

of the Maple River, following the existing alignment of US-27.

Transportation Impact

In 1995, traffic usage of Alternative F-3 would range between 24,400 trips and 27,500 trips on the average weekday (See Figure S-4). Between Route M-21 and Maple Rapids Road, 24,400 trips are expected on the facility. North of Maple Rapids Road, the usage is expected to increase to 27,500 trips per day. The F-3 Alternative would combine with US-27 to serve north-south travel demands.

Travel on US-27 would be greatly reduced since only local users are expected on the facility. Approximately 3,000 trips per day are anticipated along US-27 between Maple Rapids Road and St. Johns if the expected diversion of through travelers to Alternative F-3 is realized. The impact from the diversion would significantly affect traffic service along US-27 since usage in 1995 would be less than one-third of present usage levels.

Traveler Costs - The difference in route lengths among the alternatives will affect vehicle operating costs for a trip between Route M-21 and the Maple River. The factors that contribute to the cost of such a trip are essentially the same for all alternatives except for the travel distance along each alignment.

Frequent travelers will routinely pay these costs to operate vehicles along the facility so a special analysis was conducted to estimate what the savings in cost might be for shorter alternatives. Details of that analysis were explained earlier in this report.

Alternative F-3 length is shown in Table S-3 to be 10.0 miles-- the same length as Alternative F-1. Consequently, annual vehicle operating costs for frequent travelers are the same for either alternative. However, when compared with Alternative G (Partial), annual savings by the frequent traveler could amount to \$45 per year if either Alternative F-1 or F-3 were implemented rather than Alternative G (Partial).

Safety

As described in the section on Alignment F-1, accident data of the Michigan Department of State Highways and Transportation was used to develop accident rates for rural freeways and segments of US-27. Apply these rates and traffic assignment data to the segment lengths of Alternative F-3 produced an estimate of 1995 accidents (Table S-4).

Table S-3
 FREQUENT TRAVELER COSTS
 EACH YEAR
 (1976 Dollars)

	<u>LENGTH</u> (Miles)	<u>TRIPS (1)</u> PER WEEK	<u>TRIPS (1)</u> PER YEAR	<u>ANNUAL</u> <u>VEHICLE</u> <u>MILES OF TRAVEL</u>	<u>VEHICLE (2)</u> <u>OPERATING COSTS</u> <u>PER MILE</u>	<u>ANNUAL</u> <u>COSTS</u>	<u>COST (3)</u> <u>DIFFERENTIAL</u>
Alternative F-1	10.0	12	624	6240	\$ 0.18	\$1,123	\$ 45
Alternative F-3	10.0	12	624	6240	\$ 0.18	\$1,123	\$ 45
Alternative G (Partial)	10.4	12	624	6490	\$ 0.18	\$1,168	\$ 0

- (1) A frequent traveler is expected to make an average of one round-trip per week day and one round-trip over each weekend during the entire year. This might be the travel pattern of many residents of the area presently using US-27 for work trips to St. Johns or south of St. Johns. In all cases, the trip occurs over the entire length of the Alternative.
- (2) Energy Statistics, U.S. Department of Transportation, August, 1976, Table 3-8, P. 71.
- (3) Annual savings as compared with Alternate G (Partial).

SOURCE: Wilbur Smith and Associates

Table S-4
 PREDICTED 1995 ACCIDENT DATA
 Alternative F-3

FACILITY	HIGHWAY SECTION		LENGTH (Miles)	ADT (1)	ACCIDENT RATE (2)	ACCIDENTS PER YEAR	FATALITY RATE (3)	FATALITIES PER YEAR
	From	To						
<u>Freeway Alternative</u>								
<u>F-3</u>								
	M-21	Maple Rapids Rd.	8.3	24,400	114.3	84	1.9	1.4
	Maple Rapids Rd.	Maple River	1.7	27,500	114.3	19	1.9	0.3
	<u>Subtotal</u>		10.0			103		1.7
<u>Existing US-27</u>								
	M-21	Maple Rapids Rd.	7.3	3,000	767.0	61	4.3	0.3
	Maple Rapids Rd.	Maple River	1.7	2,500	767.0	12	4.3	0.1
	<u>Subtotal</u>		9.0			73		0.4
	<u>TOTAL</u>					176		2.1

- (1) Average Daily Traffic
 (2) Total Accidents per 100 million vehicle miles for 1975
 (3) Total Fatalities per 100 million vehicle miles for 1975

SOURCE: Wilbur Smith and Associates

Travel operations on Alternative F-3 are expected to result in 103 accidents during 1995. Of these, 1.7 fatalities are anticipated. Meanwhile, other traffic operations will be taking place on US-27 where other accidents will occur. These are expected to number 73 accidents with 0.4 fatalities during 1995.

A composite statement is then possible by combining the forecasts of Alternative F-3 operations with the forecasts for remaining US-27. Together, a total of 176 accidents are expected with 2.1 fatalities during 1995 if the operations follow the present accident experience trends used in this analysis.

By comparison total operations with Alternative F-3 Alignment are as safe as operational safety forecasts for Alternative F-1. This is as expected since traffic assignment data is the same with only a slight difference in the lengths of the two alternatives. Consequently, vehicle-miles of travel are nearly equal so accident predictions are the same.

Natural Systems Impact

The woodlots adjacent to Alignment F-3 are classified by the Department of Natural Resources as being important for providing habitat for many species of animals. Details of wildlife and timber values are listed in Appendix G of the Draft Alignment EIS. Alignment F-3 could have an impact on six woodlots.

Alignment F-3 crosses the Hayworth Creek floodplain for approximately one mile. Basically this area contains muck land, which ranges from one to six feet in depth.

Due to the depth and type of glacial till in the area, bedrock water resources will not be affected. This alignment will not have a significant affect on the adjacent buried deposits of outwash for water supply.

Alignment F-3 traverses two possible recharge zones of the ground water systems (Figure 21). These are north of M-21 and south of the Maple River. Bedrock aquifers, principal sources of water supply in the Study Area, will be directly affected by this alignment.

Most of the drains crossed by Alignment F-3 are traversed perpendicularly. This will minimize erosion and interference with drainage patterns. The alignment is situated in the Maple River Drainage Basin and the tributaries that supply the river.

De-icing operations will result in approximately 50 tons of sodium chloride being spread on the road surfaces each year in the

Study Area. Most of this salt will eventually be deposited in the Grand River via the Maple River.

Social Impact

The displacement of agricultural land is common to each of the alignment alternatives. For evaluation purposes, this impact criteria has been divided into two categories, Agricultural and Prime Agricultural (Class I and II soils) lands. An average of 300 feet has been used for computing the right-of-way (ROW) requirements for construction.

Total land requirements for Alignment F-3 is approximately 430 acres. It is estimated that 89 percent (383 acres) is agricultural land. Within the agricultural acreage, approximately 80 percent is classified as prime agricultural land or 306 acres. Included in the total acreage is the land necessary for the Maple Rapids Road interchange.

Two potential archeological sites are located in the vicinity of this alignment. The exact location of the two potential sites is not known. After an alignment is selected and prior to final design an archeological survey will be conducted prior to construction if requested by the State Archeologist (Appendix S-A).

Alignment F-3 has approximately 3.5 miles of roadway that crosses the section line grid at skew angles. This could result in irregularly shaped parcels of land that constrain agricultural production.

Ten parcels of land will be divided by this alignment. Three of these parcels are farms that range between 100 and 200 acres each and one that has approximately 300 acres. The degree of impact from severance depends upon the amount of land required, access, size and type of farming operation (i.e. cash crop, dairy, feedlot, etc.). Economic impact on the small operations will be significant, but at the same time an adverse impact will be inflicted upon the larger operations because of the volume of land and equipment required to continue a viable operation.

The F-3 Alignment passes through the St. Johns School District. This alignment, if implemented, proposes to close Steel Road, Walker Road, Silvers Road and Gratiot Road. The road closings should require minimal changes in the school bus circulation system. This alignment will displace 40 children (1%) attending classes in the St. Johns School District. It is probable that the displaced families will relocate in close proximity to their present habitat, with a new result of no change in school enrollment.

Alignment F-3 will not adversely affect emergency and fire protection services for the surrounding area. It is anticipated that services will be more efficient and expedient because of less conflict with traffic on US-27.

Relocation

The F-3 Alignment will displace approximately 19 single family structures and 4 mobile homes. In addition, Alignment F-3 will require acquisition of one commercial structure and 21 farm buildings. Alignment F-3 will remove approximately 2 acres of commercial land, 45 acres of residential land and 383 acres of agricultural land from the tax books of Clinton and Gratiot Counties.

Economic Impact

A direct and immediate impact of a highway is the amount of taxable land displaced. Alignment F-3 will reduce the amount of taxable land in Clinton County by 399 acres and Gratiot County by 31 acres. Since agricultural land accounts for 43.7 (Greenbush Township) and 70.3 (Washington Township) percent of the total tax base, this alignment would reduce the tax base of Greenbush Township by 0.6 percent and Washington Township by 0.04 percent.

School districts usually incorporate a much larger area than individual townships. Alignment F-3 will have an impact upon the St. Johns School District tax base by displacing 23 residential structures, one commercial structure and 430 acres of land.

Impact upon the county tax base is even less significant. Potential development, particularly in the vicinity of interchange locations, could have a positive impact on the areas tax base.

The provision of grade separations will alleviate the hazard of farm machinery competing with high-speed through traffic. Where grade separations are not provided alignment could have a detrimental affect on the farmers who cultivate non-contiguous parcels of land because of the adverse distance required to obtain access to the parcels.

The transportation facility will offer the user improved access to the visual aesthetics of the area's landscape. At the same time, the intrusion of a highway facility on the landscape will alter the visual quality available to the area's residents.

Air and Noise Impact

Air - There is no significant impact on air quality from the F-3

Alignment. Carbon monoxide comprises the majority of automobile pollutants in a rural area. This alignment will generate a total one-hour peak concentration of carbon monoxide of 1.0 PPM (1995) or 2 percent of the National Ambient Air Quality Standard (NAAQS) of 35 PPM. The eight hour prediction is 0.2 PPM or 2 percent of the NAAQS (9PPM).

For this analysis, the California Line Source Model (CALINE - 2) was used. Inputs into the model include: Critical wind speed of 3 MPH; Atmospheric Stability Class (PASQUILL) of F; An average speed of 55 MPH for vehicles; Wind direction of 15 degree with the highway; And a vehicle mix of 90% gasoline cars, 2% light duty gasoline, 4% each of heavy duty gasoline trucks and heavy duty diesel trucks.

In summary, based on the above analysis, the F-3 Alignment will not significantly affect the air quality within the area. It is our findings that the project is consistent with the State Implementation Plan for Air Quality.

Noise - The pattern of noise contours will change significantly because of the redistribution of traffic on the highway system. The 70 dBA and above contour will extend 243 feet either side of the center of the median. The residential structures that are located within this contour will be acquired for right-of-way. The 60 to 70 dBA contour will extend 612 feet from center of median in either direction. There are 21 residential units that could experience a noise level between 60 dBA and 70 dBA. Reduced traffic volumes on existing US-27 south of Maple Rapids Road will decrease the number of residences on or near the highway that presently experience high noise levels.

ALIGNMENT F-5

Alternative F-5 follows the alignment of F-3 from Route M-21 to Mead Road (Figure S-7). At Route M-21, the alignment occupies the quarter-section line east of Williams Road, while from Kinley Road northward it follows the quarter-section line west of Williams Road.

Just to the north of Mead Road, F-5 Alignment follows the quarter-section line west of Williams Road to a crossing of Hyde Road. At Hyde Road, or Maple Rapids Road, full interchange is planned. Figure S-7 illustrates the interchange at Hyde Road, however, the same basic configuration would apply if the interchange was located on Maple Rapids Road. The alignment then curves northwestward in a path crossing Maple Rapids Road, where a bridge will be provided. It proceeds northwestward to a crossing of

Scott Road, which would be bridged, and a crossing of Gratiot Road, which will be closed.

At Gratiot Road, the alignment curves northward and connects to existing US-27 alignment south of the Maple River. The alignment then proceeds northward along present US-27 to the Maple River crossing.

Access will be provided allowing movement between US-27 (south of the junction) to northbound US-27 freeway and from southbound US-27 freeway to US-27 south via access ramps. Southbound movement from US-27 (south of junction) to southbound US-27 freeway will not be provided because this access will be provided through the interchange at Hyde Road or Maple Rapids Road.

Transportation Impact

From 24,400 to 25,000 trips per day are expected on Alternative F-5 in 1995 if the Alternative is implemented (Figure S-4). Between Route M-21 and Maple Rapids Road, 24,400 trips were estimated, while north of Maple Rapids Road, approximately 25,000 trips are foreseen.

Meanwhile, US-27 usage would be 2,500 trips per day north of Maple Rapids Road and 3,000 trips per day south of Maple Rapids Road toward St. Johns. As compared with present usage of this segment, 1995 traffic would be less than one-third present levels. Travelers along US-27 would be mostly local with origins or destinations near the present route.

Traveler Costs - Frequent travelers using Alternative F-5 would benefit from distance savings since the alignment of Alternative F-5 is the shortest of all freeway alternatives.

Between Route M-21 and the Maple River, frequent travelers would save from 0.5 mile to 0.9 mile using Alternative F-5 rather than any of the other alternatives. Consequently, annual savings by the frequent traveler were estimated as \$45 or \$101 per year (Table S-5) depending upon the choice of competing alternative.

Alternative F-5 savings over Alternative G (Partial) were estimated at \$101 per year. In perspective, these savings would permit the vehicle owner to purchase a complete set of new first-line tires approximately every two years. This is provided the driver is a frequent traveler as defined earlier making six round-trips a week over the distance from Route M-21 to Maple River and that the driver's vehicle operates at the average cost of 18 cents per mile.

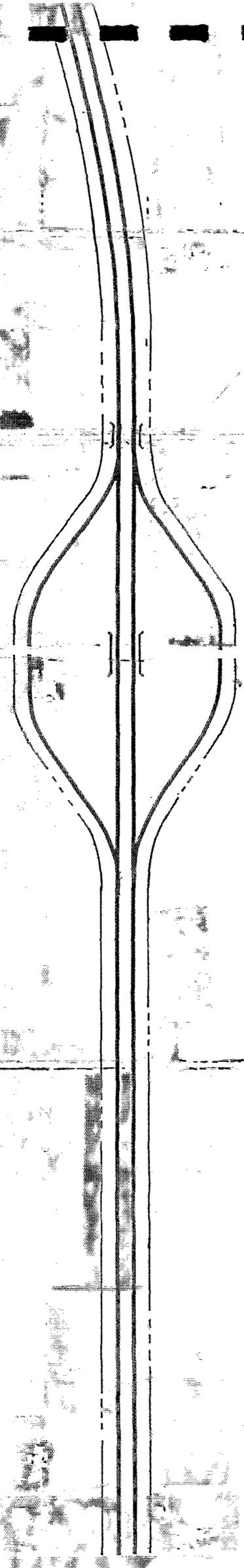
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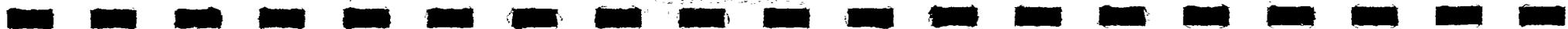
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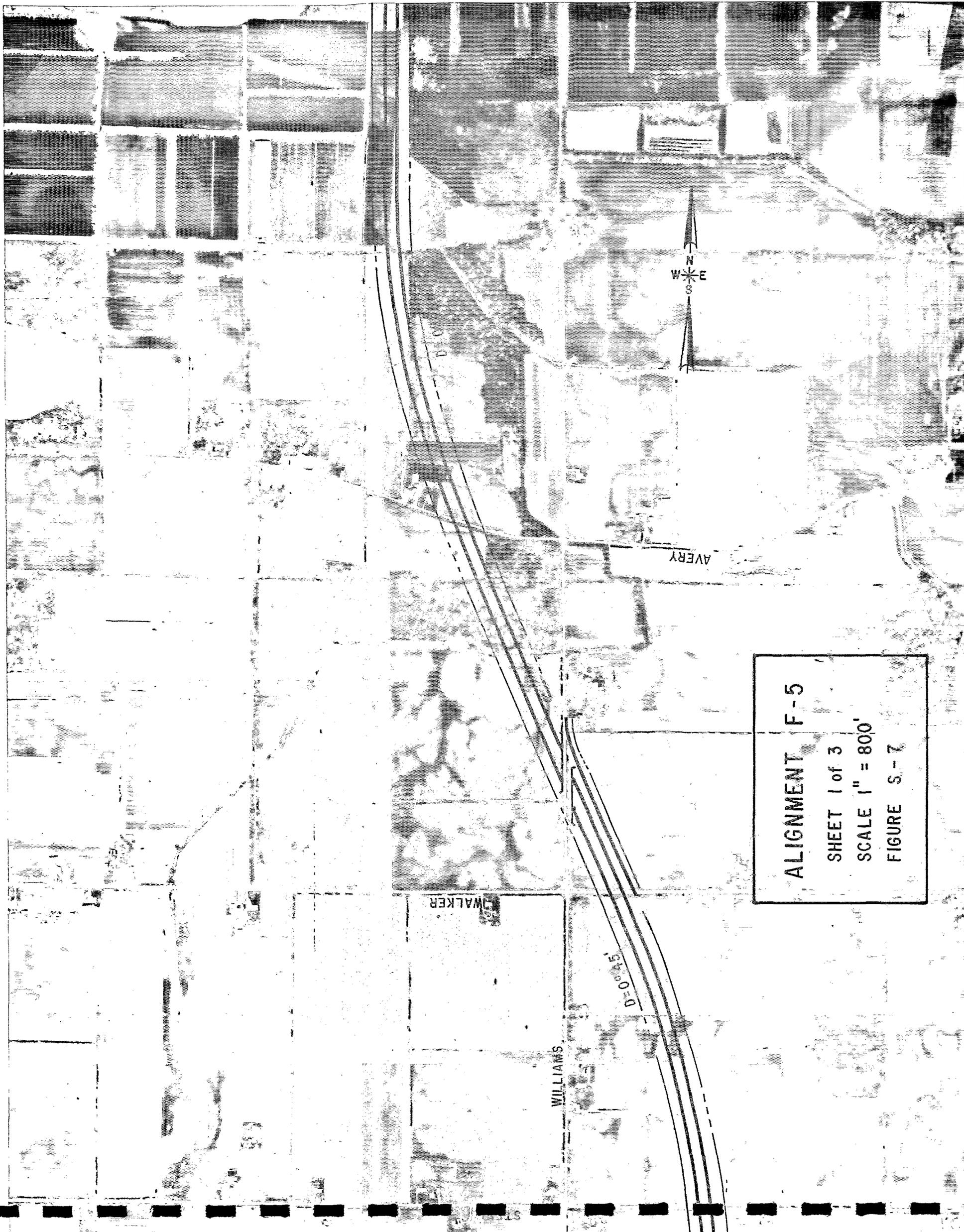
M-21

WILDCAT

ST. JOHNS





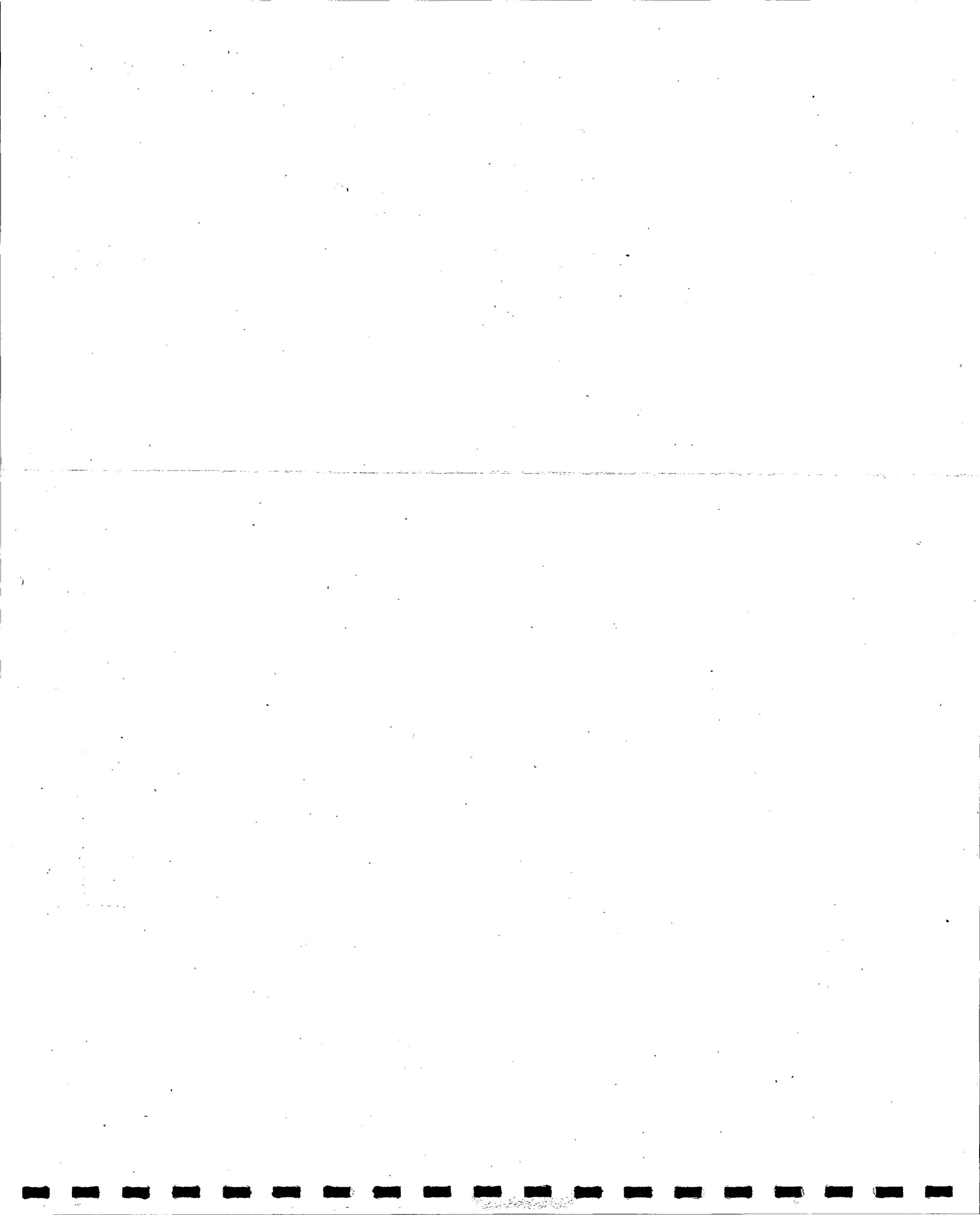


ALIGNMENT F-5

SHEET 1 of 3

SCALE 1" = 800'

FIGURE S-7



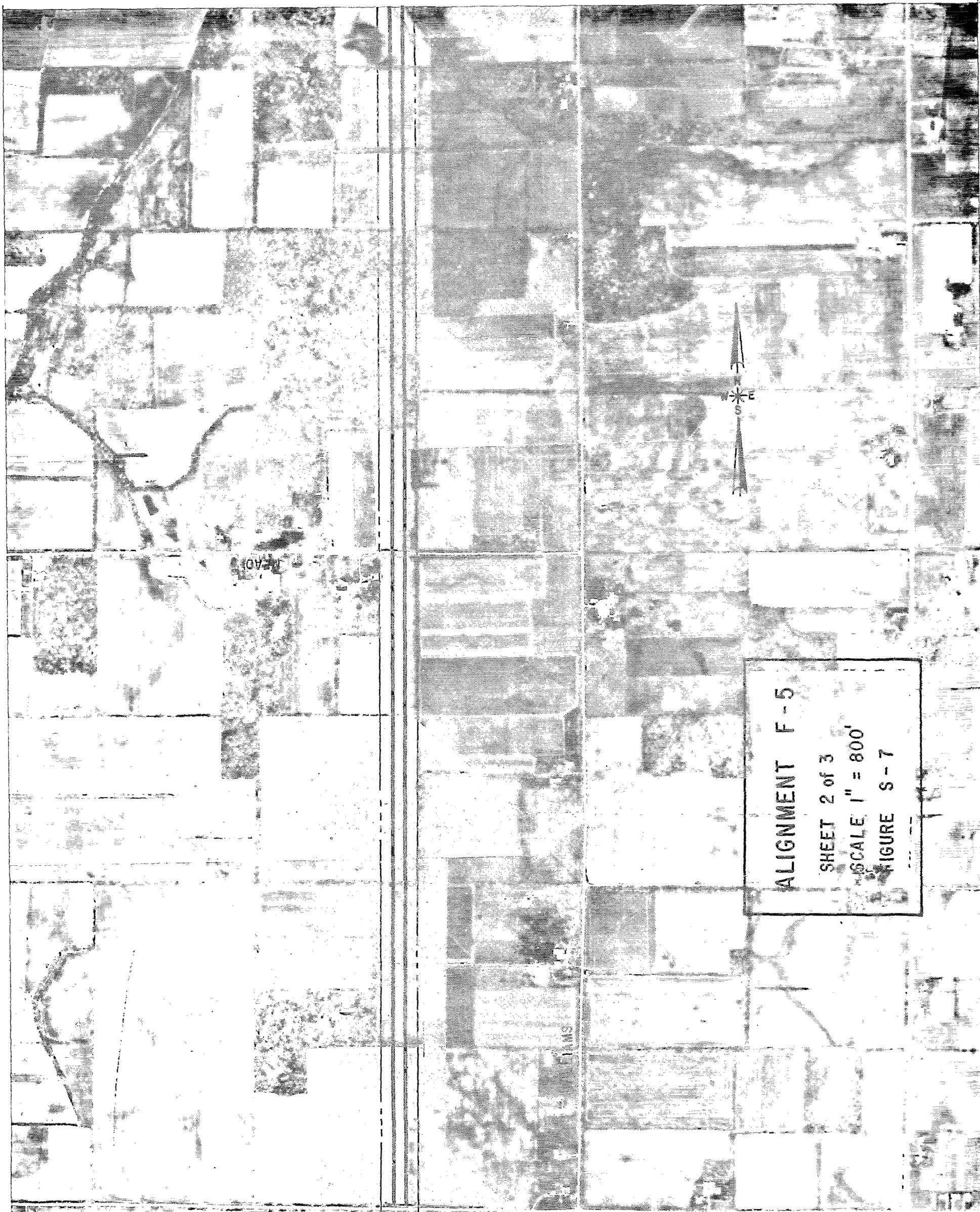


COLO

SILVERS

FRENCH





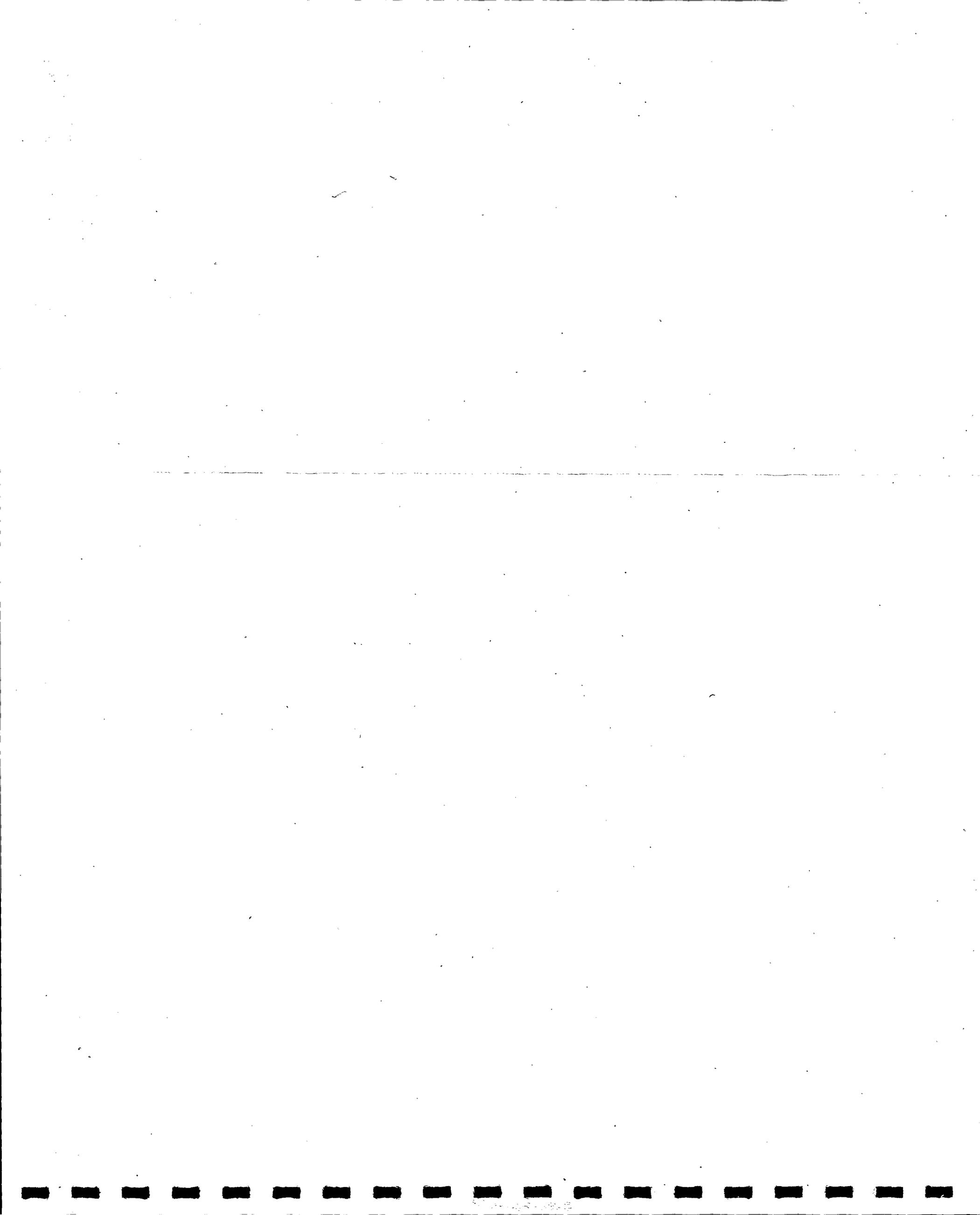
ALIGNMENT F - 5

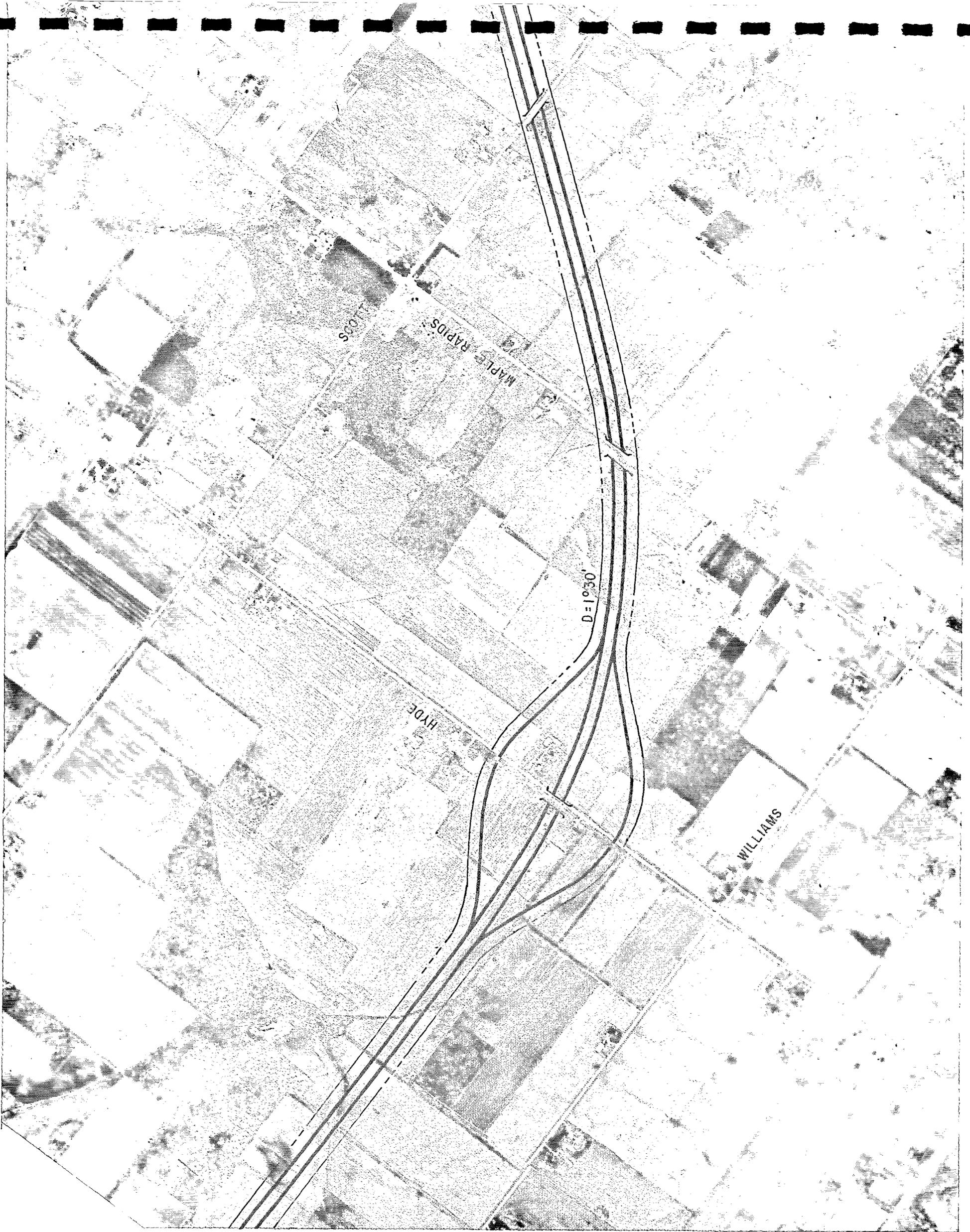
SHEET 2 of 3

SCALE 1" = 800'

FIGURE S - 7

FR NCH





SCOTT

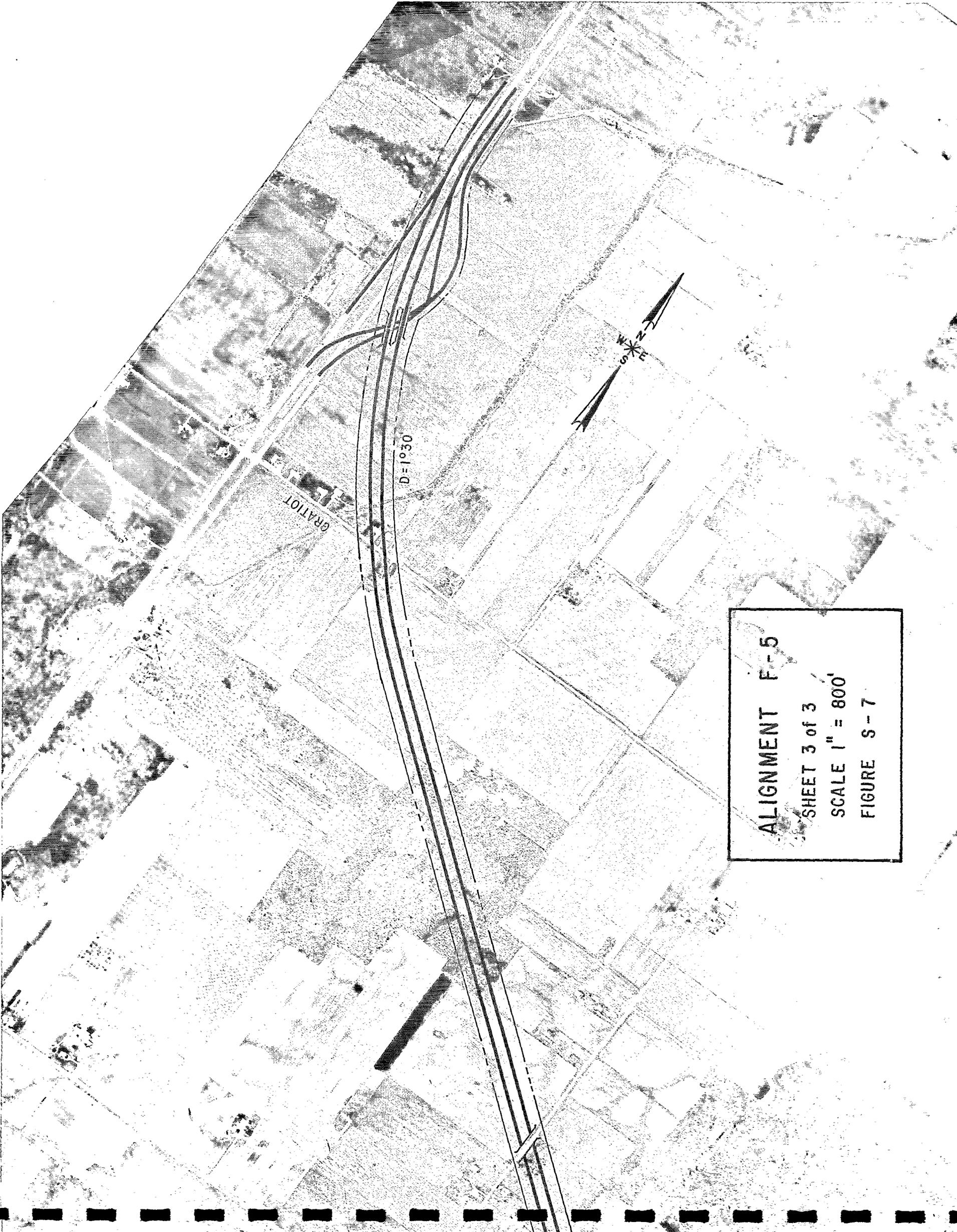
MAPLE RAPIDS

HYDE

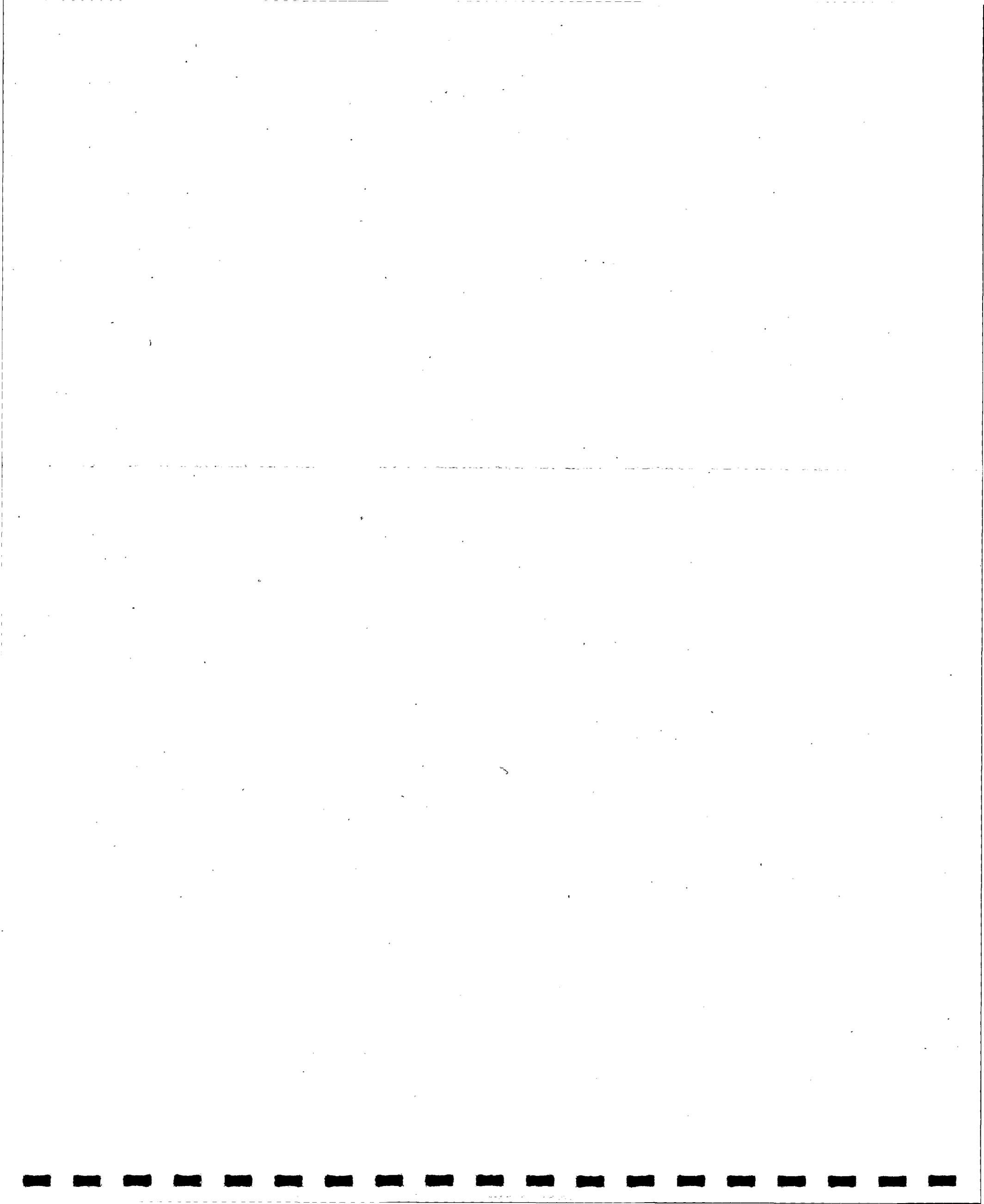
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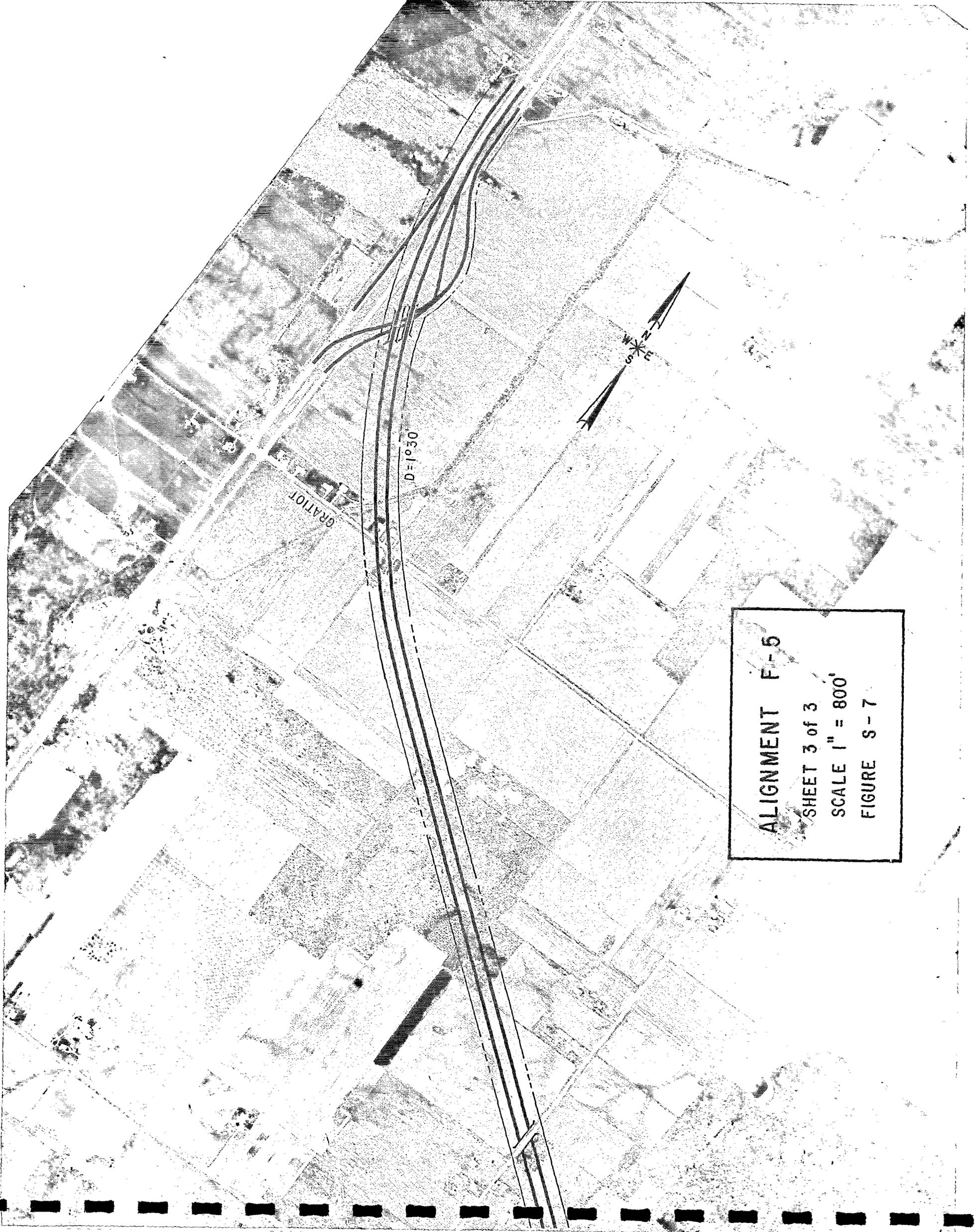
D=1030''





ALIGNMENT F-5
SHEET 3 of 3
SCALE 1" = 800'
FIGURE S-7





ALIGNMENT F-5

SHEET 3 of 3

SCALE 1" = 800'

FIGURE S-7

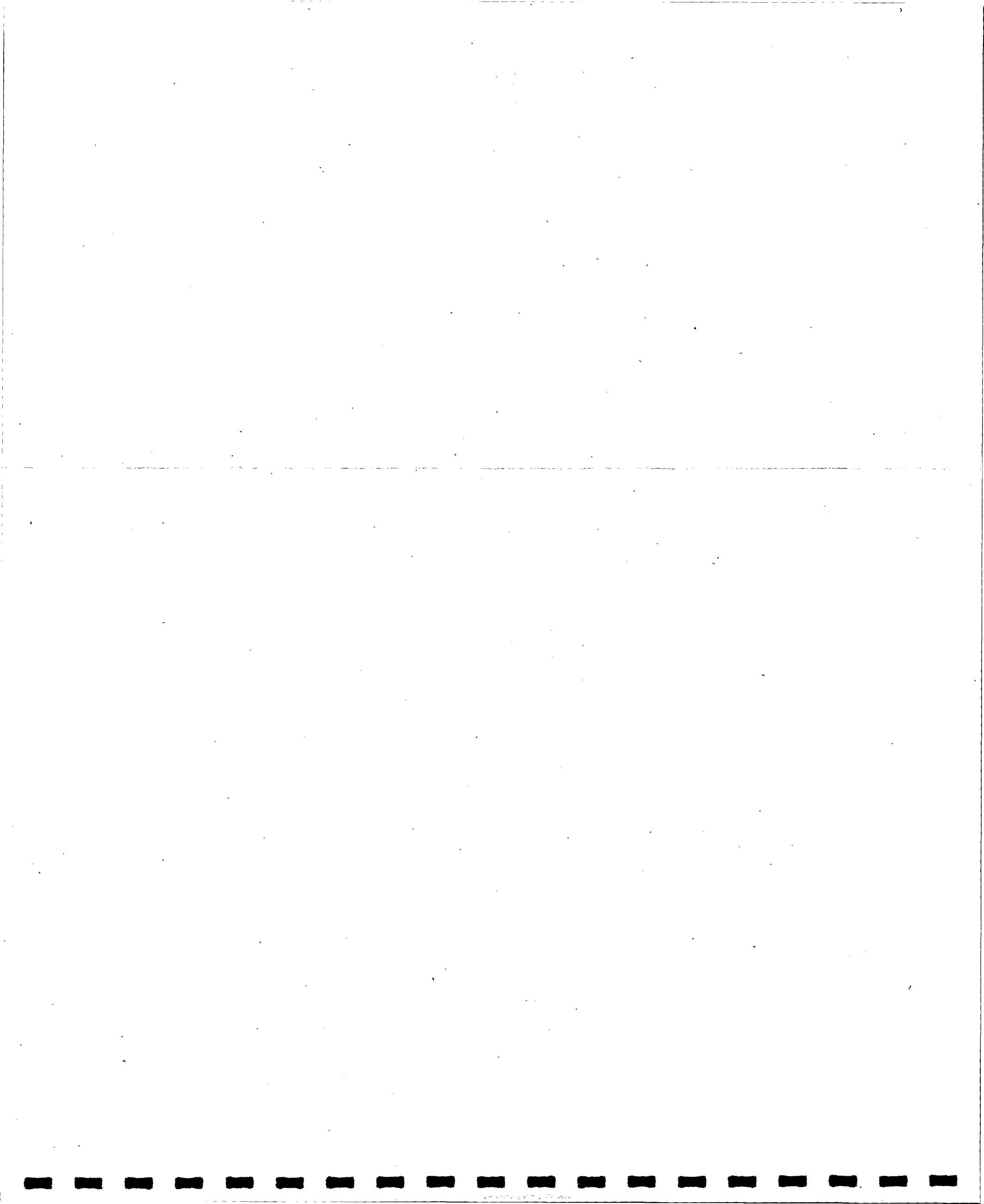


Table S-5
 FREQUENT TRAVELER COSTS
 EACH YEAR
 (1976 Dollars)

	<u>LENGTH</u> (Miles)	<u>TRIPS (1)</u> PER WEEK	<u>TRIPS (1)</u> PER YEAR	<u>ANNUAL</u> <u>VEHICLE</u> <u>MILES OF TRAVEL</u>	<u>VEHICLE (2)</u> <u>OPERATING COSTS</u> <u>PER MILE</u>	<u>ANNUAL</u> <u>COSTS</u>	<u>COST (3)</u> <u>DIFFERENTIAL</u>
Alternative F-1	10.0	12	624	6240	\$ 0.18	\$ 1,123	\$ 45
Alternative F-3	10.0	12	624	6240	\$ 0.18	\$ 1,123	\$ 45
Alternative F-5	9.5	12	624	5928	\$ 0.18	\$ 1,067	\$101
Alternative G (Partial)	10.4	12	624	6490	\$ 0.18	\$ 1,168	\$ 0

- (1) A frequent traveler is expected to make an average of one round-trip per week day and one round-trip over each weekend during the entire year. This might be the travel pattern of many residents of the area presently using US-27 for work trips to St. Johns or south of St. Johns. In all cases, the trip occurs over the entire length of the Alternative.
- (2) Energy Statistics, U.S. Department of Transportation, August, 1976, Table 3-8, P. 71.
- (3) Annual savings as compared with Alternate G (Partial).

SOURCE: Wilbur Smith and Associates

Safety

An analysis of accident experience produced estimates of 1995 accident levels considering implementation of Alternative F-5 and lighter traffic flows on US-27. The analysis procedure is described in earlier sections of this report.

Travel operations on Alternative F-5 are expected to result in 97 accidents (Table S-6) during 1995. These accidents are expected to result in 1.6 fatalities. Concurrently, traffic remaining on US-27 is expected to produce 73 accidents including 0.4 fatalities.

Totaling the estimates for Alternative F-5 and US-27 permits a forecasts of 170 accidents for both facilities during 1995. Total fatalities are estimated as 2.0 occurrences.

Alternative F-5 implementation is therefore considered a step toward safer operations than could be provided on either Alternative F-1 or Alternative F-3. In 1995, six fewer accidents would be expected and 0.1 fewer fatalities.

Natural System Impact

The woodlots on Alignment F-5 are classified by the Department of Natural Resources as being important for providing habitat for many species of animals. Details of wildlife and timber values are listed on Appendix G of the Draft Alignment EIS. Alignment F-5 could have an impact on five woodlots.

Alignment F-5 crosses the Hayworth Creek floodplain for approximately one mile. Basically this area contains muck land, which ranges from one to six feet in depth.

Due to the depth and types of glacial till in the area, bedrock resources will not be affected. This alignment will not have a significant affect on the adjacent buried deposits of outwash for water supply.

Alignment F-5 traverses two possible recharge zones of the ground water systems (Figure 21). These are north of M-21 and south of the Maple River. Bedrock aquifers, principal sources of water supply in the Study Area, will not be directly affected by this alignment.

Most of the drains crossed by Alignment F-5 are traversed perpendicularly. This will minimize erosion and interference with drainage patterns. The alignment is situated in the Maple River Drainage Basin and the tributaries that supply the river.

Table S-6
 PREDICTED 1995 ACCIDENT DATA
 Alternative F-5

FACILITY	HIGHWAY SECTION		LENGTH (Miles)	ADT (1)	ACCIDENT RATE (2)	ACCIDENTS PER YEAR	FATALITY RATE (3)	FATALITES PER YEAR
	From	To						
<u>Freeway Alternative</u> <u>F-5</u>	M-21	Hyde Road	6.6	24,400	114.3	67	1.9	1.1
	Hyde Road	Maple River	<u>2.9</u>	25,000	114.3	<u>30</u>	1.9	<u>0.5</u>
	<u>Subtotal</u>		9.5			97		1.6
<u>Existing US-27</u>	M-21	Maple Rapids Rd.	7.3	3,000	767.0	61	4.3	0.3
	Maple Rapids Rd.	Maple River	<u>1.7</u>	2,500	767.0	<u>12</u>	4.3	<u>0.1</u>
	<u>Subtotal</u>		9.0			73		0.4
	<u>TOTAL</u>					<u>170</u>		<u>2.0</u>

- (1) Average Daily Traffic
 (2) Total Accidents per 100 million vehicle miles for 1975
 (3) Total Fatalities per 100 million vehicle miles for 1975

SOURCE: Wilbur Smith and Associates

De-icing operations will result in approximately 50 tons of sodium chloride being spread on the road surfaces each year in the Study Area. Most of this salt will eventually be deposited in the Grand River via the Maple River.

Social Impact

The displacement of agricultural land is common to each of the alignment alternatives. For evaluation purposes, this criteria has been divided into two categories, Agricultural and Prime Agricultural (Class I and II soils) lands. An average of 300 feet has been used to compute the right-of-way (ROW) requirements for construction.

Total land requirements for Alignment F-5 is approximately 425 acres. It is estimated that 92 percent (390 acres) is agricultural land. Within the agricultural acreage approximately 70 percent is classified as prime agricultural land or 297 acres. Included in the total acreage is the land necessary for the interchange at Hyde Road or Maple Rapids Road.

Two potential archeological sites are located in the vicinity of this alignment. The exact location of the two sites is not known. After an alignment is selected and prior to final design an archeological survey will be conducted prior to construction if requested by the State Archeologist (Appendix S-A).

The F-5 Alignment has approximately 4.5 miles of roadway that crosses the section line grid at skew angles. This could result in irregularly shaped parcels of land that constrain agricultural production.

Thirteen parcels of land will be divided by this alignment. Four of these parcels are farms that range between 100 and 200 acres each and one parcel that has approximately 300 acres. The degree of impact from severance depends upon the amount of land required, access, size and type of farming operations (i.e. cash crop, dairy, feedlot, etc.). Economic impact on the small operations will be significant but at the same time, an adverse impact will be inflicted upon the larger operations because of the volume of land and equipment required to continue a viable operation.

The F-5 Alignment passes through the St. Johns School District. This alignment, if implemented, proposes to close Steel Road, Walker Road and Silvers Road. The road closings will require minimal changes in the school bus circulation system. This alignment will displace approximately 35 children (1%) attending classes in the St. Johns School District. It is probable that the displaced families will relocate in close proximity to their present

habitat, with a net result of no change in school enrollment.

Alignment F-5 will not adversely affect emergency and fire protection services for the surrounding area. It is anticipated that services will be more efficient and expedient because of less conflict with traffic on US-27.

Relocation

The F-5 Alignment will displace approximately 14 single family structures and 4 mobile homes. In addition, Alignment 5 will require the acquisition of 18 farm buildings. Alignment F-5 will remove approximately 35 acres of residential land, and 390 acres of agricultural land from the tax books of Clinton and Gratiot Counties.

Economic Impact

A direct and immediate impact of a highway is the amount of taxable land displaced. Alignment F-5 will reduce the amount of taxable land in Clinton County by 394 acres and Gratiot County by 31 acres. Since agricultural land accounts for 43.7 (Greenbush Township) and 70.9 (Washington Township) percent of the total tax base, this alignment would reduce the tax base of Greenbush Township by 0.6 percent and Washington Township by 0.04 percent.

School districts usually incorporate a much larger area than individual townships. Alignment F-5 will have an impact upon the St. Johns School District tax base by displacing 18 residential structures and 425 acres of land.

Impact upon the county tax base is even less significant. Potential development, particularly in the vicinity of interchange locations, could have a positive impact on the areas tax base.

The provision of grade separations will alleviate the hazard of farm machinery competing with high speed through traffic. Where grade separations are provided this alignment could have a detrimental affect on the farmer who cultivates non-contiguous parcels of land because of the adverse distance required to obtain access to the parcels.

The transportation facility will offer the user improved access to the visual aesthetics of the area's landscape. At the same time, the intrusion of a highway facility on the landscape will alter the visual quality available to the residents.

Air and Noise Impact

Air - There is no significant impact on air quality from the F-5 Alignment. Carbon monoxide comprises the majority of automobile pollutants in a rural area. This alignment will generate a total one-hour peak concentration of carbon monoxide of 1.0 PPM (1995) or 2 percent of the National Ambient Air Quality Standard (NAAQS) of 35 PPM. The eight hour prediction is 0.2 PPM or 2 percent of the NAAQS (9PPM).

For this analysis, the California Line Source Model (CALINE - 2) was used. Inputs into the model include: Critical wind speed of 3 MPH; Atmospheric Stability Class (PASQUILL) of F; An average speed of 55 MPH for vehicles; Wind direction of 15 degree with the highway; And a vehicle mix of 90% gasoline cars, 2% light duty gasoline, 4% each of heavy duty gasoline trucks and heavy duty diesel trucks.

In summary, based on the above analysis, the F-5 Alignment will not significantly affect the air quality within the area. It is our findings that the project is consistent with the State Implementation Plan for Air Quality.

Noise - The pattern of noise contours will change significantly because of this redistribution of traffic on the highway system. The 70 dBA and above contour will extend 243 feet either side of the center of the median. The residential structures that are located within this area will be required for right-of-way. The 60 to 70 dBA contour will vary from 612 feet to 628 feet either side of the center of the median. There are 15 residences that could experience a noise level between 60 dBA and 70 dBA. Reduced traffic volumes on US-27 south of the function will decrease the number of residences on or near the highway that presently experience high noise levels.

ALIGNMENT G (Partial)

This alternative alignment coincides with Alternative F-1 Alignment at Route M-21 (Figure S-8). It follows Alignment F-1 to a westward crossing of Scott Road, which would be bridged. It then proceeds due westerly to a curve which turns northward and crosses Kinley Road.

At Kinley Road, an interchange is planned. This is different from all other alternatives since no other will interchange with Kinley Road.

The alignment then proceeds northerly along the location of present

ST. JOHNS

TOWNSEND

WILDCAT

M-21

GRAND TRUNK R.R.

STEEL

WILLIAMS

