Drive. Construct storm drain on Foster Drive from Hunter Lake Drive to existing storm drain.

(2) Construct storm drain on California Avenue from Ferris Lane to Hunter Lake Drive.

AREA 21

1. Description. The area is developed as a residential area. The land use map indicates that the area is zoned for residential use. There are existing storm drains in the area. Storm drainage from a small portion of the area is carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Ultimate construction.

(1) Construct storm drain on Charles Drive northward to California Avenue, along California Avenue to Booth Street, north on Booth Street to the Truckee River.

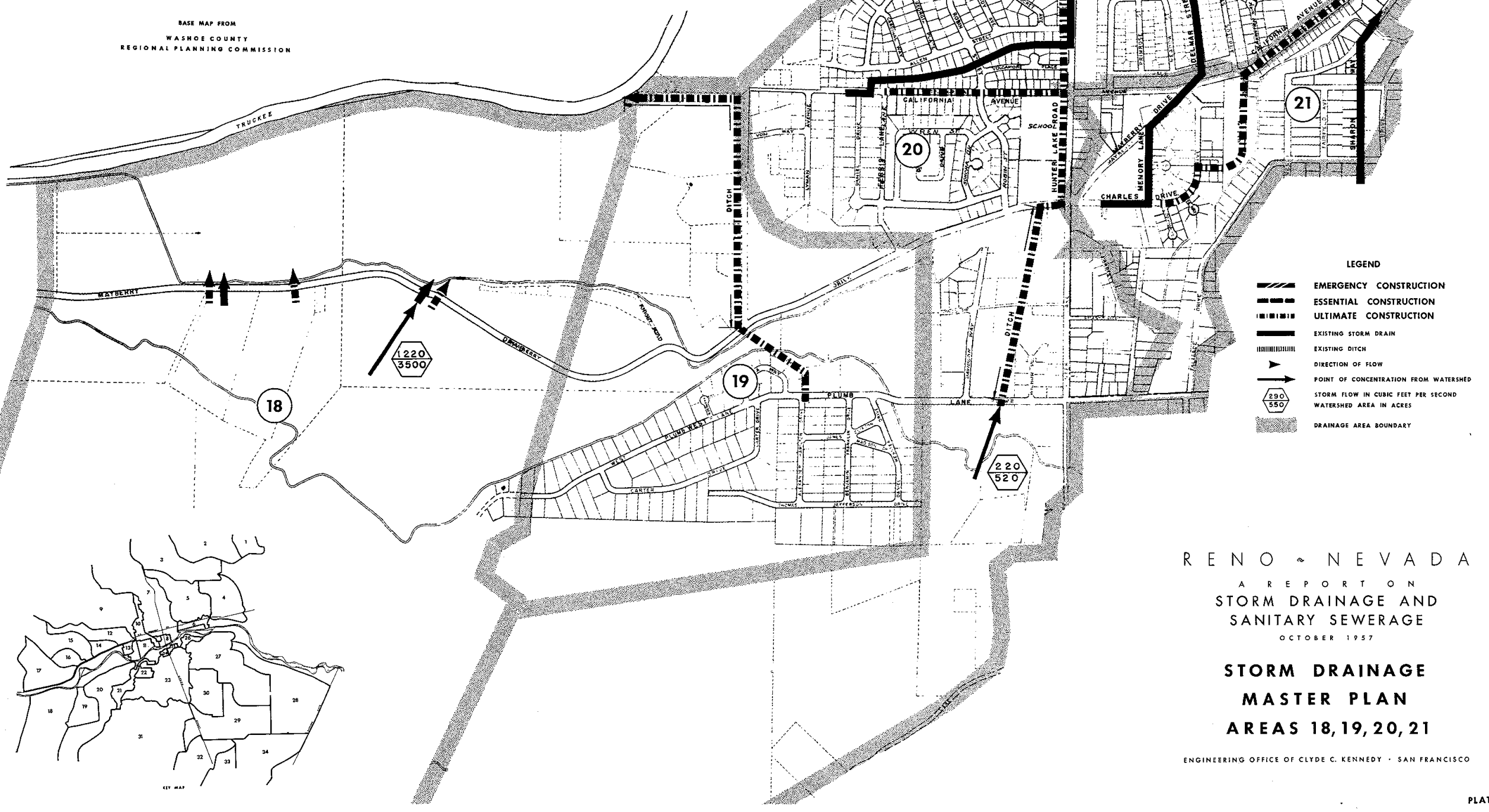
N

SCALE IN FEET

0 500 1,000 1,500 2,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 18, 19, 20, 21

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 23

AREA 22

1. Description. This is a well developed residential area. There are existing storm drains in the area which will be usable in the Master Plan but must be augmented and integrated into a workable drainage plan. A minor part of the storm drainage is carried in the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drains on Manor Drive and St. Lawrence Avenue as shown to Gordon Avenue.

(2) Construct storm drain on Gordon Avenue from Manor Drive to California Avenue, on California Avenue from Gordon Avenue to Arlington Avenue, connecting to existing storm drain discharging into the Truckee River.

AREA 23

1. Description. The area is a highly developed residential area. The land use map indicates that the area is primarily zoned for residential use except a strip adjacent to Virginia Street and Wells Avenue, zoned for commercial use. The storm drainage from a large portion of the area is now carried into the sanitary sewers. There are some minor storm drainage facilities in the area which will be usable in the Master Plan.

2. Problem. Serious flooding occurs in this area during storms as a result of overflow of sanitary sewers surcharged with storm water. Flooding of public streets and private property causes severe damage and creates a health hazard. The construction of storm drainage facilities in this area is required to alleviate these conditions.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drains generally referred to as the Mary Street storm drainage system, as shown on the facing plate.

b. Essential construction.

(1) Construct storm drains required to complete the drainage system for this area except as covered in Ultimate Construction.

c. Ultimate construction.

(1) Construct storm drain at the upper end of the La Rue Avenue and Brown Street storm drain.

AREAS 24, 25, 26

1. Description. The area is a well developed commercial and residential area. The land use map indicates that the area is zoned primarily for commercial use. There is no existing storm drainage system in the area. Most of the storm drainage is now carried into the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Emergency construction.

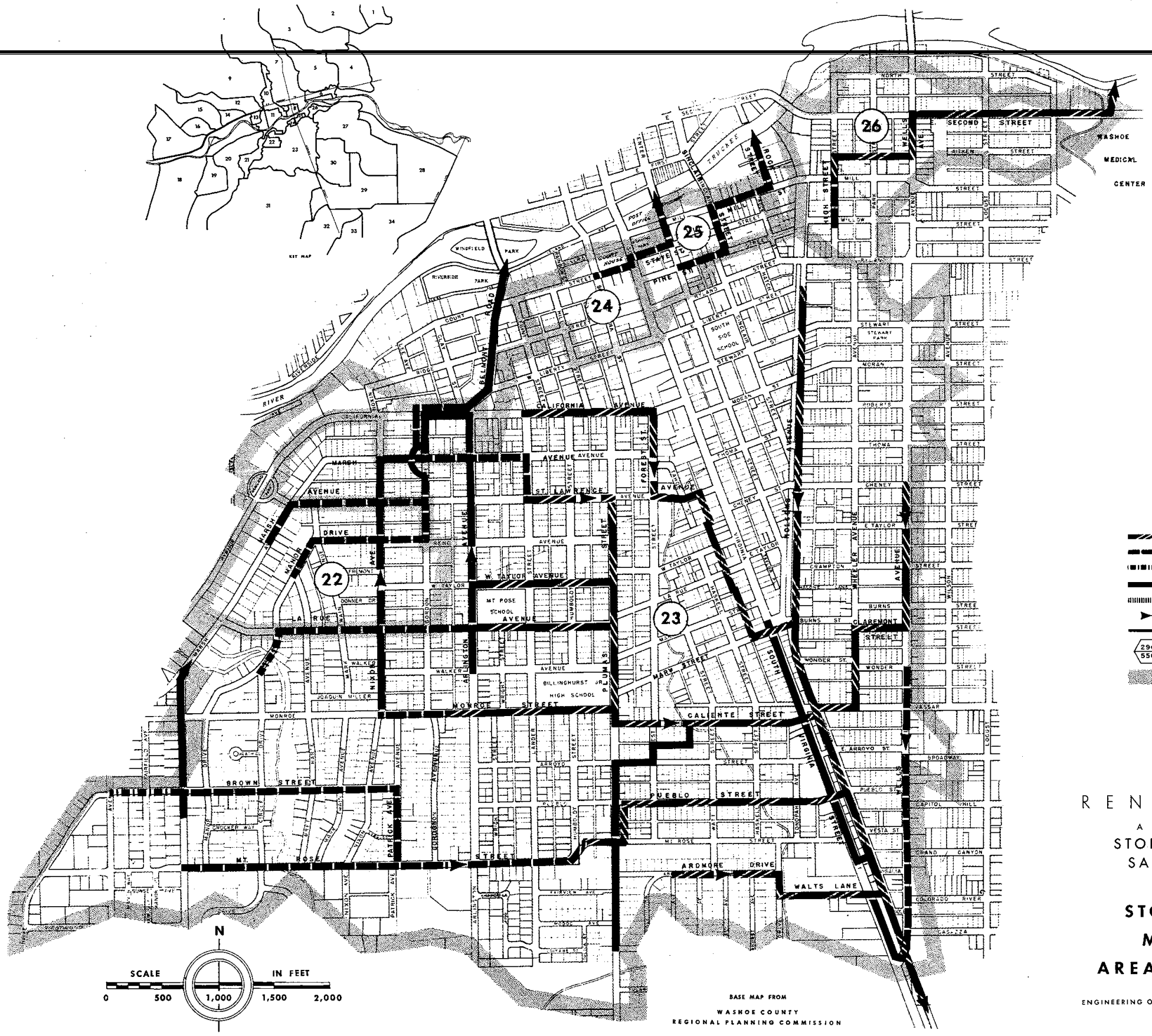
(1) Construct storm drain on High Street from Mill Street to alley north of Mill Street, in alley from High Street to Wells Avenue, on Wells Avenue from alley to East Second Street, on East Second Street east to Washoe Medical Center, discharge to Truckee River in Area 26.

b. Essential construction.

(1) Construct storm drain on High Street from Willow Street to Mill Street in Area 26.

(2) Construct storm drain on Pine Street from Center Street to Sinclair Street, on Sinclair Street from Pine Street to Mill Street, on Mill Street from Sinclair Street to Rock Street, discharge to Truckee River in Area 25.

(3) Construct storm drain on Court Street from Rainbow Street to Virginia Street, continuing on State Street to Center Street, northerly on Center Street to the Truckee River in Area 24.



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN

AREAS 22, 23, 24, 25, 26

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

STORM DRAINAGE MASTER PLAN

AREA 27

1. Description. The northwest part of the area is highly developed as a residential area. The land use map indicates that the area is zoned primarily for residential use, with some commercial and light manufacturing area. There is no existing storm drainage system in the area. Storm drainage from a portion of the area is carried in the sanitary sewers.

2. Problem. Storm drainage should be separated from the sanitary sewers. An adequate storm drainage system should be constructed to protect existing and future development.

3. Recommended construction.

a. Essential construction.

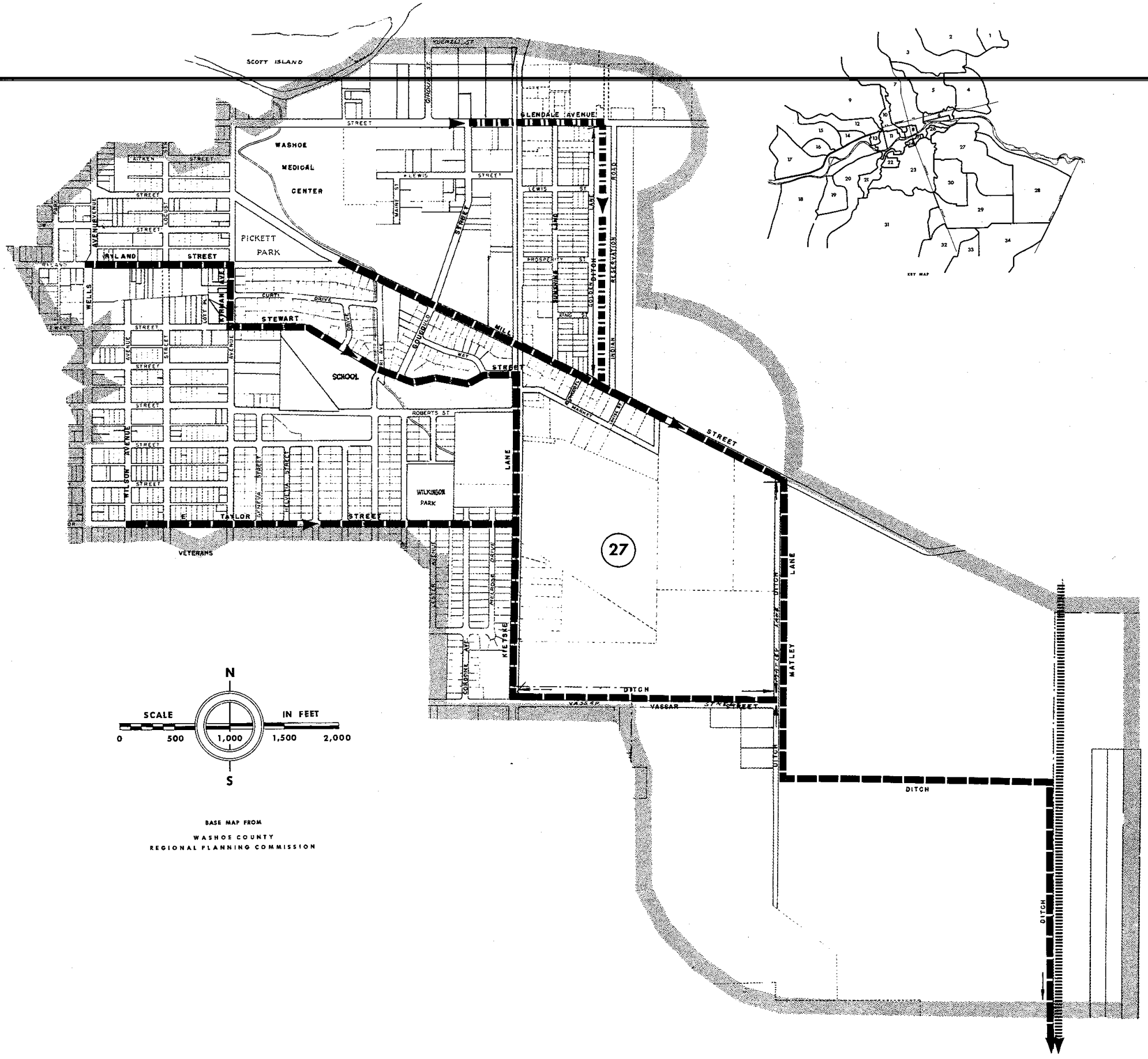
(1) Construct a storm drain on Ryland Street from Wells Avenue to Kirman Avenue, on Kirman Avenue from Ryland Street to Stewart Street, on Stewart Street from Kirman Avenue to Kietske Lane, on Kietske Lane from Stewart Street to Vassar Street, on Vassar Street (ditch) from Kietske Lane to Matley Lane, on Matley Lane from Vassar Street south approximately 700 feet, then east to the existing ditch, then south along the alignment of the existing ditch.

(2) Construct a storm drain on East Taylor Street from Wilson Avenue to Kietske Lane.

(3) Construct a storm drain on Mill Street from Ryland Street to Matley Lane, then (ditch) south on Matley Lane to Vassar Street.

b. Ultimate construction.

(1) Construct a storm drain on Glendale Road from Gould Street to Golden Lane (extended), adjacent to Indian Reservation Road (ditch) from Glendale Road to Mill Street.



LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON
STORM DRAINAGE AND
SANITARY SEWERAGE
OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREA 27

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 25

STORM DRAINAGE MASTER PLAN

AREA 28

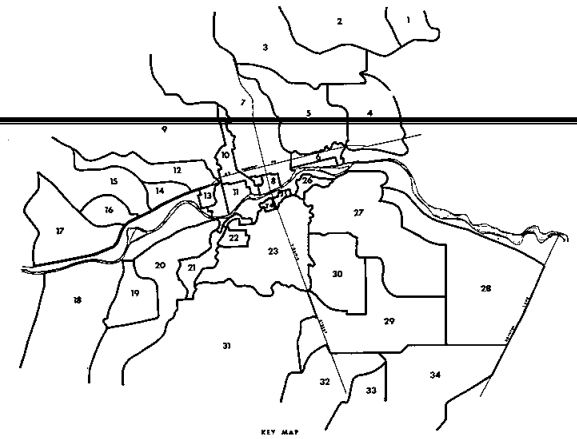
1. Description. The airport is the only major development in the area. The land use map indicates that areas adjacent to the airport are primarily zoned for residential and industrial development. There is an existing ditch drainage system in the area which will be usable under the Master Plan.

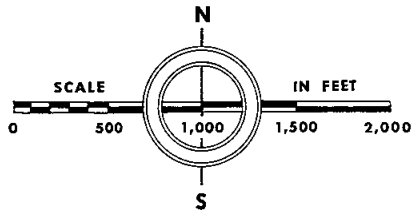
2. Problem. Additional storm drainage being brought into the area from the west will require additional storm drainage ditch construction. Construction must be extended beyond the designated metropolitan Reno area for final disposal.

3. Recommended construction.

a. Emergency construction.

(1) Construct drainage ditch extending east from the N-S runway approximately 4000 feet, then southeast approximately 1400 feet to Boynton Lane. Construct adequate culvert under Boynton Lane.





BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
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RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREA 28

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

PLATE 26

AREA 29

1. Description. There is considerable residential development west of Kietske Lane and some commercial development along Virginia Street. The land use map indicates that the area is zoned for residential, commercial, light manufacturing and tourist-trailer use. There are some existing culverts in the area west of Kietske Lane and existing ditches in the vicinity of the airport.

2. Problem. Additional culvert capacity is required to adequately drain the area west of Kietske Lane.

The ditch system must be augmented to provide adequate capacity for the Mary Street outfall and other major outfall lines.

3. Recommended construction.

a. Emergency construction.

(1) Construct storm drain extending southerly on Virginia Street to beyond Hall Drive, then east to Locust Street.

(2) Construct drainage ditch easterly from Locust Street to the N-S runway.

b. Essential construction.

(1) Construct ditch southerly along the existing ditch alignment near the N-S runway.

(2) Construct storm drain on Hall Drive from Watts Drive to Virginia Street.

c. Ultimate construction.

(1) Construct additional culverts in the area west of Kietske Lane as shown.

AREA 30

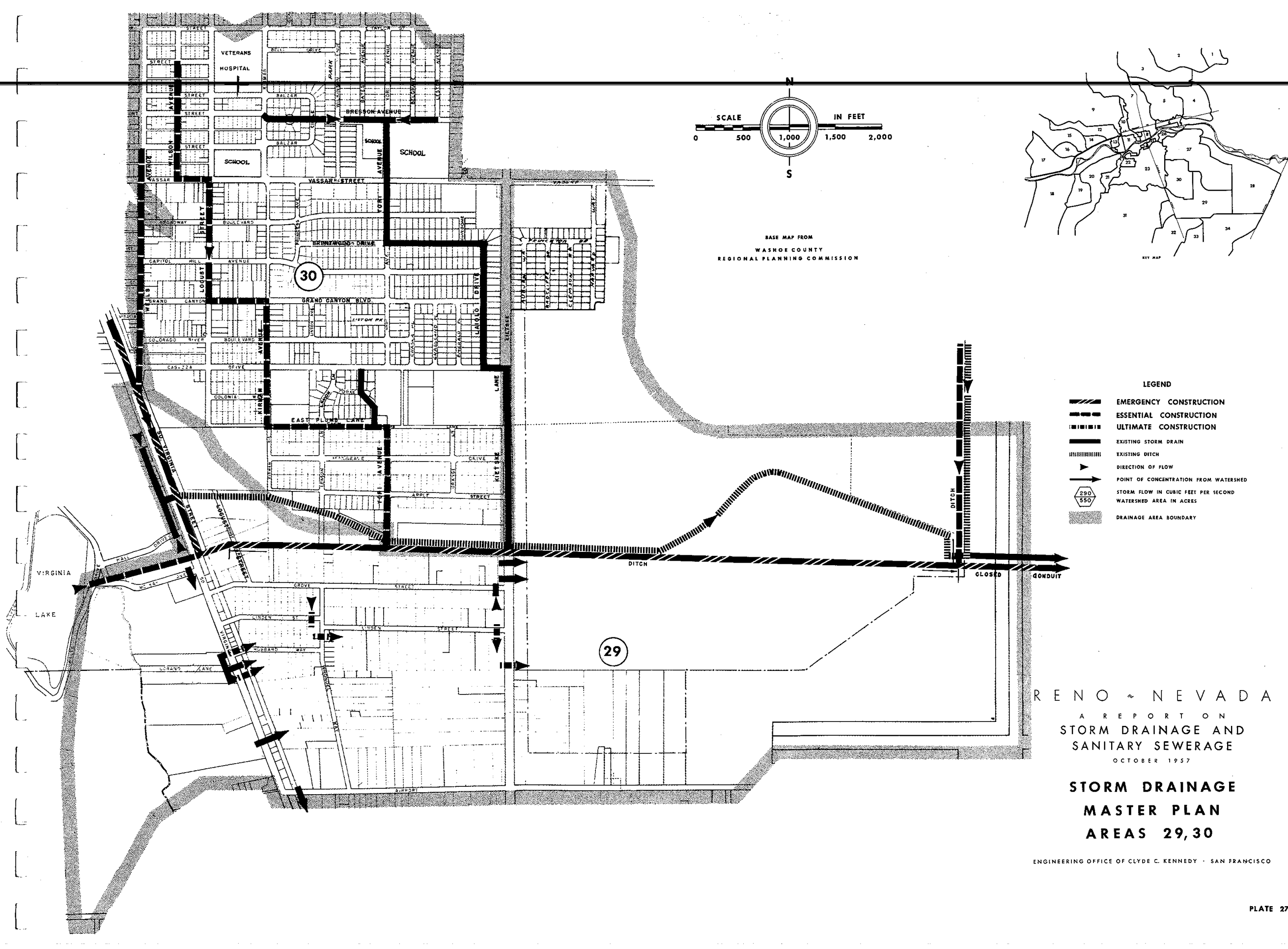
1. Description. There is considerable residential development in the area and some commercial development. The land use map indicates that the area is zoned primarily for residential use with some commercial area along Wells Avenue and Kietske Lane. Some storm drainage from the area is carried into the sanitary sewers. There are some existing storm drains in the area.

2. Problem. Additional trunk storm drains are required to supplement existing trunk storm drains and protect existing and future development.

3. Recommended construction.

a. Essential construction.

(1) Construct trunk storm drain on Wilson Avenue from Crampton Street to Vassar Street, on Vassar Street from Wilson Avenue to Locust Street, on Locust Street from Vassar Street to Grand Canyon Boulevard, on Grand Canyon Boulevard from Locust Street to Kirman Avenue, on Kirman Avenue from Grand Canyon Boulevard to East Plumb Lane, on East Plumb Lane from Kirman Avenue to Yori Avenue, on Yori Avenue from East Plumb Lane to the new E-W ditch described under Area 29.



RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 29, 30

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

STORM DRAINAGE MASTER PLAN

AREA 31

1. Description. Some of the area is developed for residential use, with some commercial use on Virginia Street. The land use map indicates that the area is zoned primarily for residential use with some commercial zone adjacent to Virginia Street. A small amount of the storm drainage from the area is carried into the sanitary sewers. There is no existing system of storm drains. There are two watersheds extending beyond the designated metropolitan Reno area which, because of topography, drain through this area.

2. Problem. An adequate storm drainage system must be provided to carry storm water flow from watershed areas to Virginia Lake which can serve as a check reservoir to reduce peak storm flows in the outfall line from Virginia Lake.

Adequate storm drainage facilities are needed to serve present developed area.

3. Recommended construction.

a. Essential construction.

(1) Construct storm drain outfall from Virginia Lake to Virginia Street.

(2) Construct storm drain on West Plumb Lane from the vicinity of Lander Street to Lakeside Drive, then south to Virginia Lake.

(3) Construct drainage ditch from Victory Drive to Moana Lane, on Moana Lane to Clover Way, then north to Virginia Lake.

b. Ultimate construction.

(1) Construct storm drain on West Plumb Lane from the vicinity of Palisade Drive west to the vicinity of Lander Street.

(2) Construct additional culverts as shown.

N

S

SCALE IN FEET

0 500 1,000 1,500 2,000

WEST PLUMB LANE

600
1130

31

WASHOE COUNTY GOLF

VIRGINIA LAKE

DITCH

520
1100

KEY MAP

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
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WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREA 31

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

AREA 32

1. Description. The area has little development now. The land use map indicates that the area is zoned primarily for agricultural and residential use, with some commercial use adjacent to Virginia Street and Airport Road. There are some existing culverts in the area. There are no connections of storm drainage to sanitary sewers. There is a watershed extending beyond the designated metropolitan Reno area which, because of topography, flows through this area.

2. Problem. Additional culverts are required to provide capacity for storm drainage in the area and to protect existing roads.

3. Recommended construction.

a. Ultimate construction.

(1) Construct additional culverts as shown.

AREA 33

1. Description. There is little development in the area at present. The land use map indicates that the area is zoned primarily for agricultural and residential use, except the area adjacent to Virginia Street which is zoned for commercial use. There are existing drainage culverts in the area. There is no connection of storm drainage to sanitary sewers. There is a watershed extending beyond the designated metropolitan Reno area which, because of topography, drains through this area.

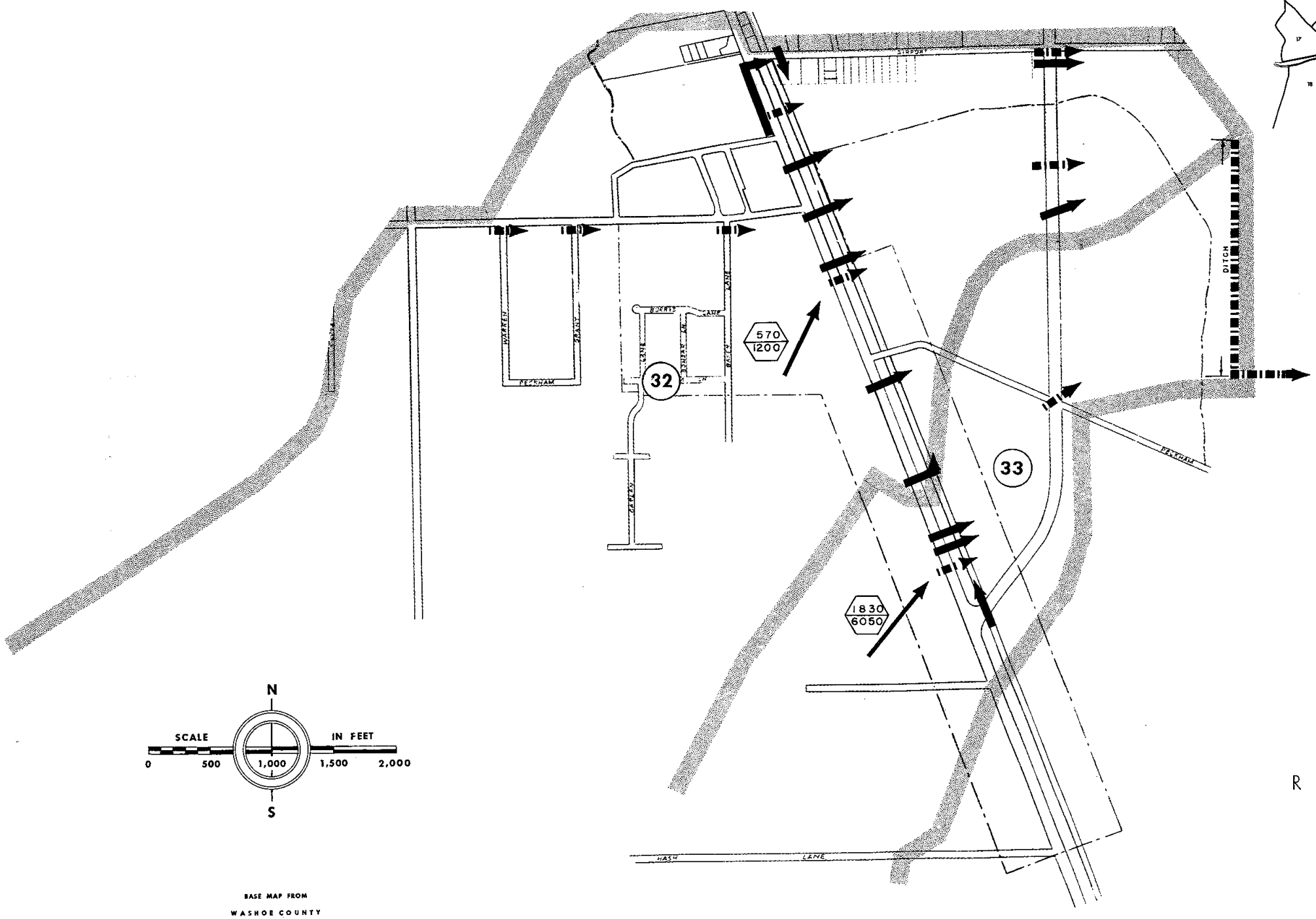
2. Problem. Additional culverts are required to provide capacity for storm drainage in the area and to protect existing roads.

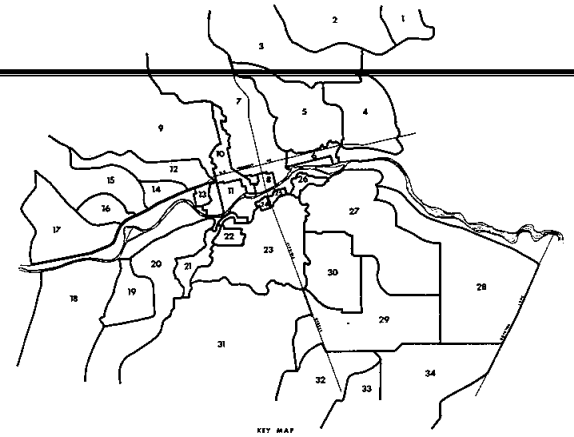
3. Recommended construction.

a. Ultimate construction.

(1) Construct additional road culverts as indicated.

(2) Construct a drainage ditch along the eastern boundary of the area.





LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
- 290 / 550 — STORM FLOW IN CUBIC FEET PER SECOND / WATERSHED AREA IN ACRES
- DRAINAGE AREA BOUNDARY

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

RENO ~ NEVADA

A REPORT ON

STORM DRAINAGE AND SANITARY SEWERAGE

OCTOBER 1957

STORM DRAINAGE MASTER PLAN AREAS 32, 33

ENGINEERING OFFICE OF CLYDE C. KENNEDY · SAN FRANCISCO

STORM DRAINAGE MASTER PLAN

AREA 34

1. Description. There is some residential development in the area at present. The land use zoning map indicates that the area is zoned primarily for residential or agricultural use, with commercial use along Virginia Street.

2. Problem. Adequate ditch capacity must be provided to carry peak storm flow from Area 32, Area 33, and Area 34.

3. Recommended construction.

a. Ultimate construction.

(1) Construct outfall drainage ditch system as shown.

N

SCALE IN FEET

0 500 1,000 1,500 2,000

S

BASE MAP FROM
WASHOE COUNTY
REGIONAL PLANNING COMMISSION

ROAD

DITCH

DITCH

DITCH

DITCH

34

KEY MAP

LEGEND

- EMERGENCY CONSTRUCTION
- ESSENTIAL CONSTRUCTION
- ULTIMATE CONSTRUCTION
- EXISTING STORM DRAIN
- EXISTING DITCH
- DIRECTION OF FLOW
- POINT OF CONCENTRATION FROM WATERSHED
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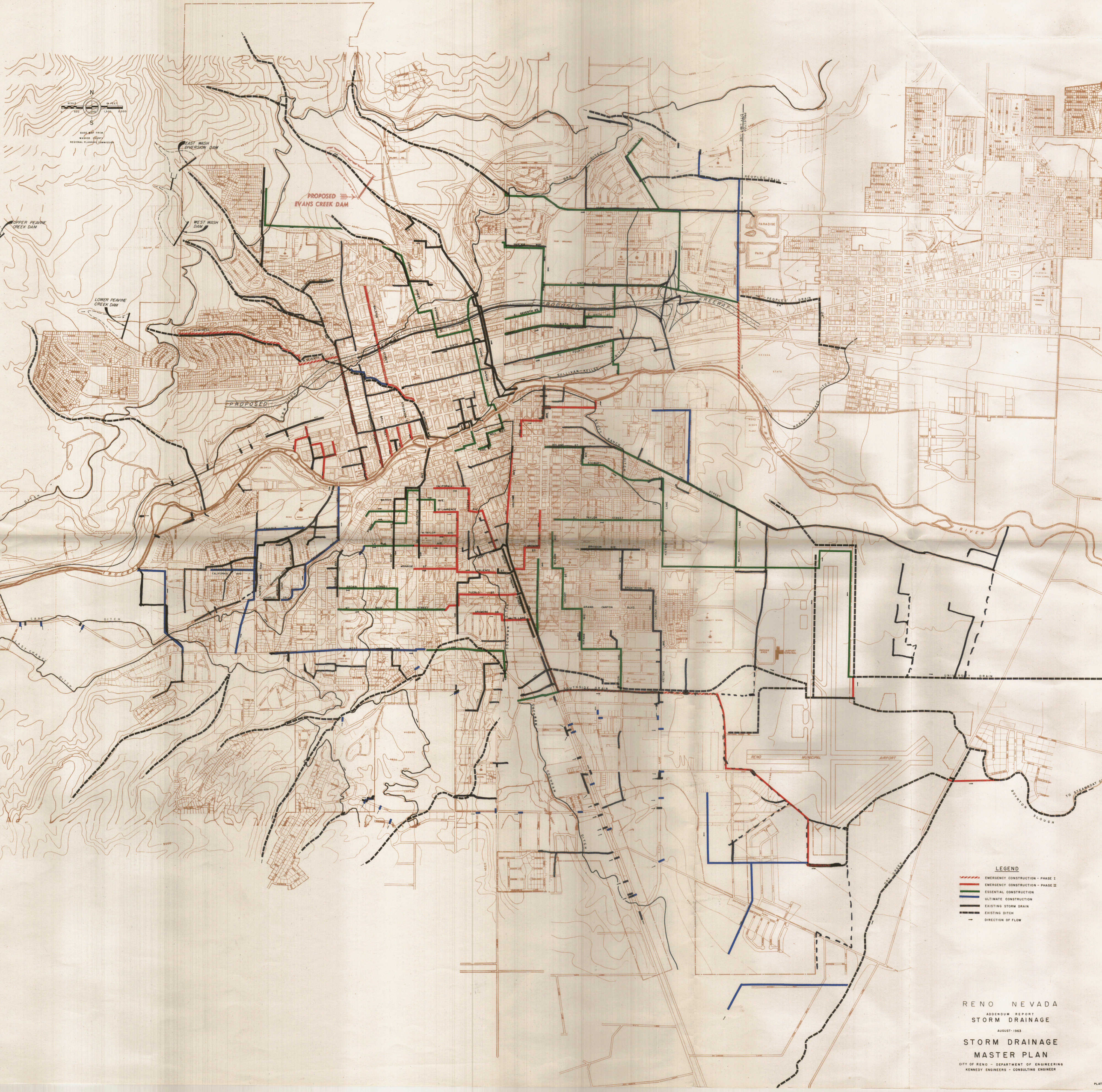
PLATE 30



RENO NEVADA

ADDENDUM REPORT

STORM DRAINAGE

AUGUST-1963

STORM DRAINAGE MASTER PLAN

CITY OF RENO - DEPARTMENT OF ENGINEERING

KENNEDY ENGINEERS - CONSULTING ENGINEER

PLAT