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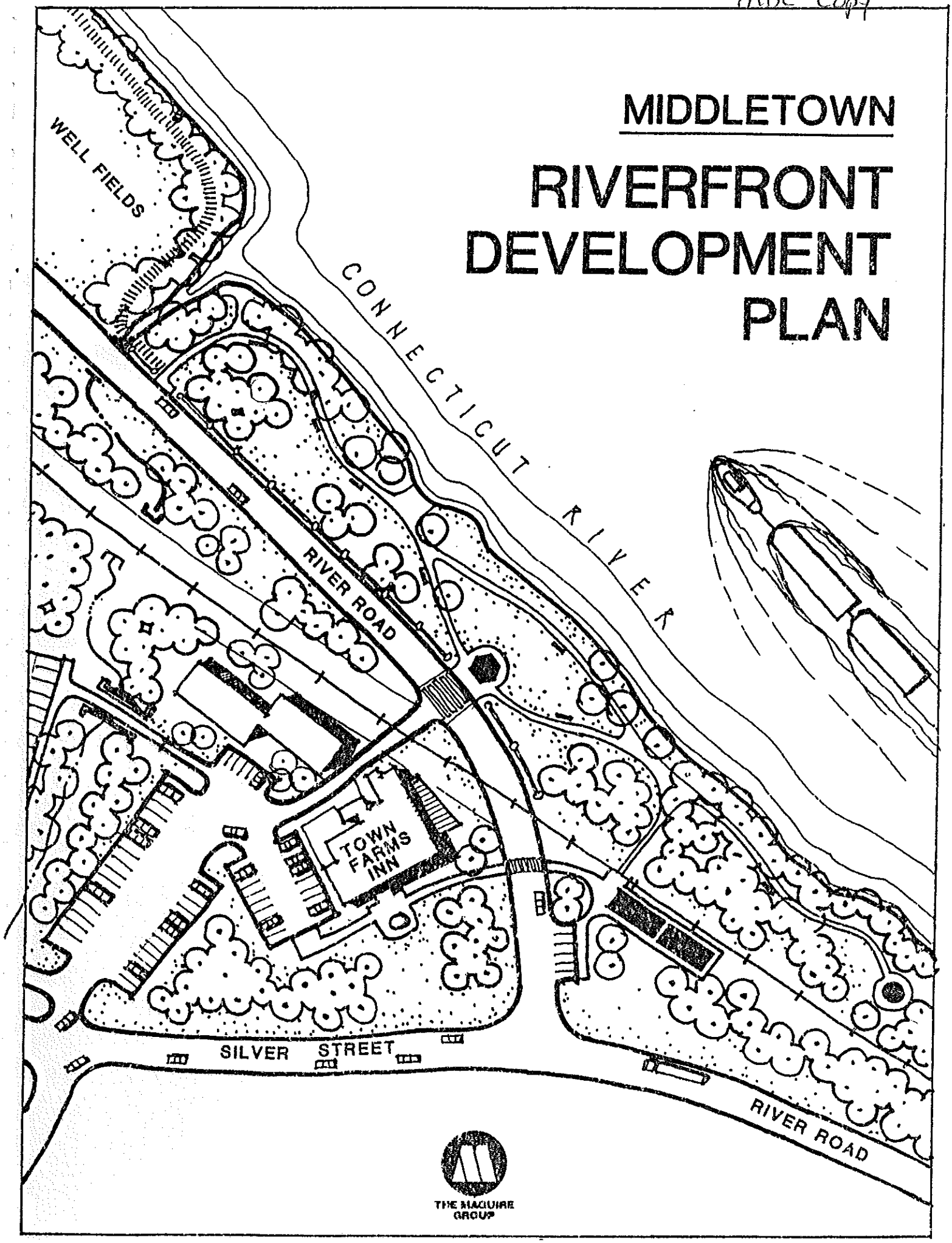
MIDDLETOWN

RIVERFRONT DEVELOPMENT PLAN



THE MAGUIRE GROUP

MIDDLETOWN RIVERFRONT

DEVELOPMENT PLAN

FINAL REPORT

Submitted by: CE Maguire, Inc.
One Court Street
New Britain, CT 06051

April 1986

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April 3, 1986

Mr. Edward J. Dzialo, Jr.
Chairman, Harbor Improvement Agency
City of Middletown
Municipal Development Office
deKoven Drive
Middletown, Connecticut 06457

RE: FINAL REPORT: RIVERFRONT DEVELOPMENT PLAN

Dear Mr. Dzialo:

The Middletown Riverfront Development Plan is submitted in accordance with our contractual agreement of September, 1985. Our analysis of the four mile linear riverfront and subsequent development recommendations reflect our numerous discussions and meetings with the City and Harbor Improvement Agency. This final report reflects also your review comments of our draft final report submitted in February, 1986. The following comments summarize the background and highlights of the enclosed Riverfront Development Plan.

EXECUTIVE SUMMARY

The goal of the Riverfront Development Plan is to continue the revitalization process of Middletown's Connecticut River shoreline. The project location is a four mile linear reach of Middletown's riverfront from Harborpark extending downstream along River Road.

Middletown's riverfront was once the location of an important commercial seaport. As transportation methods changed, the riverfront suffered from neglect and isolation from downtown activities. In August 1973, the Harbor Improvement Agency began its planning for riverfront revitalization. The plans and actions of the Harbor Improvement Agency culminated in the construction of a $1.7 million waterfront improvement program. Harborpark was dedicated on June 10, 1979 and consisted of the following riverfront attractions: 1500 feet of bulkheading and boardwalks; renovation of an abandoned yacht club building; and a waterfront park.

I. Current Planning Issues

Harborpark is a regional success. The Harborpark restaurant is a popular gathering place and its boardwalks allow extensive public access to the beauty of the Connecticut River. Annual riverfront events, such as the rowing regatta sponsored by the City, have attracted significant crowds.

Passenger vessels are arriving with increasing frequency.

The attractiveness of Harborpark reflects National interests in revitalizing waterfront real estate. The current Riverfront Development Plan should serve to focus potential development within a practical and environmentally sound framework. The maintenance and up-keep of Harborpark and other riverfront environs along River Road is a paramount concern that transcends any of the land specific recommendations.

Important existing conditions along the project corridor include:

- shoreline land areas are limited because of close proximity of River Road and riverbank;
- several fixed uses of land preclude development (wastewater treatment plant and active/reserve well fields);
- River Road is in terrible condition with dangerous intersections, recurring flooding and unsafe traffic flow accommodations;
- to capture development potential along prime parcels of the upstream riverfront, major relocation and improvements of River Road are required;
- some commercial redevelopment, reflective of the recent building boom in Middletown region, is evident within the project corridor;
- the Connecticut Valley Railroad is planning to reactivate the rail line for extension of its successful tourist train from Essex;
- natural forces, including shoreline erosion and periodic flooding, are permanent features affecting major sections of the project corridor; and
- large land parcels, along the corridor, are either privately or state owned.

II. River Road Improvements

A significant portion of the planning analyses was devoted to evaluating feasible alternatives to improve River Road. Currently, River Road has a rural character with a path that essentially parallels the banks of the Connecticut River. The road is quite narrow, flood-prone and has a severly deteriorated asphalt surface. There are several railroad crossings as River Road and the abandoned track criss-cross as frequently as five times within the mid-project corridor. River Road, particularly from Union Street to Silver Street, is a dangerious thoroughfare with several substandard intersections and no signage or center striping. Nevertheless, River Road is a popular short-cut to/from a major employer (Pratt & Whitney Aircraft) and Route 9. Its scenic, natural, and rural character, also, attract joggers and bikers, thus, increasing potential hazardous conditions.

Five alternatives to improve River Road were considered. The goals were to enhance the safety and utility of the road as well as coordinate its improvement with the overall objectives of increasing riverfront lands for potential development and/or use. The five options ranged in construction cost from $840,000 to $5.1 million. The major focus was between Union Street and Silver Street. Proposals included raising the elevation of the road surface above the flood zone, coordinating relocation with potential state improvements for Route 9 and realigning/improving major intersections and railroad crossings.

The recommended road improvement (Alternative C) proposes to: relocate an in-town intersection (Union St./River Road); elevate River Road above the flood plain from Union St. to Eastern Drive; upgrade several railroad crossings; improve the section from Eastern Drive to Silver Street with a gravel-based top without flood proofing; and improve Silver Street/River Road intersection. The major improvements at the in-town intersection will require the relocation of Sumner Brook and the creation of approximately five acres of continuous waterfront land between the existing rowing crew building and the wastewater treatment plant. The estimated construction cost for this road improvement is $1.92 million.

III. Land Use Concepts

A primary goal of the Riverfront Development Plan has been to treat the entire four linear miles as an inter-related whole. The proposed land use concepts and themes, therefore, seek balance between development, conservation and upgrading objectives within the realities of

the market place and the natural environment.

The overall land use recommendations are characterized by two large development anchors at the terminni of the project corridor. Harborpark would be extended onto lands currently occupied by a non-water dependent cement plant and a fuel oil tank farm. Created properties should extend the public access provided through extension of the boardwalk. Commercial/retail business seem a natural extension of Harborpark and, with close proximity to downtown and possible tourist trains, should prove a typical urban waterfront revitalization success.

A second major development anchor is proposed for a thirty-five acre parcel currently owned by the Connecticut Valley Hospital. Located immediately downstream from the Silver Street - River Road intersection, the land parcel is a beautiful, rolling terrain that is well suited for development or recreation. Our land use recommendations for this area include: residential development; a marina; a boat launching facility and public recreation. A conservation theme should also be mixed into this balanced plan.

Locations for moderately sized railroad depots have been recommended for the intown section and near the Town Farms Inn at the Silver Street - River Road intersection. Significant clean-up and passive recreational improvements are recommended for the mid-project corridor area. Recreational access from Towns Farm Inn to a small city park should be enhanced. The gravel-based road is part of the riverfront enhancement concept. Additionally, riverfront nature paths and a jogging/bicycle trail are recommended to support the private expansion of the Town Farms Inn. Finally, it is predicted that several properties located in the mid-project corridor will be renovated in the near term to take advantage of the beautiful vistas provided by the overlook of the Connecticut River and surrounding shores of in-town Middletown and neighboring Portland.

IV. Implementation Sequence

It is important that the City of Middletown continue its momentum towards riverfront improvement. With the changing public funding climate, partnerships with the private sector should be explored. The economy of Middletown is ripe for development and the riverfront offers unique locational opportunities.

Several of the road relocation and land use proposals will require substantial commitments of resources. It will be important to take several "first steps" toward implementation to depict community commitment. The following list of actions is a probable implementation sequence for the Riverfront Development Plan:

- Riverfront clean-up
- Upgrade (gravel base) River Road between Town Farms Inn and Eastern Drive
- Upgrade City Park (mid-project area)
- Obtain CVH property
- Coordinate train station stops for CVR
- Endorse redevelopment of mid-River Road properties
- Relocate River Road
- Acquire Tomasso/Peterson properties
- Develop former CVH properties
- Extend Harborpark development

The following main text of the Riverfront Development Plan details our analysis and recommendations. Improvement and clean-up of these naturally beautiful riverfront environs is obviously required. Development pressures are already evident and will, most probably, increase in the future. It is hoped that this plan will serve as a positive framework to guide a balanced development.

On behalf of CE Maguire, Inc., it has been our pleasure to have served the City of Middletown on this most interesting assignment. In addition, your assistance and interest has been most helpful. Bill Kuehn and Dan Cienava have also been very supportive and an integral part of our planning team. We would hope to have the opportunity to work with you again.

Very truly yours,

CE MAGUIRE, INC.

Robert H. Wardwell
Assistant Vice President
Director of Planning

Carl U. Mueller
Principal Planner

RHW:fl

cc: Harbor Improvement Agency members
Bill Kuehn, Municipal Development Office

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CHAPTER 1: Introduction

INTRODUCTION

With the advent of revitalization of the Connecticut River waterfront in Middletown during the late 1970's, the City has reestablished its close relationship with its primary natural resource. After many decades of neglect, the City of Middletown has been at the forefront of the Nation's riverfront cities by taking action to remove physical barriers and develop required improvements that allow renewed access to the shoreline of the River. The purpose of this Riverfront Development Plan is to continue this revitalization process.

I. HISTORICAL PERSPECTIVE

Middletown can trace its beginnings to its prime geographical location on the Connecticut River. During the seventeenth and eighteenth centuries, Middletown was an important international maritime center. Waterborne commerce from Europe and the Far East was transferred between vessel and shore on the piers and wharves of Middletown.

Attention to the commercial importance of Middletown's riverfront continued through the late 1800's. Subsequent improvements in rail and road transportation shifted trade route patterns. As industrial activities changed, Middletown, not unlike numerous waterfront communities, turned its back on the River. Development, particularly highways like Route 9, actually created walls between the downtown community and the riverfront. Neglect of riverfront structures, combined with natural processes, such as shore erosion, resulted in a cyclical process of decay and underutilization.

In August 1973, the Harbor Improvement Agency of Middletown began its planning for riverfront revitalization, "Middletown and the Connecticut River: A New Image" was a conceptual plan prepared in April 1974. The plan envisioned a mixed use recreational park in the Intown section of the Middletown riverfront.

The actions of the Middletown Harbor Improvement Agency culminated in the construction of a $1.7 million waterfront improvement program. Dedicated on June 10, 1979, the newly created "Harborpark" consisted of the following:

- Construction of 1500 feet of bulkheading
- Construction of 1500 feet of boardwalk
- Renovation of an abandoned yacht club building
- Construction of a shell rowing boat house
- Installation of floating docks for launching shells
- Excursion boat docking area with supporting shelter structure
- Expansion and improvement of waterfront park
- Relocation of a university boat house

Harborpark has proven to be a significant success. Its park setting provides direct access to the unique vistas and surroundings of the River. Its restaurant is a popular gathering place. Annual riverfront events, such as the Fall rowing regatta sponsored by the City, attract crowds of people to the boardwalks of Harborpark. Even the return of waterborne vessels to Middletown has been realized with the increasing visits of passenger cruise ships in recent years.

II. PROJECT GOALS AND OBJECTIVES

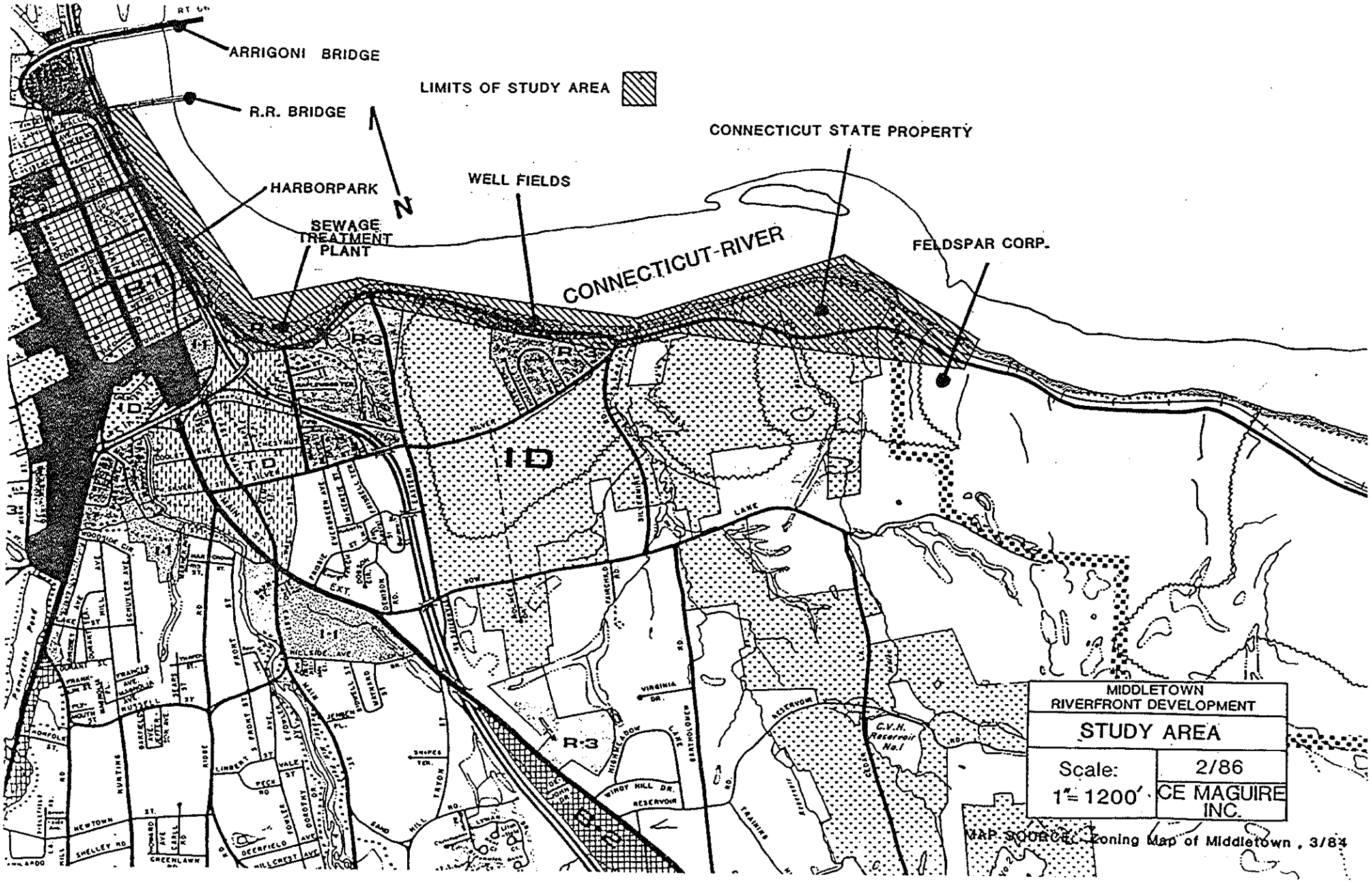
Middletown's renewed awareness of the riverfront, augmented by a tremendous amount of development activity in the Central Business District and surrounding areas has resulted in a genuine need to expand the improvement of the riverfront for recreational, conservation and development purposes. With funding from the Connecticut River Trust, the Middletown Harbor Improvement Agency commissioned CE Maguire, Inc. to provide planning analyses and recommendations regarding further riverfront development planning. The locational focus of the plan is from the railroad bridge across the Connecticut River on the north to the northerly boundary of the Feldspar property on the south. The inland boundary of the study area is generally River Road or the adjacent railroad tracks. This riverfront corridor extends approximately four miles and is depicted in Figure 1.

III. SIGNIFICANT ISSUES AND CONCERNS

The main transportation access which parallels the Connecticut River within our study corridor is appropriately named River Road. It is a major problem and has, therefore, been a primary focus of study. The section of River Road between the intersection of Union and Silver Streets is in terrible physical condition and has been characterized as the worst road in Middletown. Its close proximity to the River limits development potential and its location within flood prone areas requires continuing maintenance. Despite its poor condition, the road is heavily traveled, particularly during rush hours. As there are no curbs, sidewalks or street lighting, walking/jogging/bicycling along this road is dangerous. The attraction of the scenic river, however, invites these latter uses. The road, while a terrible and dangerous thoroughfare along this stretch, is an integral part of the riverfront. As such, it is a pleasant place to enjoy and serves as an important potential link in our overall plan.

While the improvement and potential relocation of River Road are overriding themes of this plan, there have been several other significant issues considered, including the following:

- The Connecticut Valley Railroad (CVR) currently plans to reactivate the rail as a continuation of its successful tourist railroad service from Essex. With the eventual link through Middletown to Hartford, this tourist train will


ARRIGONI BRIDGE
LIMITS OF STUDY AREA
R.R. BRIDGE
CONNECTICUT STATE PROPERTY
HARBORPARK
WELL FIELDS
SEWAGE TREATMENT PLANT
CONNECTICUT-RIVER
FELDSPAR CORP.
I D
R-3
I-1
R-1
MIDDLETOWN
RIVERFRONT DEVELOPMENT
STUDY AREA
Scale:
1" = 1200'
2/86
CE MAGUIRE INC.
MAP SOURCE: Zoning Map of Middletown, 3/84

require rail upgradings and station stops within the project boundaries. According to CVR officials, a seasonal "Brille Car", travelling along the riverfront rail line may occur as early as the summer of 1986;

- Commercial redevelopment along River Road, although only beginning in certain sections, is increasing. The Town Farms Inn, located at the intersection of River Road and Silver Street, has started a $3.4 million expansion. The new Inn, which will include 48 guest rooms, 5 meeting rooms and recreational facilities, is immediately adjacent to the paradoxical section of River Road which offers hazardous accommodations for vehicles, yet direct access to the peaceful and scenic beauty of the River;

- Housing demands in Middletown are extending to the riverfront. Potential private developers have expressed interest along various reaches of the River. Similarly, shortage of space for parking, also reflective of the downtown, will affect riverfront planning;

- Natural problems, including shore erosion and flooding, characterize significant sections of the project area;

- Large tracts of riverfront lands are not owned by the City' certain existing land uses, including the City wells fields and wastewater treatment facilities, limit development options along River Road; and

- Public access, including desires for a boat launching area, should be integrated in the Riverfront Development Plan.

IV. METHODOLOGY AND PRESENTATION

As the original planners and designers of Harborpark, the CE Maguire project team has been involved with the City in riverfront revitalization for over a decade. The investigations in this plan directly benefitted from this past experience.

As in past assignments, Maguire has worked closely with the Middletown Harbor Improvement Agency, Municipal Development Office and Community to reflect local ideas and needs. Several presentations have been held where alternative River Road improvements were discussed, as well as conceptual land use themes. Previous studies, including a report on the feasibility of constructing a pedestrian bridge across Route 9 near Harborpark, the expansion plans of Town Farms Inn and plans for a proposed marina near Town Farms Inn, have been reviewed and incorporated in our analysis.

The content of the report reflects the emphasis on River Road relocation to the overall plan of development. Chapter 2 presents a detailed engineering condition survey of River Road. Chapter 3, which reflects discussions with the Connecticut Department of Transportation, as well as local officials, depicts five definitive options for the relocation and improvement of River Road. A location study of train station stops within the study corridor is presented in Chapter 4 and reflects plans of the Connecticut Valley Railroad for future service to Middletown. An environmental study in Chapter 5 depicts the land use planning analyses undertaken, while the resulting planning elements for the riverfront use are presented in Chapter 6. The final chapter depicts recommendations and a phased implementation plan.

CHAPTER 2: River Road Condition Survey

I. GENERAL

The subject of this condition survey is River Road, located in the City of Middletown. This road is nominally two-lanes wide with a bituminous concrete surface. It extends from the Union Street/Harbor Drive Intersection in the vicinity of Route 9, easterly paralleling the Connecticut River and a railroad line to property owned by United Technologies Corp. a distance of approximately four miles. Intersecting streets are Walnut, Eastern Drive and Silver Street.

The character of the road is rural in nature, having a rolling and curvilinear alignment east of Silver Street and predominantly flat and curvilinear west of Silver Street. Its width varies throughout its length with a minimum width of 17 feet just west of the Silver Street intersection to over 30 feet wide just east of Sumner Brook. The more uniform portion of the road is east of the Silver Street intersection. The road segment east of Silver Street is the most heavily traveled due to it being utilized for access to United Technologies Corp. (Pratt and Whitney), Connecticut Valley Hospital and to the Northeast Utilities Power Plant.

The road conditions enumerated in this report are more specifically defined on the 100 scale plans entitled "Condition Survey, River Road, Middletown, Connecticut", dated November 1985.

II. EXISTING GEOMETRICS

The segment of River Road within the project limits is divided into two areas of contrasting geometrics, one being the length of road west of the Silver Street intersection; the other, east of the intersection. The west segment, has a predominantly gentle vertical alignment with grades generally less than four percent, with small radius and erratic reverse curves. The east portion being rolling has grades generally steeper than six percent and up to 12 percent in some locations, and has gradual large radius horizontal curves.

A. WEST SEGMENT

The west segment of road is generally narrow with greatly varying widths ranging from 18 to 20 feet on the average, with only one lane of traffic able to be accommodated at the Sumner Brook Bridge and at R.R. Crossing R-4. It has a predominantly gentle vertical alignment with grades generally less than four percent, with the steepest areas being at the at grade railroad crossing approaches where a 100-foot segment of eight percent is reached just West of the Silver Street terminus.

The horizontal alignment of the west segment is winding, with short radius curves and reverse curves which require erratic vehicle maneuvers to negotiate. The most severe horizontal alignment conditions occur at the Sumner Brook Bridge, because it is not aligned with either Union Street or Harbor Drive, and at at-grade railroad crossings R-1, R-2, R-3 and R-4, where the road alignment appears to have been forced to match the rail crossing.

The erratic horizontal alignment not only affects vehicle maneuverability, but driver sight lines are also impacted. The Eastern Drive area has the most limiting sight lines, which are created by the "broken back" curve alignment compounded by the vegetation overgrowth on the railroad embankment. Also at this location the intersection sight distance for vehicles entering River Road from Eastern Drive is severely limited due to these factors.

Other areas of limited sight lines within this segment are at the Union Street/Sumner Brook Bridge, and just west of the at-grade railroad crossing, R-3.

B. EAST SEGMENT

In contrast to the west segment, the road segment east of the Silver Street intersection has a rolling vertical alignment, with some grades exceeding the ten percent maximum permitted by City standards.

The horizontal alignment is generally comprised of relatively large radius curves and long tangents unlike the west segment. The road width is uniform with a striped centerline. Two-way traffic can be maintained throughout its length.

Unlike the west segment, this segment has few driver sight line problems. It is a more open road corridor with the south portion being well maintained. Intersection sight distance problems were observed at the two driveway entrances to Connecticut Valley Hospital as noted on the plans.

III. STORM DRAINAGE

As the geometric characteristics of River Road can be divided into two distinct areas, so can the storm drainage.

A. West segment of River Road that is west of Silver Street is generally below the 100-year flood level of the Connecticut River (El. 22±) for most of its length, except at railroad crossings, which are consistent with the rail line which is above this level. There are portions of this road segment below even the ten-year flood level of elevation 15±. This condition results in frequent and sometimes long-term flooding of this road segment. Minor storms are also a flooding problem due to the contributing sleep topography of

drainage area from the south, the lack of catchment structures, and the roads predominantly flat grades lacking well-defined low points in the vertical geometry.

These conditions result in frequent and sometimes extensive periods of flooding which contribute to limited road use and rapid pavement deterioration.

B. EAST SEGMENT

In contrast, the east segment of road is for the most part above the 100-year flood levels of the Connecticut River. It has a more pronounced vertical geometry with well-defined low points. Catchment structures are sparse as on the west segment, but the existence of culvert relief at most low points minimizes flooding conditions and extends pavement life.

IV PAVEMENT CONDITION AND RIDEABILTY

The pavement conditions enumerated below were based upon limited field examinations with pavement defects divided into five (5) categories consistent with Federal publication AD/A-110 296 "Pavement Maintenance Management for Roads and Parking Lots", dated October 1981, published by the U.S. Dept. of Commerce.

These five categories represent the most dominant pavement deterioration problems contributing to the pavement integrity and longevity. The degree of all deterioration found is consistent with the "Medium Severity Designated "M" or High Severity Designated "H" ratings enumerated on the excerpts from the Pavement Management publication in Appendix 'A' to this report.

All railroad crossing conditions warrant the "High" severity rating for ride quality.

The pavement is of bituminous concrete construction throughout the project limits.The pavement condition is widely varied. The worst conditions are located west of the Silver Street intersection.

A. WEST SEGMENT

From the Harbor Drive intersection with River Road east to Eastern Drive, the pavement imperfections consist predominantly of surface failures at the numerous utility trench pavement patches which usually are cracked at the seams where the patch meets the existing pavement. Some places there are cracks within the patch areas themselves. Some of these cracked areas have advanced to small potholes.

Within this segment there are three at-grade railroad crossings. The crossing at Union Street (R-1) is in the

best condition with some pavement cracking adjacent to the rails and some depressed areas within the crossing itself. The other two crossings (R-2, R-3) have substantial deterioration. They have pavement depressions adjacent to and within the crossings, structural timbers missing and some advanced pothole development present. These severely deteriorated crossings require driving speeds of less than 10 miles per hour in order to maintain vehicular control.

From Eastern Drive east to Silver Street the pavement deterioration and failure has advanced to a virtually continuous length of ruts and potholes requiring very low operating speeds (10-15 mph) and weaving maneuvers by vehicles to avoid vehicle suspension damage from the numerous potholes.

The at-grade railroad crossing (R-4), located approximately 150 feet west of the Silver Street intersection has deteriorated extensively, having pavement depressions adjacent to the rails and pothole development. The timbers within this crossing have been broken and no longer support the interior area of pavement. The road way approaches to this crossing have extensive cracking and pothole development.

The posted speed limit of 25 MPH cannot be safely maintained within this road segment due to geometric and roadway surface conditions. The edges of the north approach road segment are being broken off and slowly reducing the road width, which is now about 17 feet.

B. EAST SEGMENT

The segment of River Road east of Silver Street has been overlayed within the past two years and its surface is in good condition. The pavement surface does not have evidence of pavement structure failure and rideability throughout its length is good with regard to pavement condition. It is not known where problem areas existed prior to the overlay, therefore no evaluation of conditions effecting its longevity can be made. The posted speed limit of 25 MPH can be maintained throughout this road segment and it was usually exceeded by most drivers observed. The estimated average running speed of this road segment is 35 MPH at which the 220 foot radius at the River Road/Silver Street intersection require that westbound drivers cross into the eastbound lane creating a hazardous condition.

V. SIDE ROADS

The side roads that intersect River Road include the following:

. Walnut Street, which has pavement in good condition.

- Eastern Drive, which has extensive cracking and pothole development, and provides only limited access to River Road. This is due to the railroad underpass which has sufficient width for only one vehicle and vertical clearance of 9'-6" allowing only cars and small truck passage. This road also is very steep with grades exceeding 15 percent in some segments.

- Harbor Drive, has some utility patch deterioration and an irregular surface throughout its length indicating subgrade deterioration.

- Union Street has pavement in good conditions.

VI. TRAFFIC CONTROL - SIGNING AND STRIPING

The length of road from Union Street to Silver Street does not have adequate traffic control and warning signing. Advance warning of hazardous conditions and railroad crossings also are not posted.

From Silver Street to the east project limit, the road centerline is striped with a double line with speed limits posted and some limited advance warning signs in place. This road segment carries approximately 3000 vehicles per day based on machine counts.

CHAPTER 3: Relocation of River Road

FEASIBILITY REPORT

RELOCATION OF RIVER ROAD

I. INTRODUCTION

As documented in the previous chapter, River Road in the City of Middletown is currently in a state of severe disrepair from Union Street to Silver Street. A study of this road was done in order to determine what type and degree of improvements could be made to best meet both the short and long-term needs of potential development along this road corridor and the City transportation network. The study limits extend from Union Street to approximately 4,500 feet east of the River Road/Silver Street Intersection. The road condition east of Silver Street to the Feldspar Properties is considered satisfactory and is, therefore, precluded from relocation evaluation.

Some of the major problems addressed by the four alternates prepared, include: substandard roadway geometrics; flooding; substandard bridge clearances; accelerated pavement deterioration, numerous at grade railroad crossing; and inadequate traffic control and delineation devices. In addition, the potential land use of the road corridor and future Route 9 improvements affecting the study area were taken into consideration for road alternate development.

II. CONCEPTUAL DESIGN CRITERIA

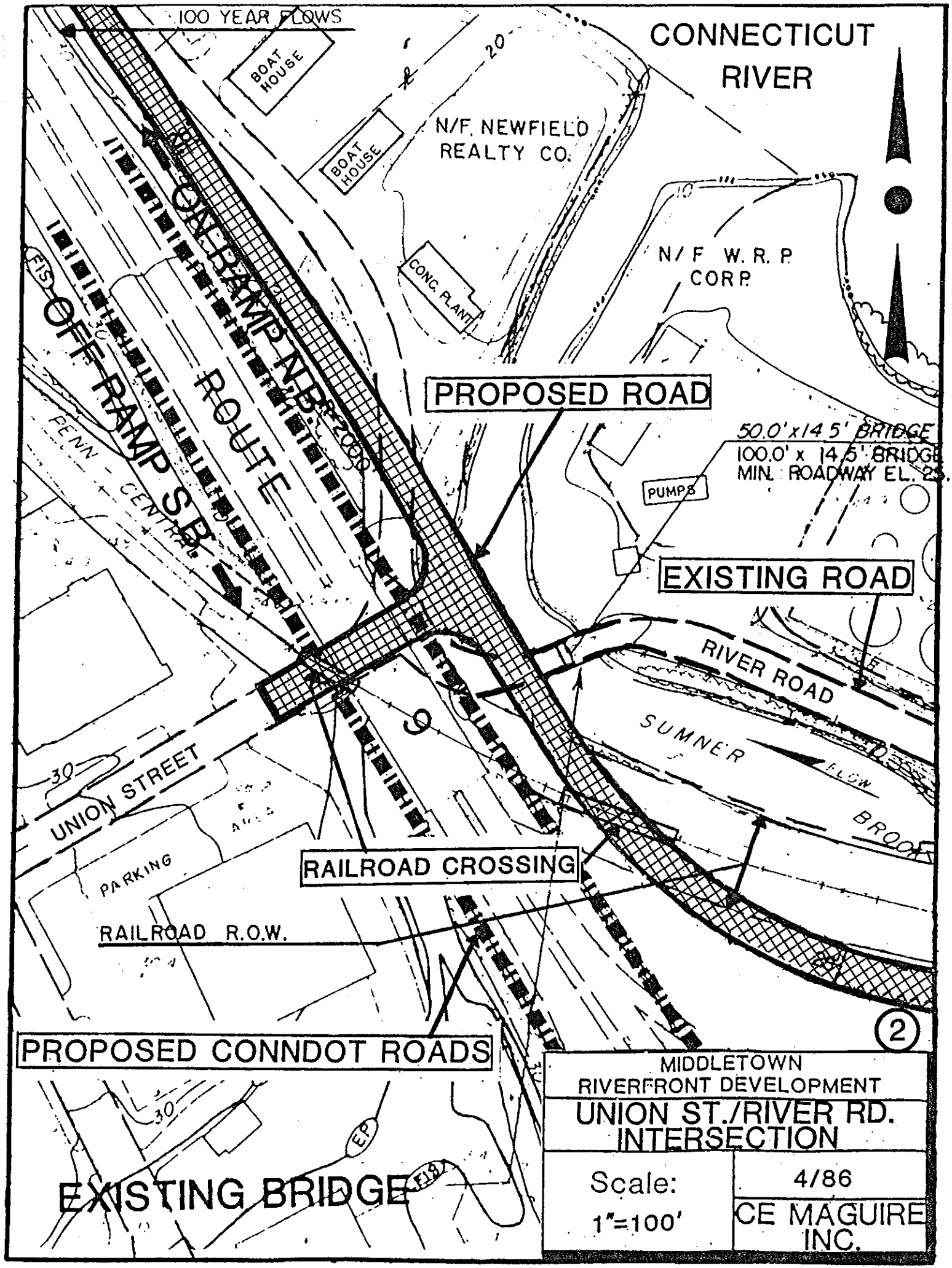
The alternate road layouts prepared have been designed in accordance with roadway standards established by the City of Middletown and the most current AASHTO Standards.

III. ALTERNATE DESIGNS

There are five (5) roadway layout alternates that have been prepared, identified as "A" through "E". Each alternate is intended to serve the riverfront area with a differing approach as to location and level of service provided. Each alternate was prepared on 100' scale base maps. Copies of maps depicting Alternative C are included in the Appendix.

A. ALTERNATE "A"

Alternate "A" utilizes a roadway shift to the south side of the railroad in the area of the sewage treatment plant just west of Walnut Street. This shift will allow compatibility with the potential future Route 9 improvements which includes a "Tee" intersection of Union Street, Harbor Drive and River Road. This "Tee" intersection is a recommended improvement in several alternatives and is depicted on Figure 2.


100 YEAR FLOWS
CONNECTICUT RIVER
BOAT HOUSE
BOAT HOUSE
N/F. NEWFIELD REALTY CO.
N/F W. R. P. CORP.
CONC. PLANT
ON RAMP N.B.
OFF RAMP S.B.
ROUTE 9
PROPOSED ROAD
50.0'x14.5' BRIDGE
100.0' x 14.5' BRIDGE
MIN. ROADWAY EL. 25.1
PUMPS
EXISTING ROAD
RIVER ROAD
SUMNER BROOK FLOW
UNION STREET
PARKING
RAILROAD CROSSING
RAILROAD R.O.W.
PENN CENTRAL
PROPOSED CONNDOT ROADS
EXISTING BRIDGE
2
MIDDLETOWN
RIVERFRONT DEVELOPMENT
UNION ST./RIVER RD.
INTERSECTION
Scale:
1"=100'
4/86
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The remainder of the road, east to Silver Street, utilizes the existing road corridor for the most part, with flattening of horizontal curves to meet accepted standards.

This alternate requires that the road grade be raised above the 100 year flood elevation for its entire length, thus minimizing impact of the Connecticut River flood stage. In order to achieve this, large volumes of fill material must be placed, creating extensive slopes on land adjacent to the roadway. In the area of the Jackson building the road is very close to the river and a retaining wall will be required in order to avoid placement of fill in the Connecticut River.

There are also some small areas just east of Eastern Drive, now used for various recreation purposes that will be impacted with this alternate due to the required slopes. As part of this layout, Sumner Brook is to be piped in a box culvert to the Connecticut River and the existing stream bed will be filled. This will create additional potential land area for development and will delete the existing separation of land north and south of the existing brook at the concrete plant and the tank farm.

The intersection of River Road and Silver Street is modified in this alternate by flattening the substandard horizontal curve on Silver Street and thus lengthening the distance from the Railroad crossing to the intersection. A portion of Silver Street is also to be raised above the 100 year flood level making for a continuous floodproofed road segment.

Generally, the improvements will include new 28' wide pavement, curbs, signing, stripping and storm drainage. Securing of permits and coordination with the Army Corps of Engineers and other environmental regulatory agencies will be required for all work associated with the Sumner Brook relocation where the proximity of the new road to the Connecticut River is significant and for all storm drainage outlets to the Connecticut River.

Alternate "A" provides the best possible road link utilizing the existing road corridor to Silver Street. The main hinderances to traffic flow will be the five (5) at grade railroad crossings present within this road segment.

The estimated construction cost for this alternate is $4,600,000 without federal assistance for the railroad crossings, and $3,600,000 with federal assistance.

B. ALTERNATE "B"

This alternate is identical to Alternate "A" from Union Street to just west of the Jackson Building, beyond which, the road is shifted to the south side of the railroad. The existing road corridor located on the north side is to be closed to through traffic.

This repositioning of the road in relation to the railroad eliminates two at grade railroad crossings and allows utilization of larger horizontal curve radii creating a flatter horizontal alignment. It utilizes a strip of City-owned land that runs from Silver Street to the railroad, in order to link with Silver Street at a point 650 feet west of the existing intersection. As in Alternate "A", the entire road will be above the 100 year flood level.

The property impact from this alternate is more severe than would be required under Alternate "A". The road for the most part is within the existing railroad right-of-way and properties to the west of Eastern Drive are encroached upon. Two of these properties have buildings within the proposed road alignment requiring modification or removal of these structures in addition to the necessary land takes. Therefore, Alternative B would require property acquisition west of Eastern Drive.

Due to the very steep hillside condition east of Eastern Drive, deep cuts must be made to the proposed road with extensive retaining wall construction required to avoid excessive property encroachment. The slope limits shown on the plans represent use of 20 foot high retaining walls.

The aforementioned hillside condition will require that an interceptor ditch be constructed on the south side of the road to intercept overland flow from traversing the travelway. Roadway foundation underdrain will be installed to reduce the water table in the pavement area to reduce deterioration due to frost action.

As in Alternate "A", a 28 foot wide road with curbing, storm drainage and traffic control signing and stripping is proposed, including the Sumner Brook relocation and Silver Street realignment. It is compatible with the proposed conceptual State DOT Route 9 improvement scheme.

Alternate "B" represents the most efficient and unrestricted traffic link between Union Street and Silver Street. It does not permit direct access to the Riverfront as does Alternate "A". Pedestrian railroad crossings will have to be established if access to the riverfront is to be achieved. This Alternate requires two (2) at-grade railroad crossings. Existing River Road will be closed to through traffic with its use being determined by the plan of development for the area.

The estimated construction cost of this alternate is $3,660,000 without federal assistance for the railroad crossing and $3,220,000 with federal assistance.

C. ALTERNATE "C"

The proposed roadway treatment from Union Street to Eastern Drive for Alternate "C" follows the same alignment both horizontally and vertically as Alternate "A", including treatment of the Union Street intersection and relocation of Sumner Brook. River Road is raised above the 100 year flood level for this segment and an at-grade intersection with Eastern Drive is provided.

River Road to the east of Eastern Drive to Silver Street will not be raised out of the 100 year flood level and only minor horizontal alignment modifications will be made. This segment of road is to be of bituminous concrete construction without curbs or storm drainage and of the standard 28 foot width. Improvements to Silver Street are included as part of Alternate "C". Figure 3 illustrates the improvements recommended at the Silver Street intersection.

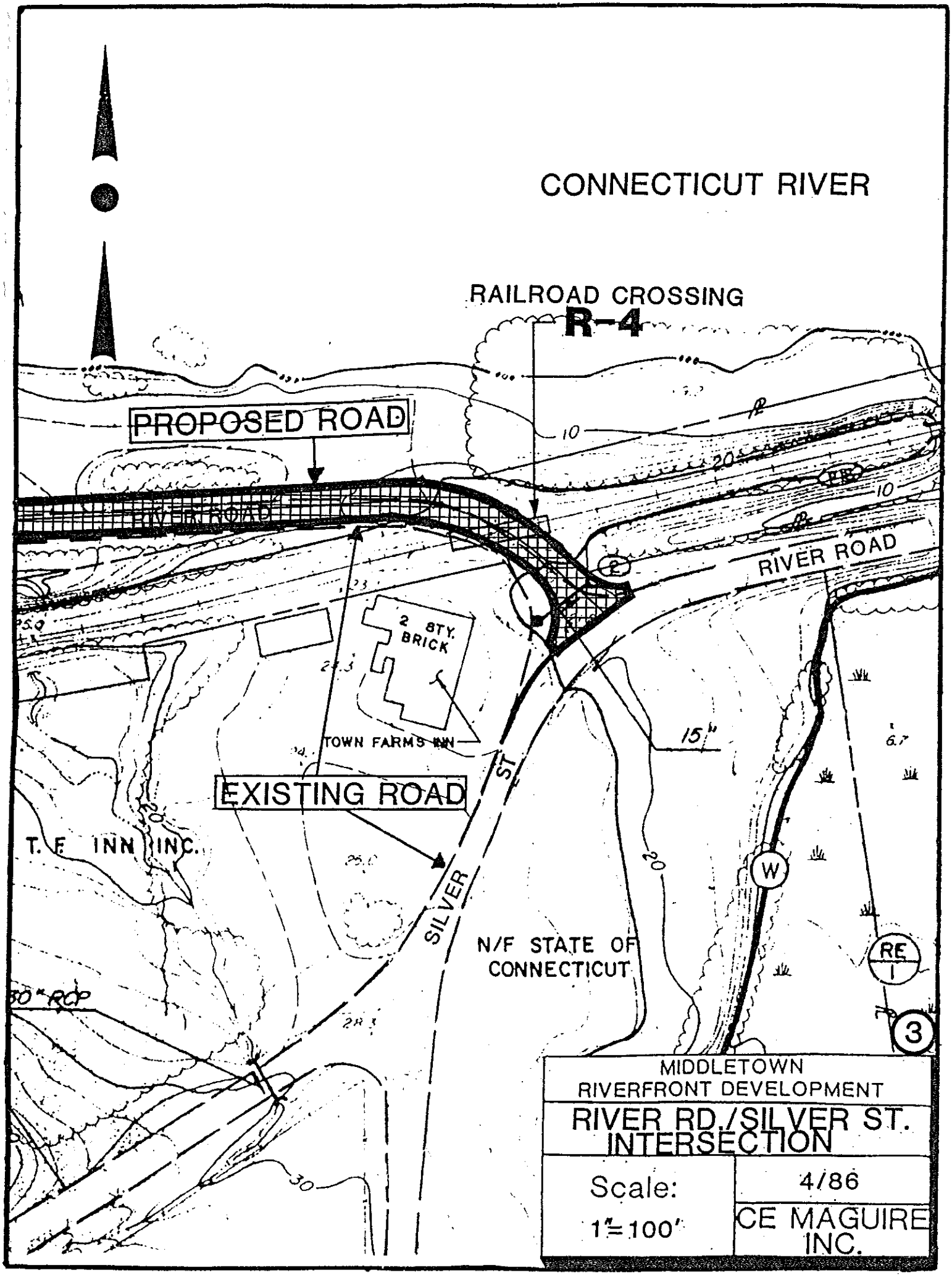
This alternate will provide a roadway of high quality above the 100 year flood level from Eastern Drive west to Union Street where development and businesses currently exist. East of Eastern Drive, the rideability of the road will be improved, but it will be subject to the flooding problems present today, thereby limiting the longevity of the pavement. A gravel surface in lieu of a paved road was priced for comparison purposes for this road segment, which would not require the inevitable maintenance associated with a bituminous paved road.

The estimated costs for Alternate "C" improvements consist of the following and include construction of five (5) at-grade railroad crossings with full signalization.

. Alternate "C" without Federal Funding For Railroad Crossings	=	$3,310,000
With Gravel Alternate	=	$2,900,000
. Alternate "C" with Federal Funding For Railroad Crossings	=	$2,300,000
With Gravel Alternate	=	$1,920,000

D. ALTERNATE "D"

This alternate represents the minimum recommended road improvement and consists of a bituminous concrete overlay for the entire road length from the Sumner Brook Bridge east to Silver Street.


CONNECTICUT RIVER
RAILROAD CROSSING
R-4
PROPOSED ROAD
RIVER ROAD
RIVER ROAD
2 STY. BRICK
TOWN FARMS INN
EXISTING ROAD
SILVER ST.
T. F. INN INC.
N/F STATE OF CONNECTICUT
30" RCP
15"
W
RE
3
MIDDLETOWN
RIVERFRONT DEVELOPMENT
RIVER RD./SILVER ST.
INTERSECTION
Scale:
1"=100'
4/86
CE MAGUIRE INC.

Due to the severity of the problems associated with the existing Sumner Brook Bridge, it is not recommended that it remain in place under even this minimum improvement alternate. A new bridge aligned with Union Street to accommodate two-way traffic and a pedestrian walk is recommended. Due to the bridge replacement, reconstruction west of Sumner Brook to create a "Tee" intersection with Harbor Drive and Union Street is required.

The road alignment under this scheme will be along the existing road corridor and will not be raised above the 100 year flood level. The overlay will be uniform in width to meet the City standard of 28 feet, which will require some excavation and road base placement in areas that are less than this width. No storm drainage or curbing will be installed but signing and stripping will be done.

The four at-grade railroad crossings within the project area will have minor repairs made consisting of replacement of crossing timbers and paving within the crossing and approaches. Warning signs will also be installed as required by the governing state agencies. It is not anticipated that full signalization will be required due to the maintenance type of repairs being done. As with Alternate "C", a gravel surface has been estimated in addition to the bituminous overlay.

This alternate represents a maintenance oriented improvement to upgrade the rideability of this road segment. Realignment of Silver Street has not been included with the cost estimate below due to the minimum degree of improvements this alternate represents. Due to utilization of the existing road corridor west of Walnut Street and north of the railroad, this alternative is not compatible with the conceptual layout being proposed by the State DOT for the Route 9 Interchange.

The estimated construction cost for this alternate is $900,000 with a bituminous concrete overlay throughout and $840,000 if a gravel surface is utilized from Eastern Drive east to the railroad crossing west of Silver Street.

E. ALTERNATE "E"

This alternate, as with "A" and "B", raises River Road above the 100 year flood level for its entire length, and is identical to both these alternates from Union Street up to the Jackson Building area where an eastbound one-way road will run to the south side of the railroad and a westbound one-way road will run on the north side of the railroad.

The impacts on the Connecticut River and on properties adjacent to Eastern Drive will be similar to both Alternates "A" and "B" previously described requiring retaining walls at the Connecticut River and on the south side of the eastbound road. There will also be a building structure modification to the Meadow Meat Company and the Jackson building. There will be five at-grade railroad crossings required with a signalized traffic intersection at Eastern Drive to allow access from the westbound travelway.

The pavement width for each one-way road is proposed to be eighteen feet to allow for a twelve foot travelway and a six foot shoulder, curbing, and storm drainage. Traffic signing and stripping are part of alternate E.

Two alternate connections to Silver Street are possible, one being at the existing intersection location, the other being west of Town Farms Inn, as in Alternate "B". The existing intersection location will have property impact at Town Farms Inn and possible direct impact on the existing building. The west intersection alternate does not impact privately owned property or existing buildings and is the more feasible alternate.

Due to the level of improvement associated with this alternate, Silver Street realignment has also been incorporated.

The estimated construction cost associated with this alternate is $5,130,000 without federal assistance for railroad crossings and $4,230,000 with federal assistance.

IV. SUMMARY

The five alternative roadway treatments described herein have had conceptual designs completed and are shown on plans having a scale of 1"=100'. The construction cost estimates stated include only construction costs and do not include costs for property acquisition, building demolition, utility relocations and engineering fees. Summary information on each alternative is presented in Figure 4.

Based upon the investigations made with regard to the existing condition of River Road, it is recommended that improvements be made as soon as possible to alleviate the problems enumerated in the "Condition Survey". Any one of the five Alternates formulated would be a betterment to the road from a safety standpoint, but the particular Alternate to be implemented must be based upon the ultimate desired use of the road and adjacent lands, which will be determined by the City.

CITY OF MIDDLETOWN, CONNECTICUT
STUDY OF RIVER ROAD
SUMMARY OF ALTERNATES

ALTERNATE	IMPROVEMENTS	SPECIFIC ALTERNATE IMPROVEMENTS/BENEFITS	IMPACTS/COMMENTS	ESTIMATED CONSTRUCTION W/O FED. FUNDS*	W/FED. FUNDS*
'A'	-Above 100 yr. flood west of Eastern drive -Sumner Brook relocated. -Compatible with D.O.T. Rt. 9 Interchange concept. -"Tee" Intersection at Union St./River Rd./ Harbor Drive -Silver Street re-aligned -Substandard eastern Dr. bridge deleted. -Proposed 28' wide road (City standard) -Rubber surface railroad Crossings and signalization. -Geometrics within standards for 35 MPH.	-Raise above 100 yr. flood east of Eastern drive. -Signalize 5 at grade R.R. crossings. -Riverside proximity to road maintained	-Railroad crossings are hinderance to traffic flow. -Retaining walls required at Conn. River. -Minumum Betterment to existing road corridor -High fills reduce land use adjacent to river.	$4,600,000	$3,600,000
'B'		-River Rd. relocated to south side of R.R. east of Jackson Building. -Signalize 2 at grade R.R. crossings.	-Property and Building impact by road at Jackson Building and Meadow Meat Building -Extensive retaining walls. -Alternate river access required to cross R.R. -Most efficient alternate with regard to traffic.	$3,660,000	$3,220,000
'C'		-Construct new road east of Eastern drive without curbing, drainage and existing grade. -Riverside proximity to road maintained. -Signalize 4 at grade R.R. crossings.	-Roadway flooding east of Eastern drive unchanged. -Limited pavement life east of Eastern drive to Silver Street. -Traveling east of eastern drive de-emphasized.	$3,300,000 Gravel Road east of Eastern drive $2,900,000	$2,320,000 $1,920,000
'D' (4)	-Pavement overlay from Union St. to Silver St. -Sumner Brook Bridge replacement -Railroad Crossing maintenance. -Tee Intersection Union St./River Rd./Harbor Dr.	-Riverfront access unchanged -Improve 4 at grade R.R. Crossings. -Temporary Improvement	-Lowest cost alternate -Not compatible with Rt. 9 Interchange by Conn. D.O.T. -Roadway flooding unchanged. -Short pavement life Union to Silver Street -Silver St. not realigned.	$900,000 Gravel Road east of Eastern drive $840,000	

'E'	-Same as A thru C. except road width. -Two one way 18' roads on north and south R.R. from Jackson Building to Silver Street.	-Signalize 5 at grade R.R. crossings.	-Conn. River Impact as 'A'. -Property and Building Impact as 'B'. -Retaining wall as'B'	$,5,130,000	$4,230,000

Note: Estimated costs include construction only and do not include cost for land acquisition permits, engineering surveys or mapping.

It is recommended that Silver Street be realigned at the existing River Road intersection area regardless of which River Road alternate is selected due to the detriment to safety it represents. The Silver Street realignment is included in each of the alternatives with the exception of alternate D.

The range of River Road improvement and relocation alternatives presents opportunities for enhanced travel and access to the riverfront. Alternative C is the preferred option. Alternative C addresses many of the realignment and flood prone problems west of Eastern Drive. The creation of a "Tee" intersection at Harbor Road, Union Street and River Road is an important element for both riverfront land availability and compatibility with potential State improvements to Route 9. A gravel based road segment from Eastern Drive to Silver Street is recommended as part of alternative C. Since this segment will remain within a flood prone area, the gravel base will reduce maintenance costs. At the same time, this road segment should be de-emphasized as a main thoroughfare and highlighted as access to the scenic beauty of the Connecticut River.

CHAPTER 4: Location Study–Railroad Depot

LOCATION STUDY - RAILROAD DEPOT

I. GENERAL

A. CONNECTICUT VALLEY RAILROAD (CVR)

The CVR currently operates a very successful tourist railroad presently originating in Essex, Connecticut. Company future plans include extension of their rail service from Essex to Middletown by 1988 and eventually to Hartford.

Rail service is proposed to include a rebuilt 1920's vintage diesel operated coach, as well as the more historically conventional steam locomotive with a train of several passenger cars. The service would be seasonal.

CVR requirements include the location of a depot in Middletown. As a tourist facility, the depot should provide good access to downtown Middletown and the intown riverfront. As a public transportation facility, the depot must meet the various institutional criteria for controls and safety for all aspects of the operation.

CVR presently forecasts a rider service that may be accommodating up to 1000 persons at the Middletown depot location. While specific construction plans for a Middletown depot are not yet available, the component parts of such a facility might ultimately include a sheltered platform, ticket office, storage, enclosed waiting area and restrooms.

II. DEPOT LOCATION GUIDELINES

A. DEPOT PHYSICAL CHARACTERISTICS

For purposes of this study, and because no specific plans are available, the depot is described in its more obstruct form. In terms of capacity, using a maximum criteria of 1000 persons, allocations of from 3 square feet (standing room) to 7 square feet (seated areas) per person are dimensional guidelines (Reference: The State Building Code). Additional support facilities (ticket office, waiting room, storage and restroom facilities) are somewhat dependent on the dictates of tourist demand and economic feasibility for the owner. Again, for purposes of this study, these support spaces have been assigned floor areas that are based in part on author-perceived immediate needs, dimensional constraints of the various site locations that were considered and research data based on similar facilities in other geographical areas.

As a result of this study, it is readily apparent that any future development planning (short as well as long-term) must wrestle with a substantial number of variables. The more significant of these revolve around issues of timing and funding, e.g., Route 9 and the ConnDOT realignment options for River Road at Union Street, Sumner Brook undergrounding and the disposition of private properties (Tomasso & Peterson). As the graphic study illustrates, (Figure 5-7) the location options are many and each offers its own unique potential. It is also clear that some options, while not necessarily offering the best solution, are the most feasible alternative (pragmatically) in the short-term. Acknowledging this as a valid planning approach, this study considered the potential for a (1) modular depot and/or a (2) temporary or moveable facility. ("Movable" is constructed to mean a precast concrete platform and bolt-down bus shelter style enclosure with seating.)

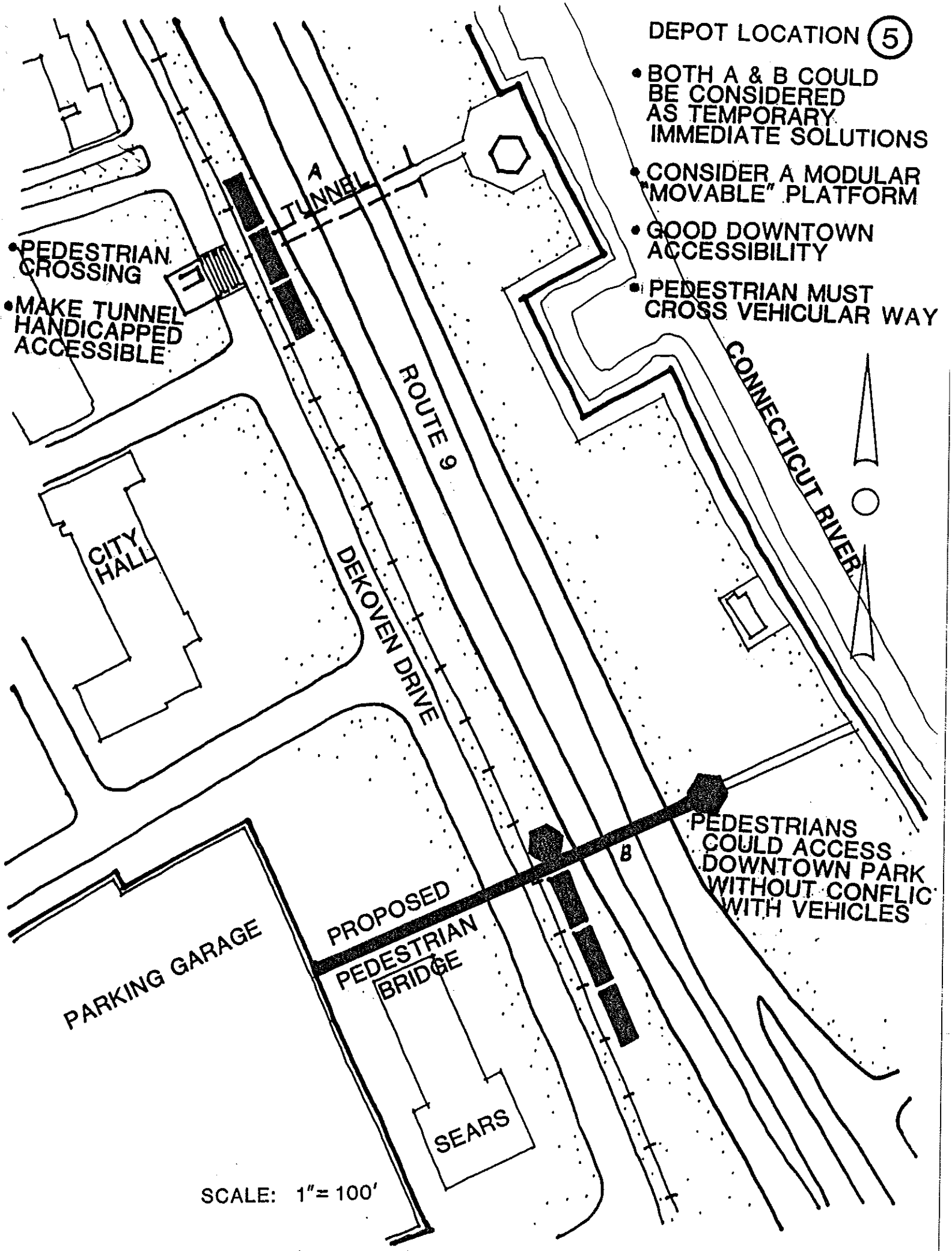
By most general definitions of service and frequency, the CVR is a "light rail" service and, as such, is not obligated to abide by the more stringent requirements of "heavy rail" service. In many cases, even light rail commuter services that operate year-round are, in fact, very functional, austere facilities designed to handle a fast moving transient rider. Support facilities such as enclosed waiting rooms are replaced by "bus-stop style" partial enclosures. Tickets are available through the office facilities of other para-transit services or perhaps from a ticket machine and restroom needs are accommodated elsewhere. Utilizing this lesser criteria for accommodation of passengers allows one to consider site locations that demand much more flexibility in dimensional constraints and convertibility.

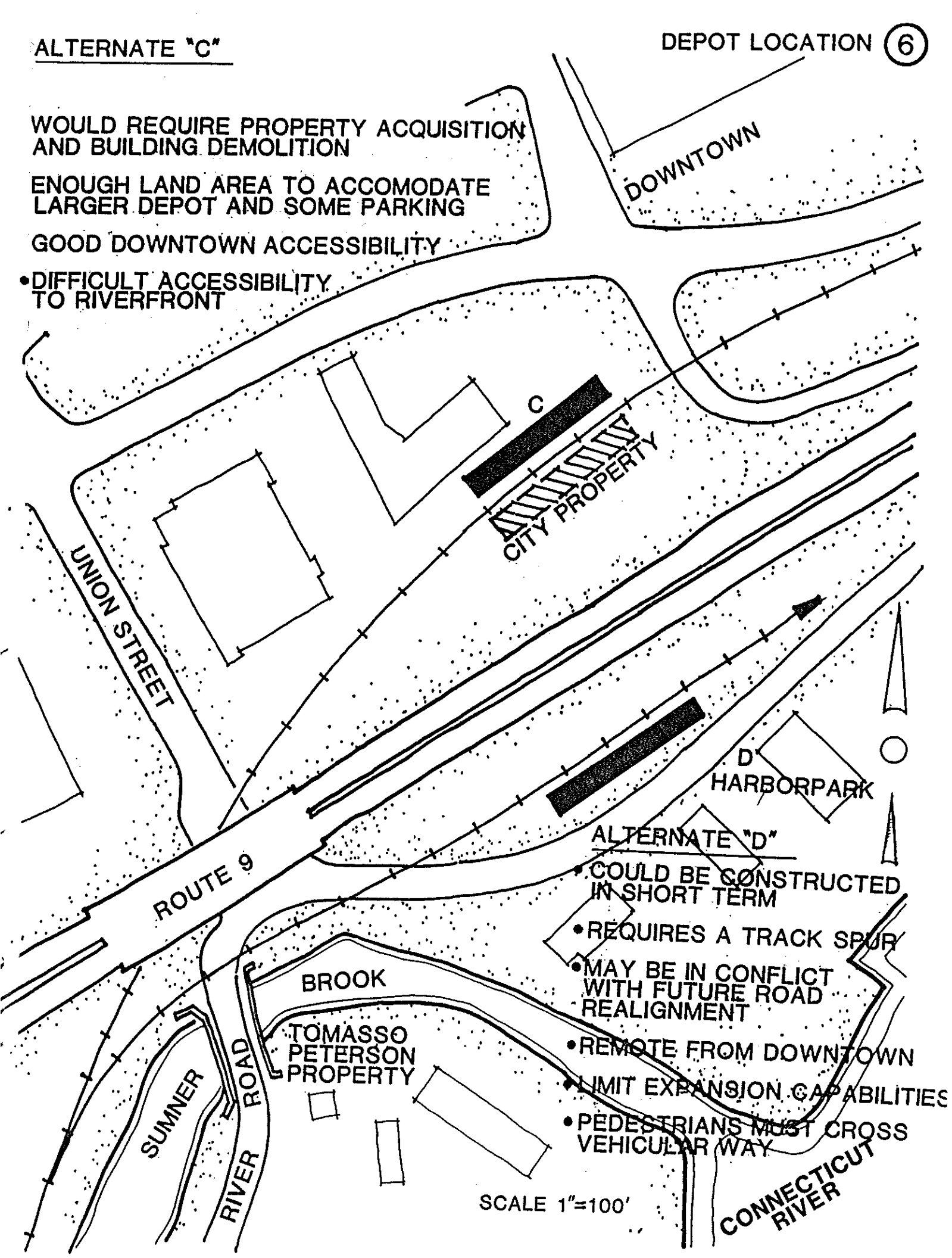
In order that the full gamut of depot embellishment be addressed, this study considered selected sites that may have the potential to service a more comprehensive permanent facility, as well as those that might demand the need for a more short-term, lesser facility should the timing of the CVR plans precede those of the City or the ConnDOT.

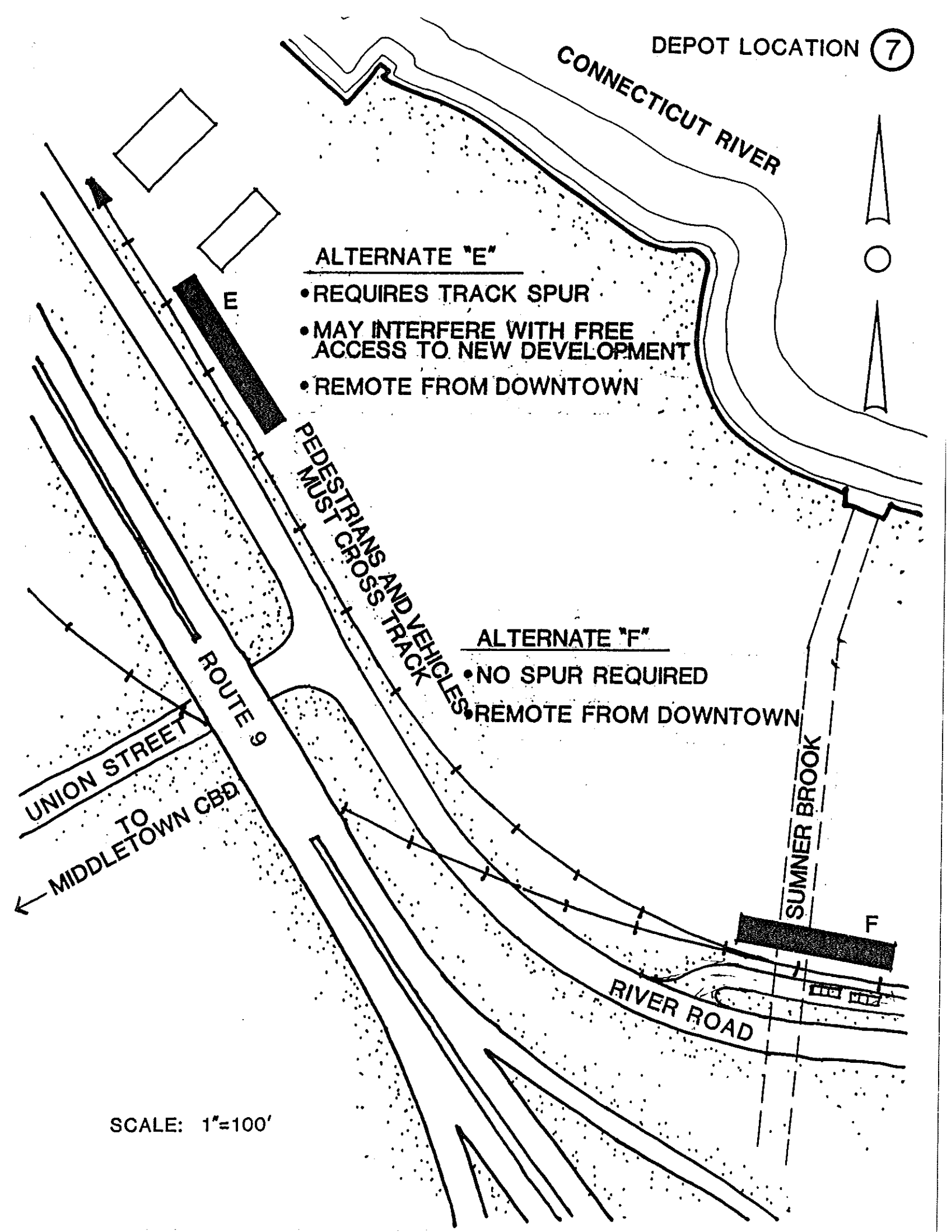
B. DEPOT SITE CONTEXT

While CVR and Middletown's primary objectives for the rail service may differ somewhat in emphasis (increased ridership for CVR and increased economic activity for Middletown) both entities share the same locational criteria. Ideally, the depot should be easily accessible (5-10 minute walk) to the following:

1. Municipal (or other) parking
2. Central Business District
3. Harbor Park Restaurant and future development to east
4. Riverfront Park


DEPOT LOCATION 5
• BOTH A & B COULD BE CONSIDERED AS TEMPORARY IMMEDIATE SOLUTIONS
• CONSIDER A MODULAR "MOVABLE" PLATFORM
• GOOD DOWNTOWN ACCESSIBILITY
• PEDESTRIAN MUST CROSS VEHICULAR WAY
• PEDESTRIAN CROSSING
• MAKE TUNNEL HANDICAPPED ACCESSIBLE
A
TUNNEL
ROUTE 9
CONNECTICUT RIVER
CITY HALL
DEKOVEN DRIVE
B
PEDESTRIANS COULD ACCESS DOWNTOWN PARK WITHOUT CONFLIC WITH VEHICLES
PROPOSED PEDESTRIAN BRIDGE
PARKING GARAGE
SEARS
SCALE: 1"= 100'


ALTERNATE "C"
DEPOT LOCATION 6
WOULD REQUIRE PROPERTY ACQUISITION AND BUILDING DEMOLITION
ENOUGH LAND AREA TO ACCOMODATE LARGER DEPOT AND SOME PARKING
GOOD DOWNTOWN ACCESSIBILITY
•DIFFICULT ACCESSIBILITY TO RIVERFRONT
DOWNTOWN
C
CITY PROPERTY
UNION STREET
D
HARBORPARK
ALTERNATE "D"
•COULD BE CONSTRUCTED IN SHORT TERM
•REQUIRES A TRACK SPUR
•MAY BE IN CONFLICT WITH FUTURE ROAD REALIGNMENT
•REMOTE FROM DOWNTOWN
•LIMIT EXPANSION CAPABILITIES
•PEDESTRIANS MUST CROSS VEHICULAR WAY
ROUTE 9
BROOK
TOMASSO PETERSON PROPERTY
SUMNER
RIVER ROAD
SCALE 1"=100'
CONNECTICUT RIVER


DEPOT LOCATION 7
CONNECTICUT RIVER
ALTERNATE "E"
• REQUIRES TRACK SPUR
• MAY INTERFERE WITH FREE ACCESS TO NEW DEVELOPMENT
• REMOTE FROM DOWNTOWN
E
PEDESTRIANS AND VEHICLES MUST CROSS TRACK
ALTERNATE "F"
• NO SPUR REQUIRED
• REMOTE FROM DOWNTOWN
ROUTE 9
UNION STREET
TO MIDDLETOWN CBD
SUMNER BROOK
F
RIVER ROAD
SCALE: 1"=100'

In addition to the above considerations of off-site, accessibility, the following site specific issues are listed:

5. Pedestrian safety/handicap accessibility
6. Infrastructure (utility service availability)
7. Paratransit links (Bus/taxi/private shuttle connection)
8. Depot expansion ability
9. Visibility and image
10. Traffic impact of emergency access.

The geometric area within which the four (4) major access points are located is a rectangle of approximately 1600x1200 linear feet. The juxtaposition of the various destinations (parking, CBD, Harbor Park, etc) is such that all points occur generally at the periphery of our imaginary rectangle. This, of course, translates into a maximum traverse within the described bounds for certain relationships (see Figure 8).

The greater concern, however, is not the maximum walk that may be required (1/2 mile±) between destinations, but rather the actual and (more importantly) the perceived nature of that traverse. In all cases, Route 9 (by overpass or tunnel) and at least one City street must be negotiated. Depending on your origin and point of destination, you may need to add additional street crossings to the walk. It is within this context that the various depot site alternatives occur (Reference Figures 5).

The conceptual approach regarded the general area within the rectangle objectively. This yielded in the greater perspective, two general areas of location for the depot: (1) north of Route 9; and (2) south of Route 9.

Based upon study guidelines and criteria in Part III, Section "A", establishing the physical dimensions of the depot and combining these with road alignment alternatives and land use potentials in other parts of this report, several potential sites were identified.

The possible permutations of the "what if" scenarios are many. This study has sought to identify the most obvious. Rather than attempt a specific depot location recommendation amidst a background of changing land use options and sequential variables, it seemed more useful to suggest alternate depot locations (A-F) for short-term and long term implementation.

An evaluation matrix (see Figure 9) ranks these alternatives against a set of criteria common to all. The objective is to find the most flexible alternative, i.e., the one

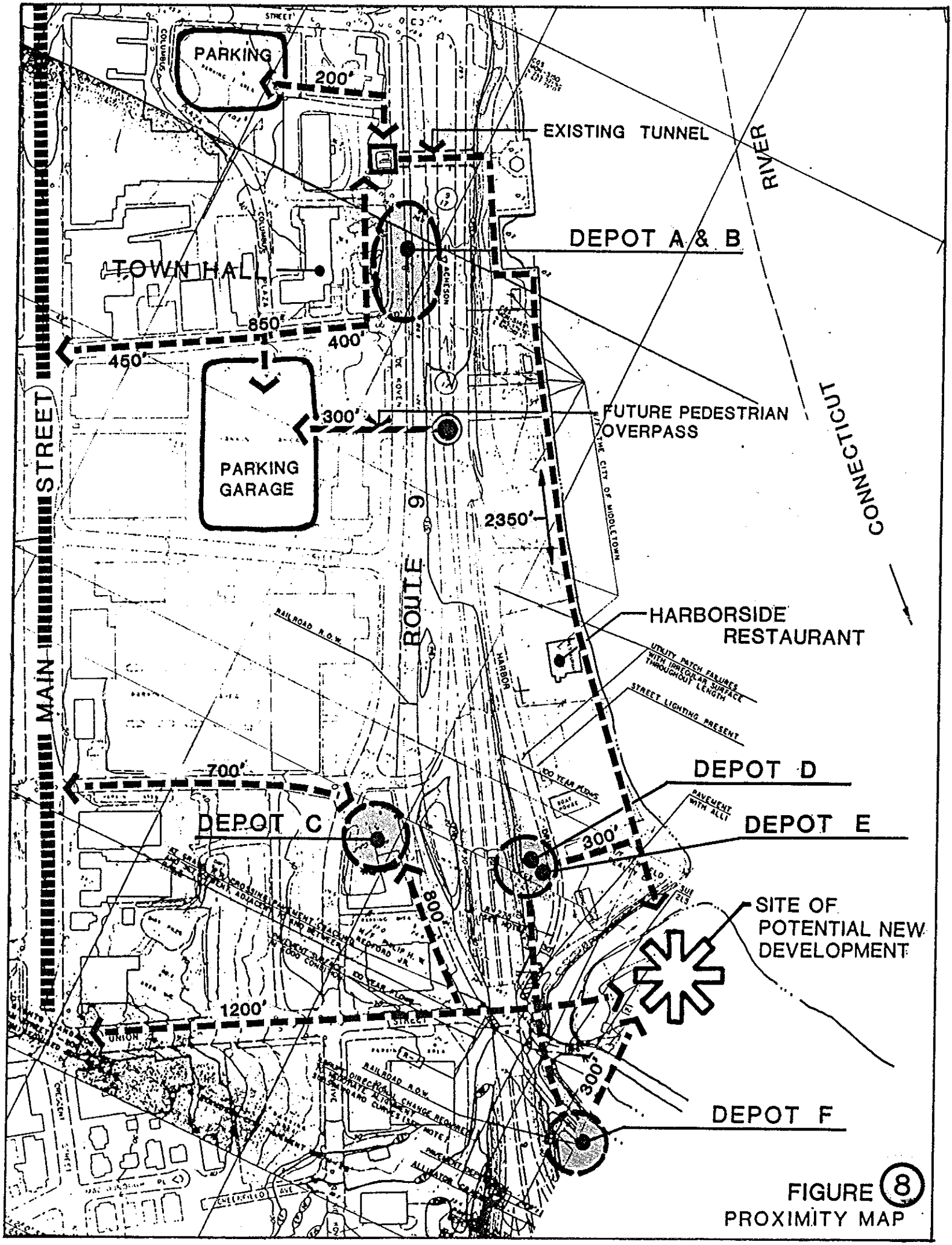


FIGURE 8
PROXIMITY MAP

EVALUATION MATRIX

CONN. VALLEY RAILROAD DEPOT LOCATION ALTERNATIVES

LOCATION ALTERNATIVES
(Refer to figures 5 thru 7)

CRITERIA	A	B	C	D	E	F
ECONOMIC						
• No track spur required	X	X	X			X
• Not based on future major construction projects or land acquisitions	X			X		
• Relatively low (initial) project costs	X	X				
• Permanent (not considered a short-term, "movable" unit)			X		X	X
Sub-Total	3	2	2	1	1	2
FUNCTIONAL						
• Large depot capacity (site is large enough to accomodate a major facility if needed)			X		X	X
• On-site parking potential			X		X	X
• Close to CBD[1]	X	X	X			
• Close to existing public parking[1]	X	X				
• Close to intown waterfront[1]		X		X	X	X
• Minimal pedestrian/vehicular conflicts involved	X	X			X	X
Sub-Total	3	4	3	1	4	4
Total	6	6	5	2	5	6

[1]"Close" infers easily accessible and within reasonable walking distance.

Note: The location with highest count is most desirable. Matrix conclusions are always subject to change based on priority weighting of any single criterion.

Figure 9

that best meets long and short term needs. The report matrix represents a very basic set of economic and functional criteria with no particular weight given any one criterion. Matrix conclusions address both short and long-term location alternatives. In the short term, a moderate depot with a potentially movable structure and staging platform could be located near the municipal buiidings (sites A or B). Over the long term and depending upon the extension of Harborpark (down river), a large scale depot could be positioned near the Union St./River Road intersection to facilitate access to the Riverfront.

CHAPTER 5: Environmental Study

ENVIRONMENTAL STUDY

I. METHODOLOGY

In this stage of the study, the field observation and previous analytical work associated with the road engineering tasks were combined and supplemented with additional field reconnaissance and evaluations more specifically related to the land areas bounded by the River Road, Route 9 and the Connecticut River.

Utilizing a system of 100 scale graphic overlays, specific environmental and cultural data was abstracted from air photo interpretation, photogrammetric mapping, property maps, railroad right-of-way and various other City map resources. In this manner, the various major natural physical components (vegetation, slopes, wetlands, flood boundaries, soils) and cultural features (infrastructure, existing land uses, access, ownerships, historic landmarks) could be identified and evaluated in context with the basic objectives of this study.

II. GOALS AND OBJECTIVES

City and Connecticut River Trust planning goals and objectives were reviewed in the initial stages of the study. These same basic criteria were reiterated and personal expectations were recorded at several "shirt-sleeve" presentation/workshops with various city representatives.

Three primary goals were identified for the study area:

1. To repair, preserve and enhance the existing natural and cultural resources.

2. To improve existing recreational assets and develop new recreational resources.

3. To realize, to the fullest extent possible, the development potential that exists along the 4-mile study corridor.

The following objectives are founded on these goals:

1. Protect existing critical wildlife habitats and natural vegetative areas.

2. Implement corrective measures to repair and maintain the integrity of sections of the river bank that are presently unstable and eroding.

3. Discourage those uses of the river corridor that are destructive to the overall quality of the river environment as part of an on-going rehabilitation and management program.

4. Increase public awareness of the value and fragile nature of their river environment as a program to reduce destruction of park resources through ignorance and carelessness.

5. Improve existing recreational resources and develop new potential for expansion of those resources towards the creation of a linear recreational corridor.

6. Improve access to the public recreation areas for the general public, including the elderly and handicapped.

7. Obtain funding for the facilitation of project and riverfront improvements as a part of an implementation program.

8. Identify and pursue markets for development of selected riverfront opportunities. Actively work to directly or indirectly effect the public and/or private consolidations of lands for future development consistent with the goals for the riverfront.

III. ANALYSIS CRITERIA

Consistent with the goals and objectives previously defined, five general areas of concern have been identified as determining factors in the successful development of the study corridor: (1) Conservation, (2) Environmental Enhancement, (3) Public Access, (4) Compatible Land Uses and (5) Overall Corridor Configuration.

A. CONSERVATION

Conservation implies not only preservation, but also care/maintenance and protection. In this study, we have identified riverfront areas that fall into all of these categories of definition. Similarly, to facilitate an orderly evaluation, we have partitioned the study corridor into three distinct environments and have assigned an appropriate category(ies) of conservation to each:

Environments

1. Naturalized - Those areas characterized by heavy vegetation and/or steep slopes and generally inaccessible to the public should be preserved (limited use).

2. Public Recreation - Those lands that are City-owned or State-owned and formally designated for public use require a regular maintenance program and care through public awareness programs (controlled use).

3. Built-Up - Those lands that are either privately-owned or City-owned (public utilities) developed land uses require protection through the institution and enforcement of protective covenants that control extent and type of development in City designated fragile environments (regulated use).

B. ENVIRONMENTAL ENHANCEMENT

Enhancement is the act of making something greater either in cost, relative value or aesthetic. In terms of the river environment, enhancement is a comprehensive concept that touches all aspects of the study. In its most literal sense, enhancement along the river corridor requires the "dressing-up" of the perceived landscape for the sake of aesthetics. In its more comprehensive sense the act of enhancement transcends superficial cosmetics and becomes a more integral part of the overall plan of development.

Regarded in its more complex sense, environmental enhancement is considered here a baseline criterion that functions as another planning and design guideline for each of the other four major areas of concern. As part of the analysis and evaluation step, environmental enhancement was considered in the following contexts:

1. Conservation Areas - Those areas that are in critical need of improvements to insure physical and environmental stability, as well as aesthetic embellishment.

2. Public Access - Addresses the functional requirements of road alignment (vertical and horizontal) and public access locations to the riverfront as they relate to the governing influences of topography, vegetation, environmentally sensitive areas, sight lines and compatibility with the existing and potential land uses they serve.

3. Compatible Land Uses - Consideration of the nature of the transitional landscape that links adjacent land uses. Identification of those existing and potential new land uses that may benefit through enhancement of apparent common functional relationships or conversely, are in conflict and need of isolation.

4. Overall Park Configuration - Regarding the overall river corridor study area in its proper perspective. Enhancement of the river environment in context with the larger community it serves. as a riverfront park: recognize significant corridor interfaces with the City and adjacent community; and understand the continuity of the various components that make up the 4 mile study area itself.

C. PUBLIC ACCESS

Supplementary to the analysis, evaluation and recommendations concerning the River Road design alternatives, is the identification of the study area existing and potential future land uses that may be public related. These would include both recreational and commercial facilities. Accessibility to these land uses would be ultimately from River Road.

From River Road, access has been further defined as a hierarchy of travel modes:

1. Vehicular - driveways and parking areas.

2. Pedestrian - formal walks, informal trails, shared use with vehicular ways.

3. Bicycle - shared use with vehicular ways, off-road bicycle trails.

4. Inter-modal - mixed public/private vehicular transit and light rail.

These various modes of public access potential throughout the river corridor will be analyzed and evaluated with respect to the following criteria:

1. Environmental Compatibility

   . Avoidance of wetlands and unstable subsoil conditions.

   . Adaptability to existing topography

   . Harmonious fit with existing vegetation and natural features.

2. Recreation Facilities (Types)

   . Formal access (parking/walks) related to commercial structures and intown riverfront areas

- Shared uses; bicycle and jogging with vehicular ways
- Foot paths associated with passive recreational areas
- Nature trails associated with natural edges and the riverfront
- Class II bicycle paths accessing off-road areas
- Picnic areas associated with open play areas, foot paths and trails
- Open play areas lending themselves to a variety of recreation uses.
- "Car-top" small boat opportunities.

3. Site Specific Location Criteria

- River adjacency
- River Road access
- Distance from incompatible land uses
- Natural environment (flora/fauna interests)
- High visibility (security concern)
- Soil suitability
- Topography (high relief)
- Physical separation (from other user)
- Flood susceptability
- Handicap accessibility

D. COMPATIBLE LAND USES

Identification of existing land uses that demonstrate apparent compatibility in terms of:

- Zone - (residential, commercial, business, public recreation, etc.)
- Water dependency

- Site physical suitability
- Use intensity vs land capacity
- Infrastructure capacity
- Positive impact of viable and expanding commercial enterprises.

Identification of new land use potentials with respect to existing land uses.

- Shared use potential
- Reuse potential
- New development potential

Evaluation of the compatible land uses will contribute the general study perspective and formulation of specific future land-use proposals.

E. OVERALL CORRIDOR CONFIGURATION

That portion of the river corridor that is within the purview of this study may be defined as a relatively narrow and very linear land area that is visually relieved to the north by the river and physically, as well as visually, confined along the south by steeply rising slopes.

Land Configuration

The linearity of the study area provides one with a strong sense of direction and an invitation to continue on through the corridor, thereby, making the experience a very transient one. This suggests the need to create strong opportunities for stopping within the corridor.

The confining aspect, while perhaps contributing to the transient quality, also lends an air of exclusivity to that portion of the riverfront. Adding to this remote quality is the relatively distant access to Route 9 and the contrasting scale of the intown urban area at the westerly corridor terminus and the broad, open expenses of landscape that characterize the State lands at the easterly terminus.

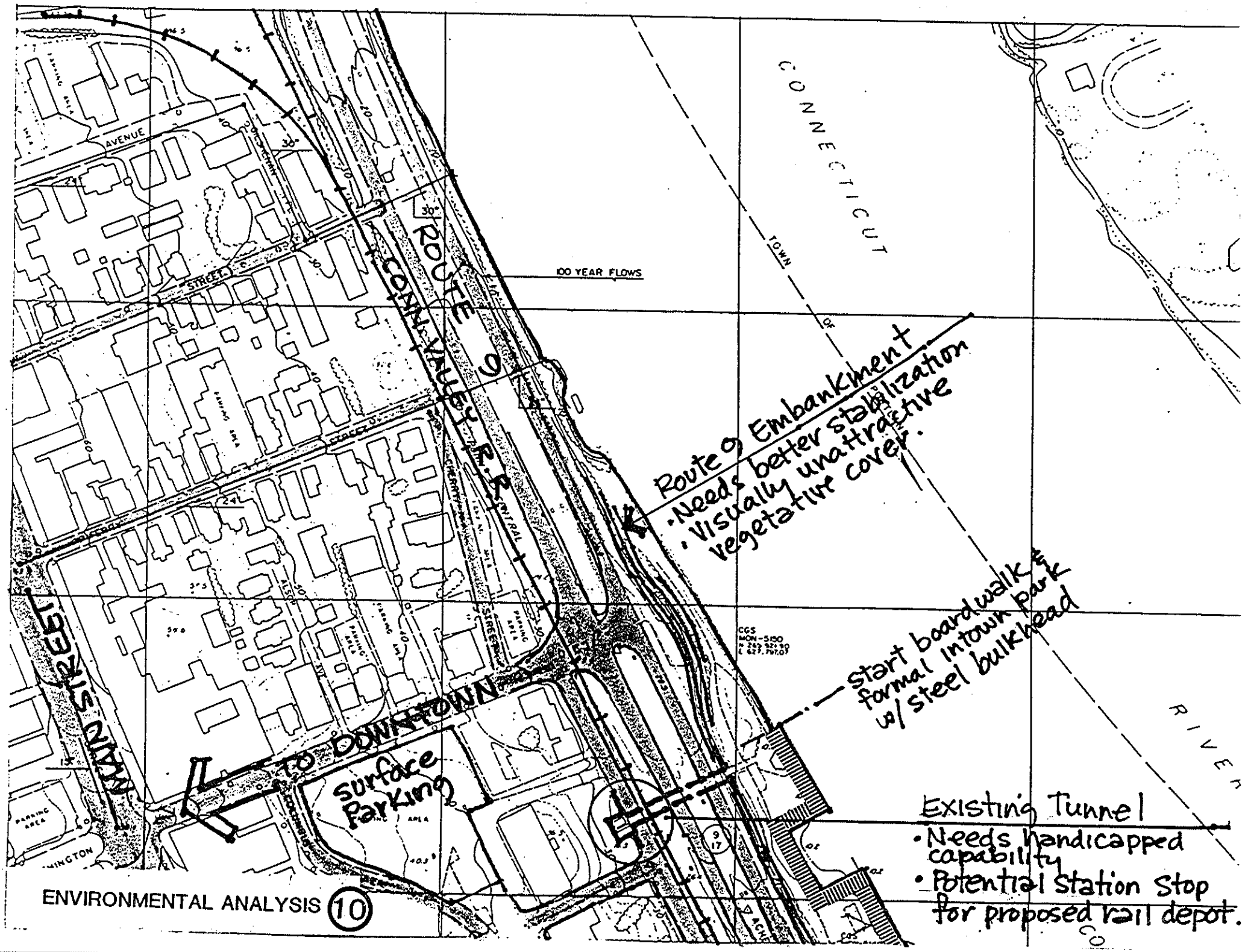
Fortunately, the land areas are comprised of a relatively few large parcel ownerships and these are for the most part, located between the River Road and the river. This is one reason why the River Road experience has some sense of continuity today and is considered an existing asset that can be easily enhanced to further unify the corridor.

Circulation Link

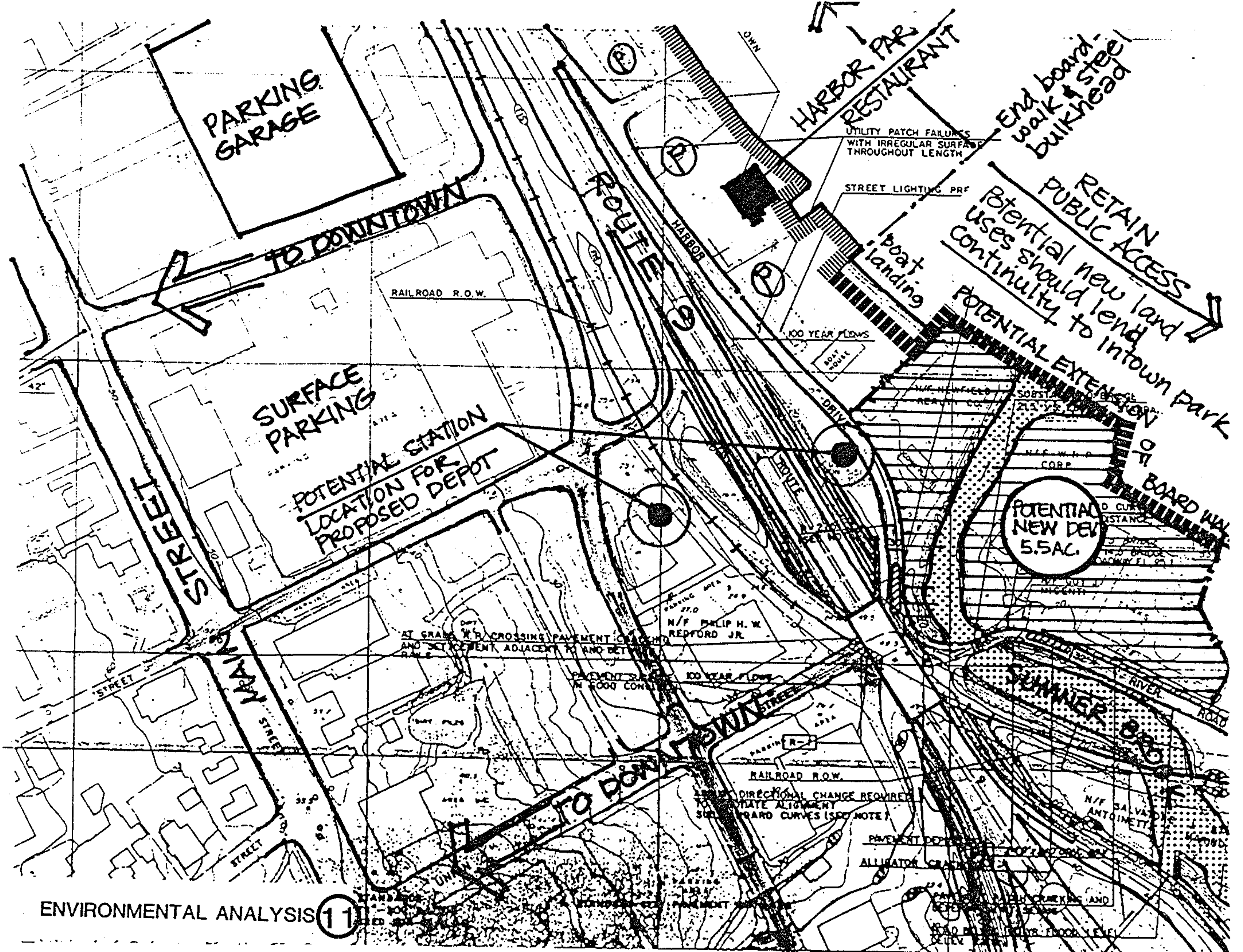
The River Road and Connecticut Valley Railroad represent the common thread that creates a continuous whole of the various land uses occupying the corridor. Perceived in this context, the overall corridor can be simplistically conceived as a potentially strong, unified entity that has a beginning (Middletown CBD and the intown riverfront) a middle (River Road and adjacent lands) and an end (State land; the "Chicken Farm").

This overall corridor concept provides us with a basic framework. Within the riverfront corridor, several development opportunities are recommended to enhance the overall improved integrity of Middletown/Connecticut River interface. Planning analyses and opportunities are depicted in the following Environmental Analysis Maps.

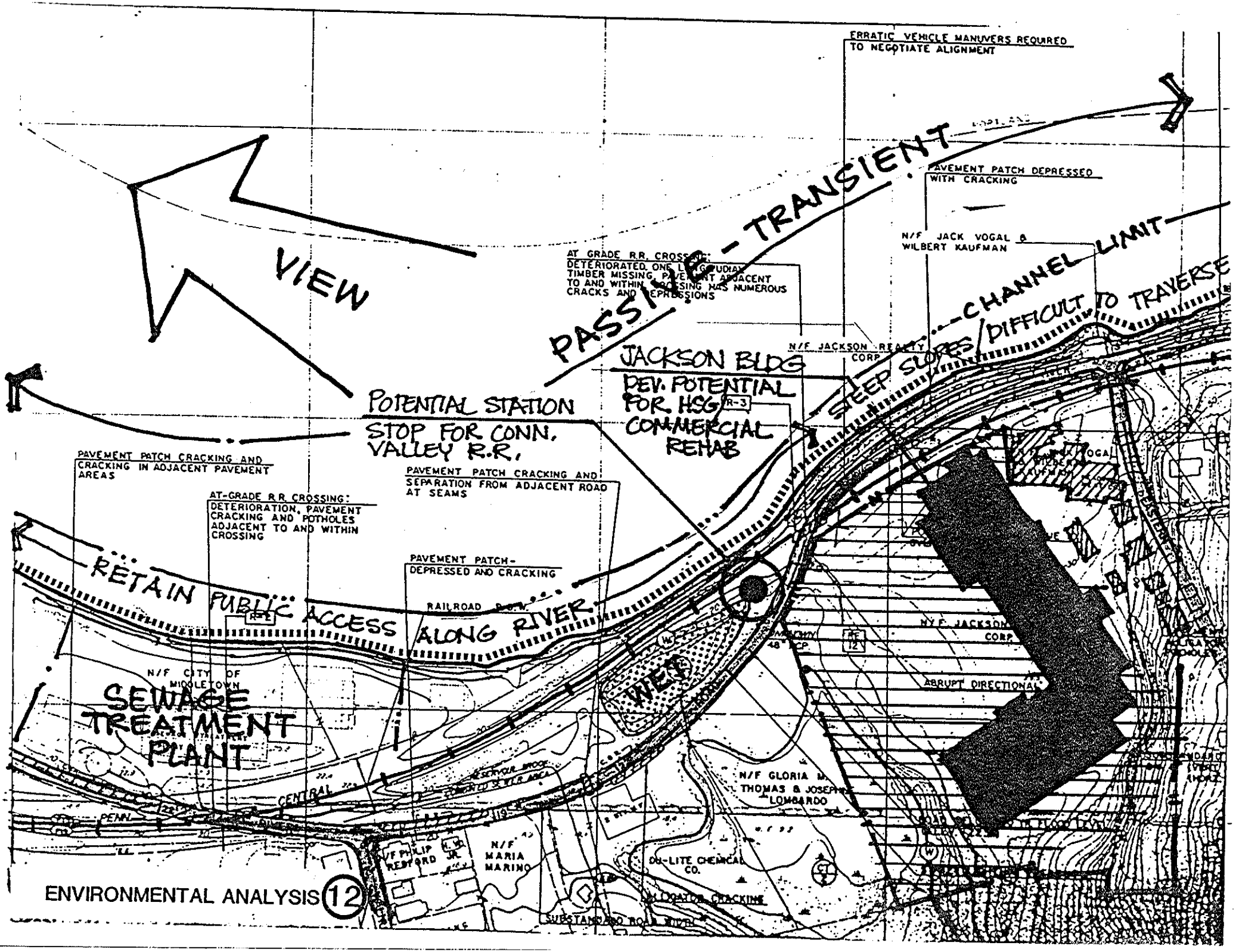
As an interim product, the analysis maps and supporting data and conclusions reached represent a baseline reference resource and design catalyst that can be further developed in the Land Use Study step which follows. (Figures 10-17)



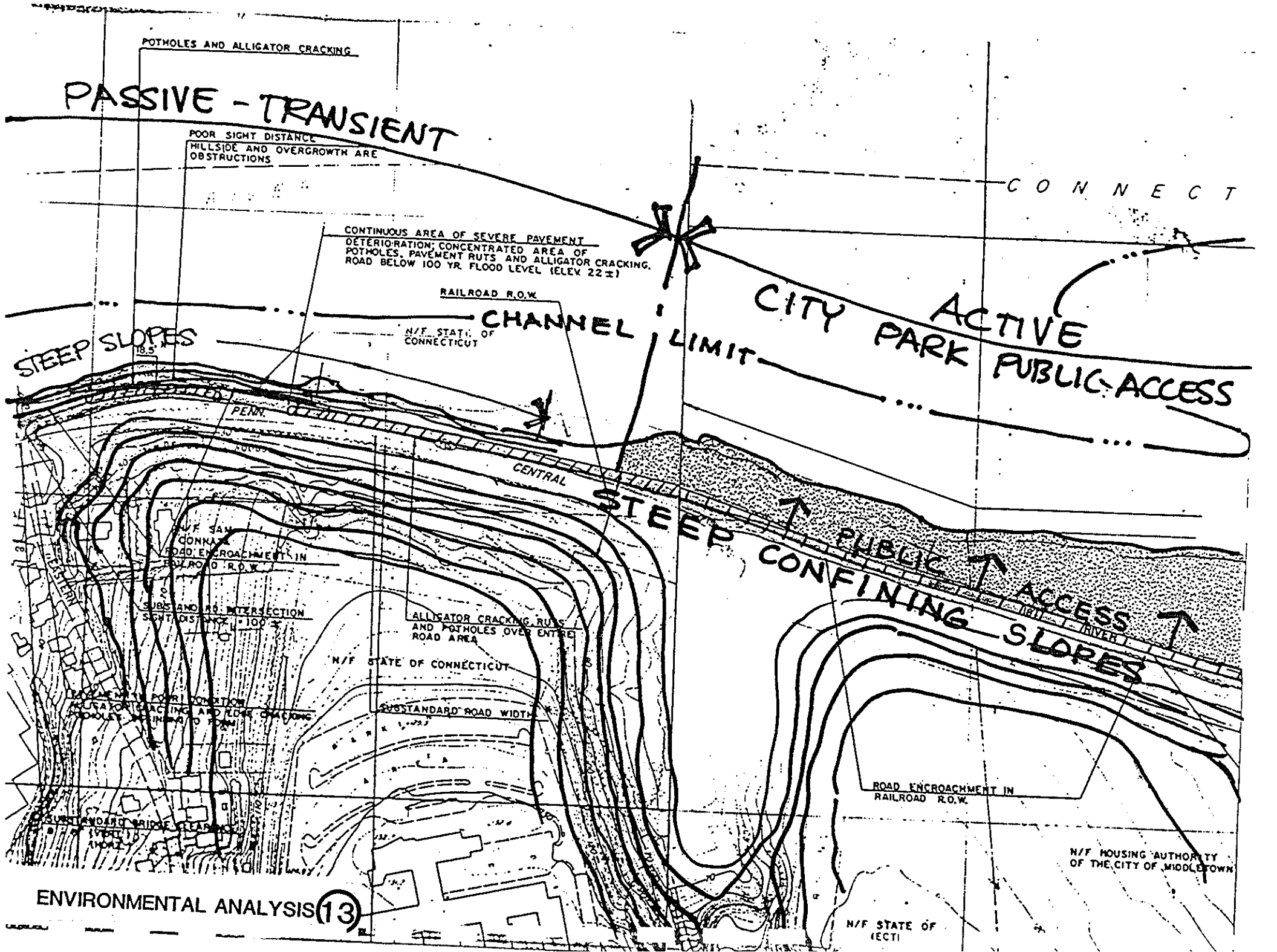
ENVIRONMENTAL ANALYSIS (10)



ENVIRONMENTAL ANALYSIS 11



ENVIRONMENTAL ANALYSIS (12)



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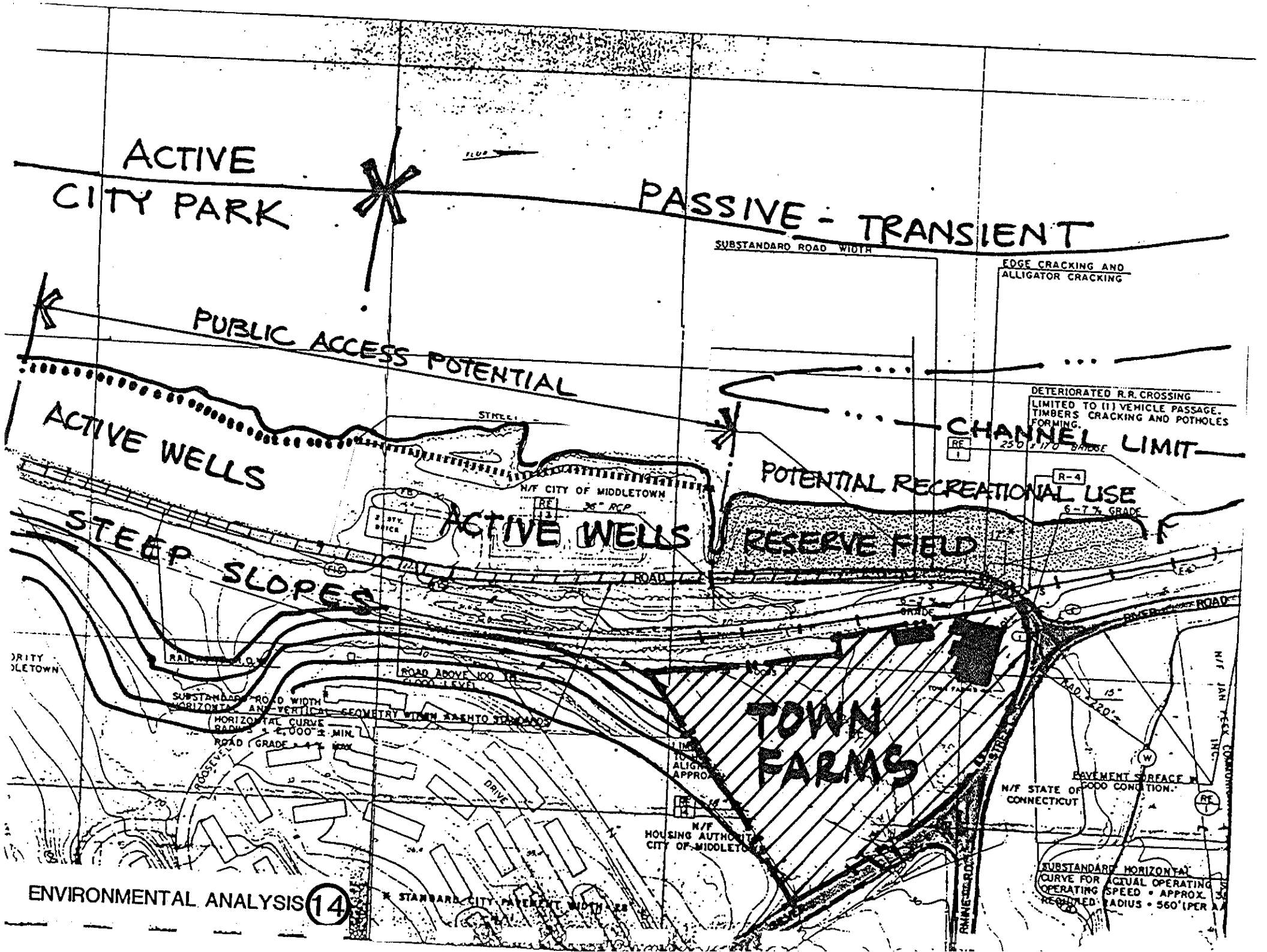
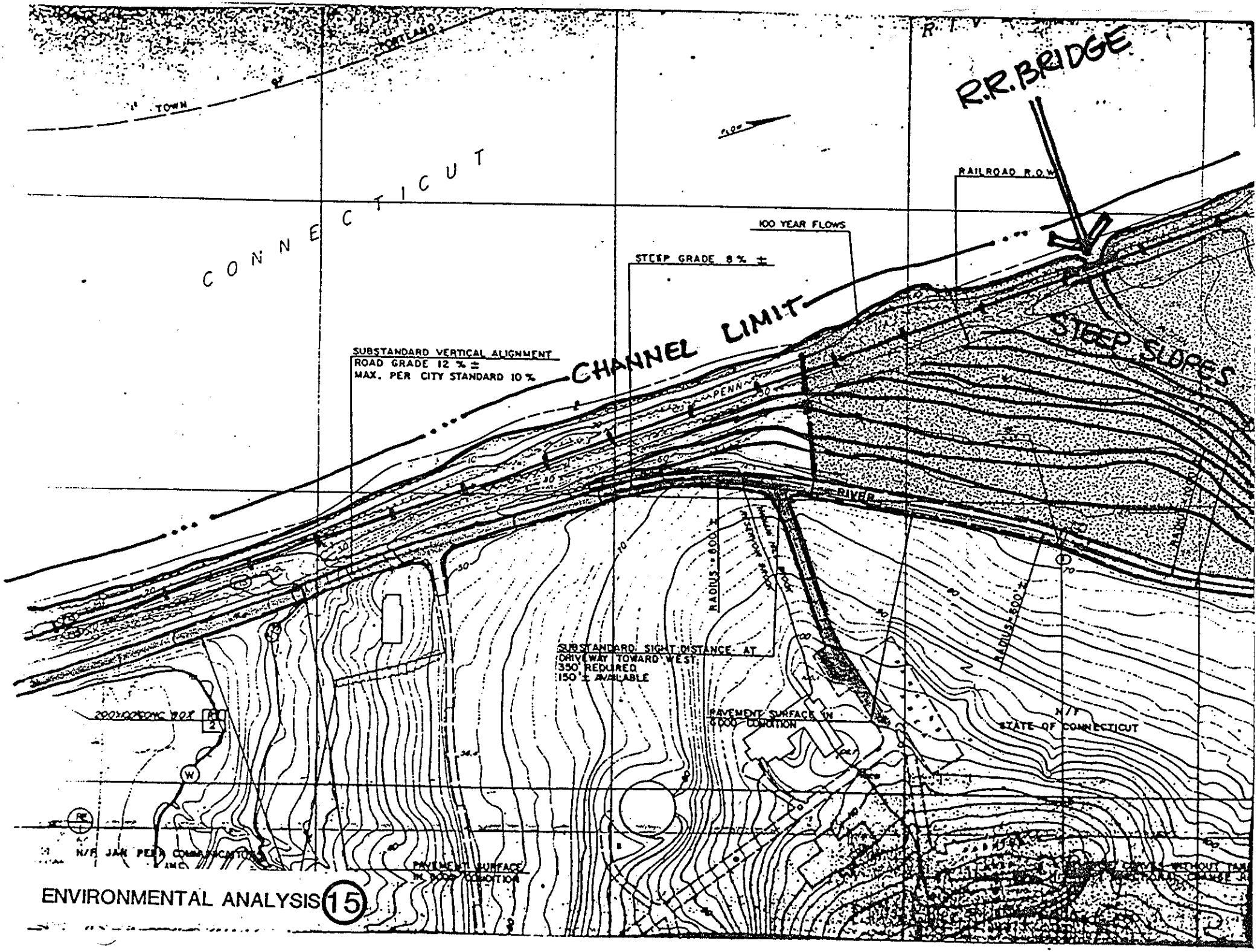
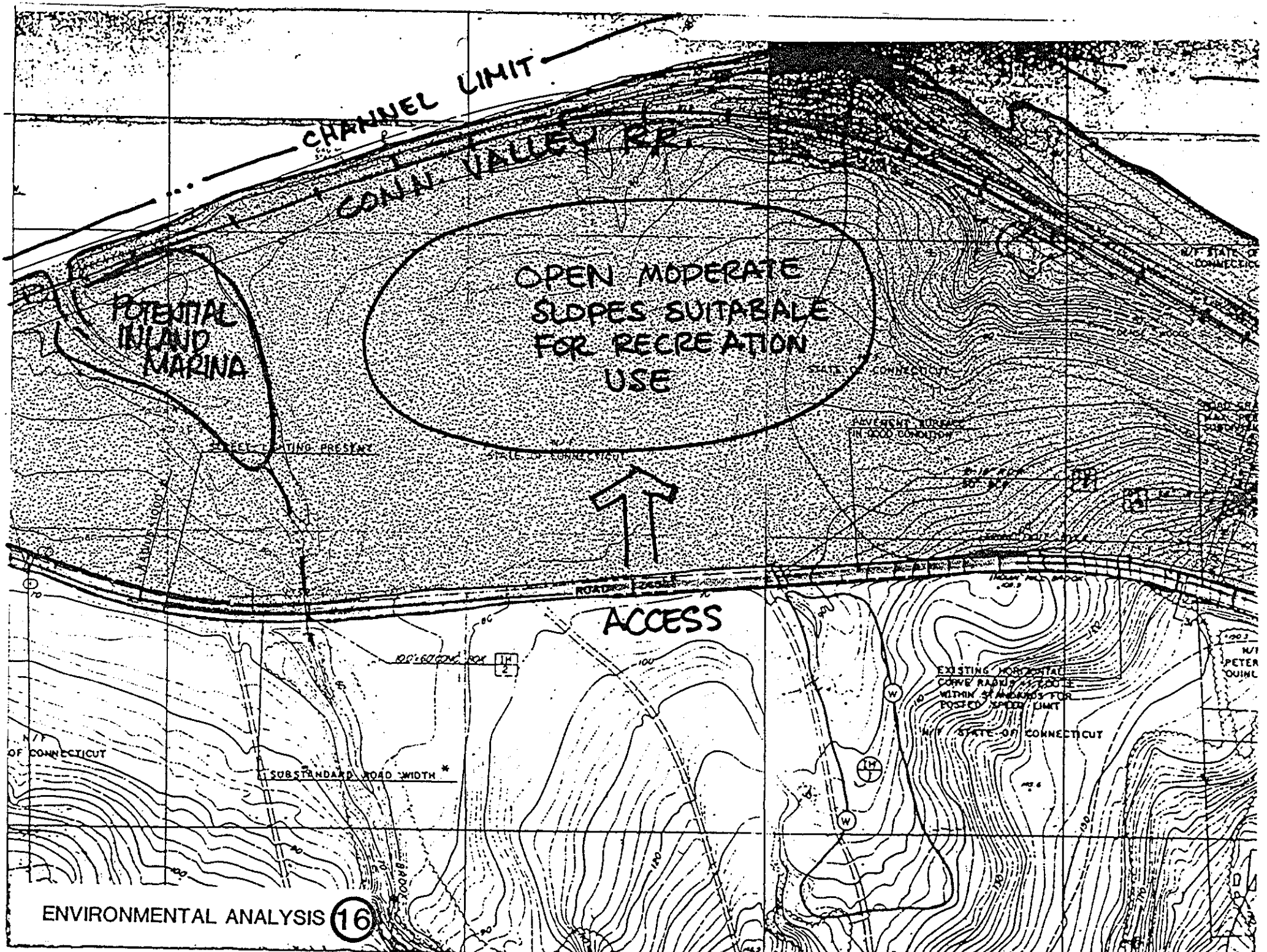
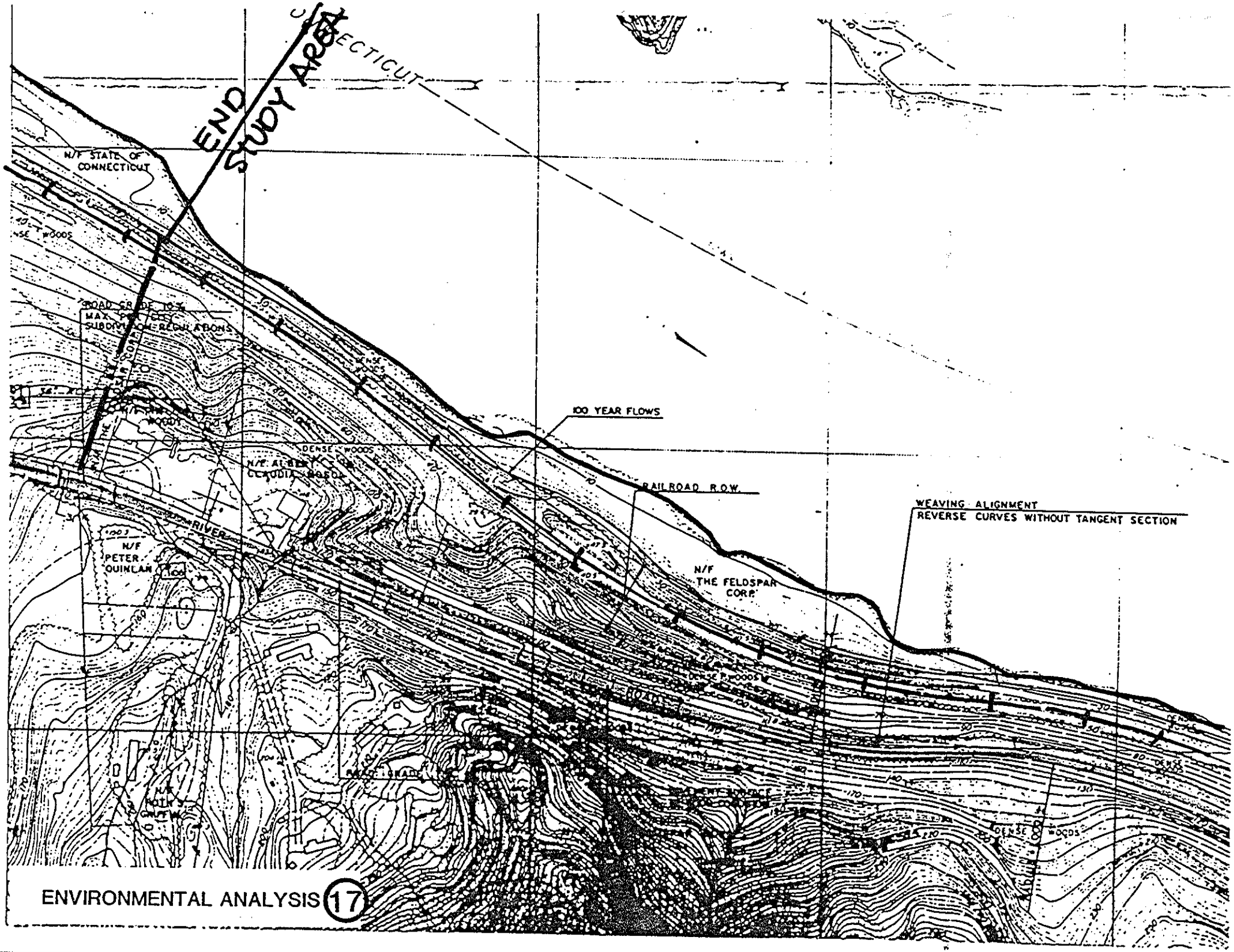

ACTIVE CITY PARK
PASSIVE - TRANSIENT
PUBLIC ACCESS POTENTIAL
ACTIVE WELLS
STEEP SLOPES
ACTIVE WELLS
RESERVE FIELD
POTENTIAL RECREATIONAL USE
CHANNEL LIMIT
TOWN FARMS
SUBSTANDARD ROAD WIDTH
EDGE CRACKING AND ALLIGATOR CRACKING
DETERIORATED R.R. CROSSING
LIMITED TO (1) VEHICLE PASSAGE. TIMBERS CRACKING AND POTHOLES FORMING.
N/F CITY OF MIDDLETOWN
ROAD
ROAD ABOVE 100 YR. FLOOD LEVEL
SUBSTANDARD ROAD WIDTH HORIZONTAL AND VERTICAL GEOMETRY WITHIN AASHTO STANDARDS
HORIZONTAL CURVE RADIUS = 2,000' ± MIN.
ROAD GRADE = 4% MAX.
N/F HOUSING AUTHORITY CITY OF MIDDLETOWN
N/F STATE OF CONNECTICUT
PAVEMENT SURFACE IN GOOD CONDITION.
SUBSTANDARD HORIZONTAL CURVE FOR ACTUAL OPERATING SPEED = APPROX.
REQUIRED RADIUS = 560' (PER AA
STANDARD CITY PAVEMENT WIDTH
GRADE
R-4
6-7% GRADE
230' x 170' BRIDGE



ENVIRONMENTAL ANALYSIS 15



ENVIRONMENTAL ANALYSIS 16


END STUDY AREA
N/F STATE OF CONNECTICUT
ROAD GRADE 10% MAX. PER SUBDIVISION REGULATIONS
100 YEAR FLOWS
RAILROAD R.O.W.
WEAVING ALIGNMENT
REVERSE CURVES WITHOUT TANGENT SECTION
N/F PETER QUINLAN
N/F THE FELDSPAR CORP.
DENSE WOODS
RIVER

CHAPTER 6: Land Use Study

LAND USE STUDY

I. DEVELOPMENT APPROACH

The land use study process is a development approach that is derived from the conclusions reached in the analysis step. These conclusions are succinctly stated as:

1. The study corridor is divided into three distinct environments: Built-up/urbanized, Public recreation, Naturalized.

2. Enhancement of the study corridor has general application which includes everything from design continuity with the greater community to general aesthetic concerns, to environmental stability.

3. Public access as a key objective, is multi-modal in scope addressing all forms of movement, appropriately accessing all areas of the project. (e.g. vehicular, bicycle, rail, pedestrian)

4. The potential for new land uses and reuse of existing land uses must be determined relative to the issue of compatibility with adjacent land uses, site physical suitability/capacity and proposed developments.

5. The strong linear definition, inherent visual continuity and high potential to achieve a unified whole is a function of the successful anticulation of the parts.

II. DESIGN CONCEPT

A. DEVELOPMENT STRATEGY

As a recreation resource covering an extensive geographical area, the river corridor naturally functions as several separate public access opportunities, each with its own identity. This fragmented use pattern will probably continue and should be accommodated by providing for additional points of access with provision for parking at each location.

As a linear tract with the potential for an almost continuous, uninterrupted east-west movement, the Middletown, Connecticut River Corridor can provide the unique opportunity for an extended river-related experience. Strategic placement of a variety of recreational/educational attractions throughout the Corridor will serve to augment the existing public access areas and enhance the linear experience. In this regard, a recreational bikeway facility that uses River Road is well suited to linear recreational activity and also serves to augment the vehicular travelway as an access for maintenance, emergency and security vehicles.

Linear Development Strategy

The success of a linear park depends heavily on its continuity; that is, the maintenance of a continuous and always identifiable park environment from beginning to end. To this end, it is important that the phased development of the recreation corridor progress in a series of connected segments as opposed to arrangement of physically separate and unrelated recreational areas. The connection may be a foot or bike trail or simply a visual continuity achieved through the use of signage (e.g., River Road Recreation Corridor) and vegetation (dominant street tree and/or typical use of recent planting along the route).

B. RECREATION KEY PROGRAM ELEMENTS

PROGRAM ELEMENTS	PROGRAM DESCRIPTION
A. Pedestrian nature trail; picnic areas Use: Walking, jogging, cross-country ski and "Fit-Trail".	A passive trail system that may be partially located within the Flood Plain and providing controlled access to specific areas for educational and recreational use.
B. Bikeway Use: Exclusively bicycle-oriented.	A recreational bicycle route located generally along the outside edge of the Flood Plain and ultimately extending the full length of the project area. Construction: Hard surface; typically bituminous concrete. Others include; stone dust, soil cement or rubber asphalt surface treatment.
C. River Corridor Maintenance/ Clean-up.	Perceived initially as an organized effort to be coordinated with and carried out concurrently with the construction of

PROGRAM ELEMENTS		PROGRAM DESCRIPTION
		any new recreation element. In terms of long range programming, corridor maintenance and clean-up should be regarded as a necessary on-going operation with equal emphasis placed on maintenance of existing facilities and improvement of the ecological environment.
D.	Expansion of existing recreation facilities.	Availability of future land resources, (acquisition) and better utilization of existing land resources, (filling of river edge erosion areas) would provide additional land area suitable for sustaining rivers edge developments. (foot trails, bike trails).
E.	Water-related Recreation Facilities.	Provision of "put-in" facilities for "car-top" small craft (canoe, small out-boards, sunfish, sailboats, etc.) could be easily accommodated at selected points along the river corridor. Facility requirements would include stabilized, negotiable river bank with some special appurtenances to facilitate put-in and take-out operations. The facility should be reasonably close to parking areas and appropriately separated from adjacent recreational user.

PROGRAM ELEMENTS	PROGRAM DESCRIPTION
F. Corridor Access	Provision for parking at selected locations along River Corridor to facilitate pedestrian access to all recreation areas.
G. Law Enforcement/Security	Law Enforcement, with regard to the maintenance of public adherence to regulations governing use of facilities, is basically an educational burden that falls heavily upon the municipality; e.g., consistent and frequent enforcement of the law supported by parainstitutional education programs such as "Driver's Education" courses conducted within the school system. Security is an equally, but potentially more significant problem in terms of the consequences of inadequate surveillance techniques that fail to meet the real problem of vandalism. Suggested methods of supplementing chronically undermanned security forces include the installation of sophisticated electronic light sensitive and sound actuated alarm systems.
H. Handicapped Facilities	Provision for the inclusion of special design features to accommodate the handicapped. Facilities would include

PROGRAM ELEMENTS	PROGRAM DESCRIPTION
	designated drop-off/pick-up points and designated corridor access to enable handicapped to participate in the recreation program.
J. Supplemental Planting	Provide new plant materials in selected areas for: a. Buffer (visual) b. Aesthetic (color, shape) c. Climatic (windscreen, shade) d. Educational (botanical variety) e. Habitat improvement

Handicapped Design Considerations

All proposed recreational facilities should provide access to the handicapped. If designed properly, an extensive River Recreational Corridor would provide a much appreciated additional resource for this group.

Following is a list of convenience design features for the handicapped:

(a) modified parking facilities.

(b) bituminous or other easily navigable (wheelchair) surface provided with curb-type delineation for the blind.

(c) raised-letter orientation and information signage for the blind.

(d) wheelchair-related trail gradients.

(e) strategically located rain shelters for the wheelchair dependent and others with reduced ambulatory abilities.

(f) modified rest room facilities.

C. BIKEWAY FACILITY PROGRAM REQUIREMENTS

Refer to Appendix data.

D. NEW LAND USE AND REUSE POTENTIAL

Regarded as the singlemost dynamic aspect of the riverfront study is the new and reuse land potential that offers dramatic possibilities from one end of the corridor to the other. Realization of this potential is contingent on several factors including River Road alignment decisions, CTDOT Route 9 design decisions and timeframes, municipal commitments, development market futures and land acquisitions.

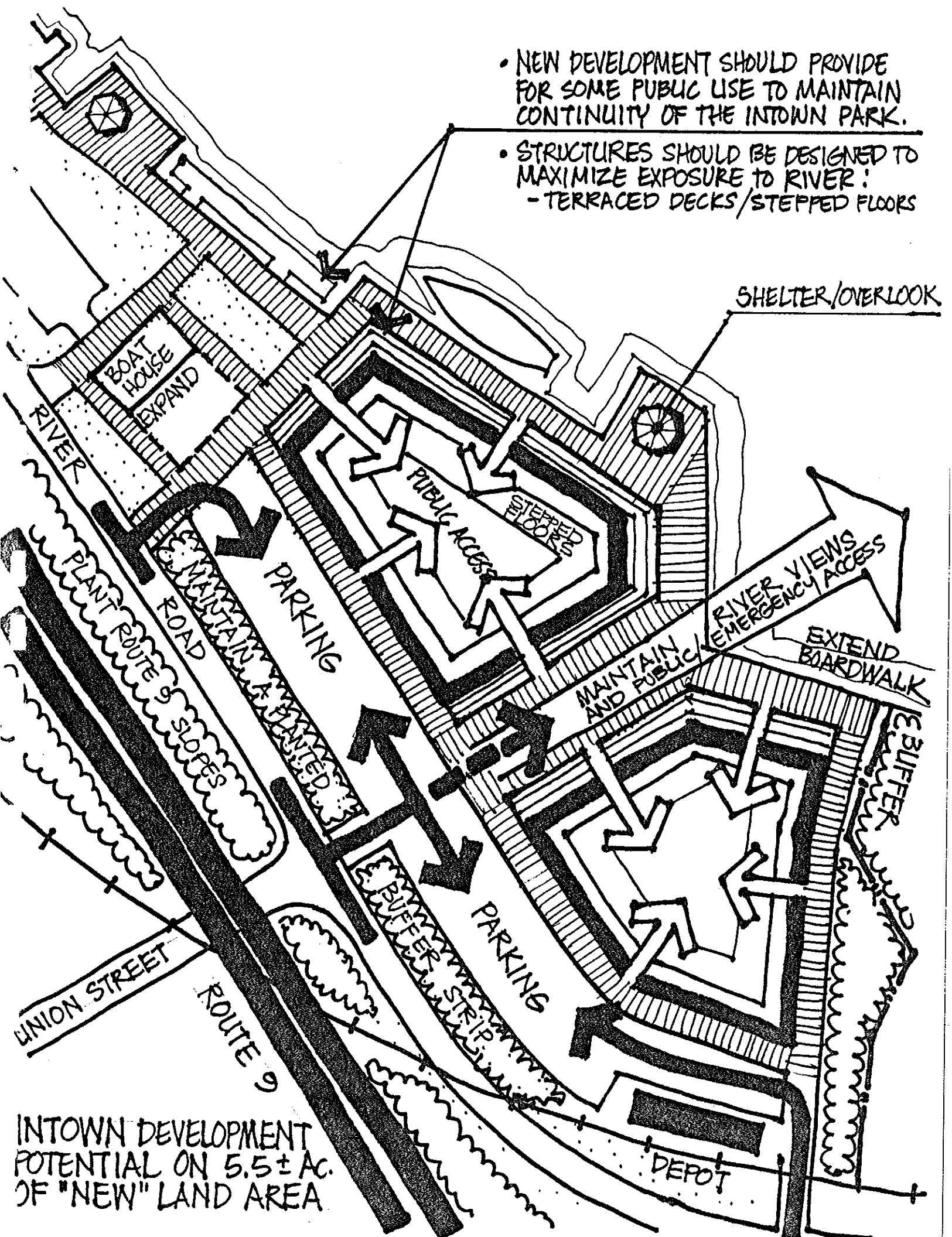
Tomasso/Peterson Parcels

Realignment of River Road and undergrounding of Sumner Brook will create a nominal 5.5 acres of contiguous land at these sites. The existing gravel plant is not water-dependent and while the tank farm would have to be demolished, the gravel enterprise can be moved thereby freeing a significant land resource for alternate development.

The apparent value of such a 5+ acre land parcel would be very high indeed, given its close proximity to the intown park facilities and Route 9. As a logical extension of the intown park facility, this riverfront opportunity can reinforce the continuity of the public waterfront and development efforts should be so directed.

As the Land Use Maps (Figure 18-21) illustrates, analysis conclusions for this area strongly suggest that land use be (at least in part) publicly oriented. This could be conceived as a multi-level high activity development serving the public at ground level and professional tenants on second or third levels. Extension of the bulkhead and boardwalk would add to the sense of continuity, provide a viable pedestrian circulation medium and create additional riverfront exposure to meet a growing water-borne recreation element. One could envision commercial development occupying this important strench of riverfront. Public access should be maintained through zoning. Shops and businesses should be water enhanced uses similar to the successful waterfront redevelopments in Boston, Baltimore or Norfolk, Virginia.

Surface parking, while easily accommodated, should be carefully assessed with respect to apparent need on-site versus the development value of the land it would occupy (i.e., economic return).


• NEW DEVELOPMENT SHOULD PROVIDE FOR SOME PUBLIC USE TO MAINTAIN CONTINUITY OF THE INTOWN PARK.
• STRUCTURES SHOULD BE DESIGNED TO MAXIMIZE EXPOSURE TO RIVER:
- TERRACED DECKS/STEPPED FLOORS
SHELTER/OVERLOOK
BOAT HOUSE EXPAND
RIVER
PUBLIC ACCESS
STEPPED LOOKS
PARKING
MAINTAIN PLANTED BUFFER
PLANT ROUTE 9 SLOPES
ROAD
RIVER VIEWS
EMERGENCY ACCESS
EXTEND BOARDWALK
MAINTAIN AND PUBLIC
BUFFER
BUFFER STRIP
PARKING
UNION STREET
ROUTE 9
DEPOT
INTOWN DEVELOPMENT POTENTIAL ON 5.5± AC. OF "NEW" LAND AREA

Jackson Property

This property commands one of the more magnificent up-river views and has a substantial frontage along River Road. As a mid-corridor property, it enjoys some of the flavor and exclusivity of the natural linear environment. Reuse potential is varied and depends largely on market demand. It is relatively easy to conceive a potential for commercial and/or residential use. As with the Tomasso/Peterson parcel, mixed use possibilities could also be applied to this property. (Figure 19)

Residential on the upper levels of a multi-story structure would benefit by the unobstructed scenic views and isolated nature of the mixed light business (specialty shop/convenience store/professional office) occupying the first floor. Parking would be adequate especially if ratios were minimal (elderly apartments) and small car parking policy was in place.

City Park/Active and Reserve Well Fields

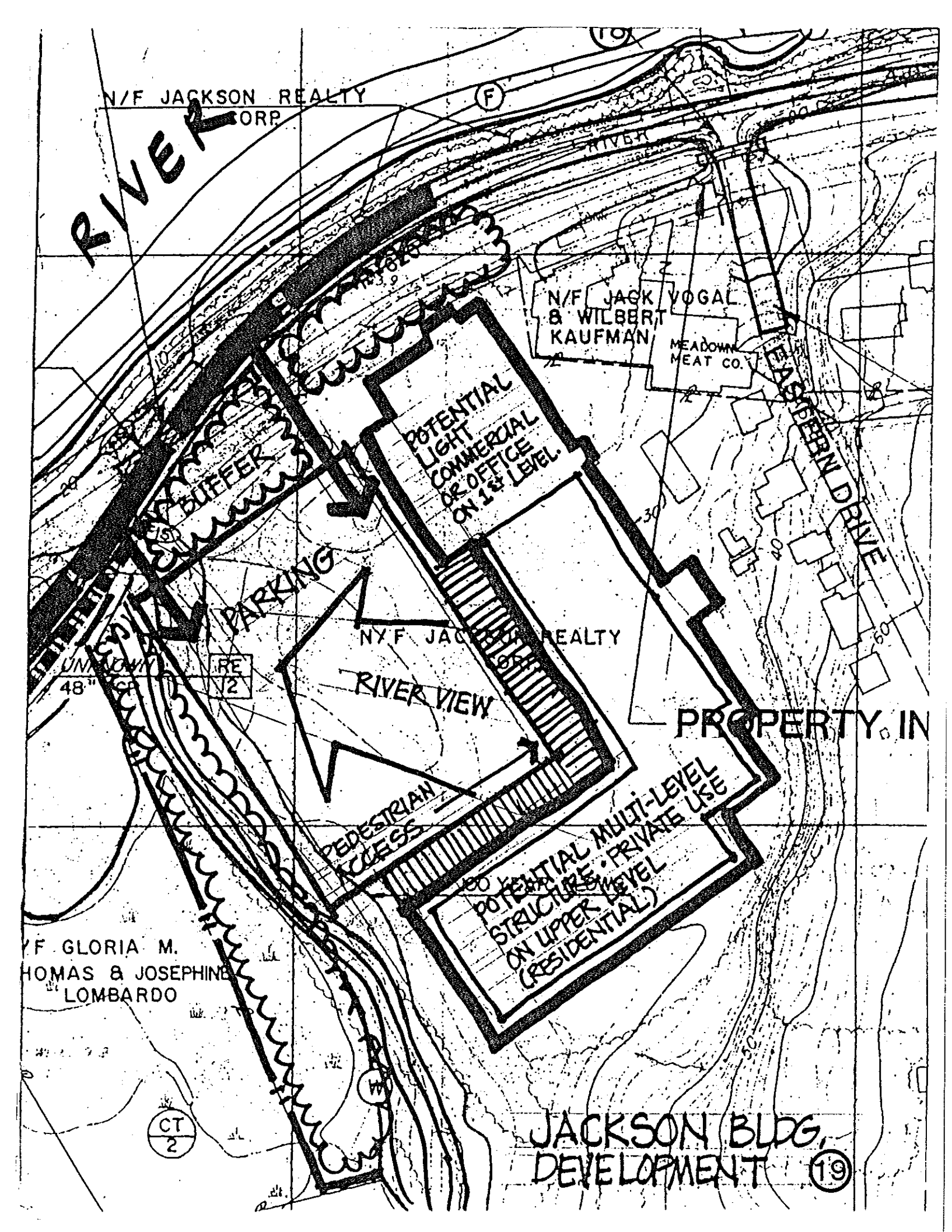
Due to the relatively small land areas involved, these parcels have limited capacity. Parking should be limited and located along River Road in a head-in configuration to maximize available land areas for recreation. Vehicle parking should be prohibited from lands located on or adjacent to the active and reserve well fields. Both the City Park and Reserve Well Field may support picnic facilities (benches, grills, shelters) selected court games (volleyball, badminton, horseshoes, etc.) and "car-top" boat put-in facilities (City Park, only).

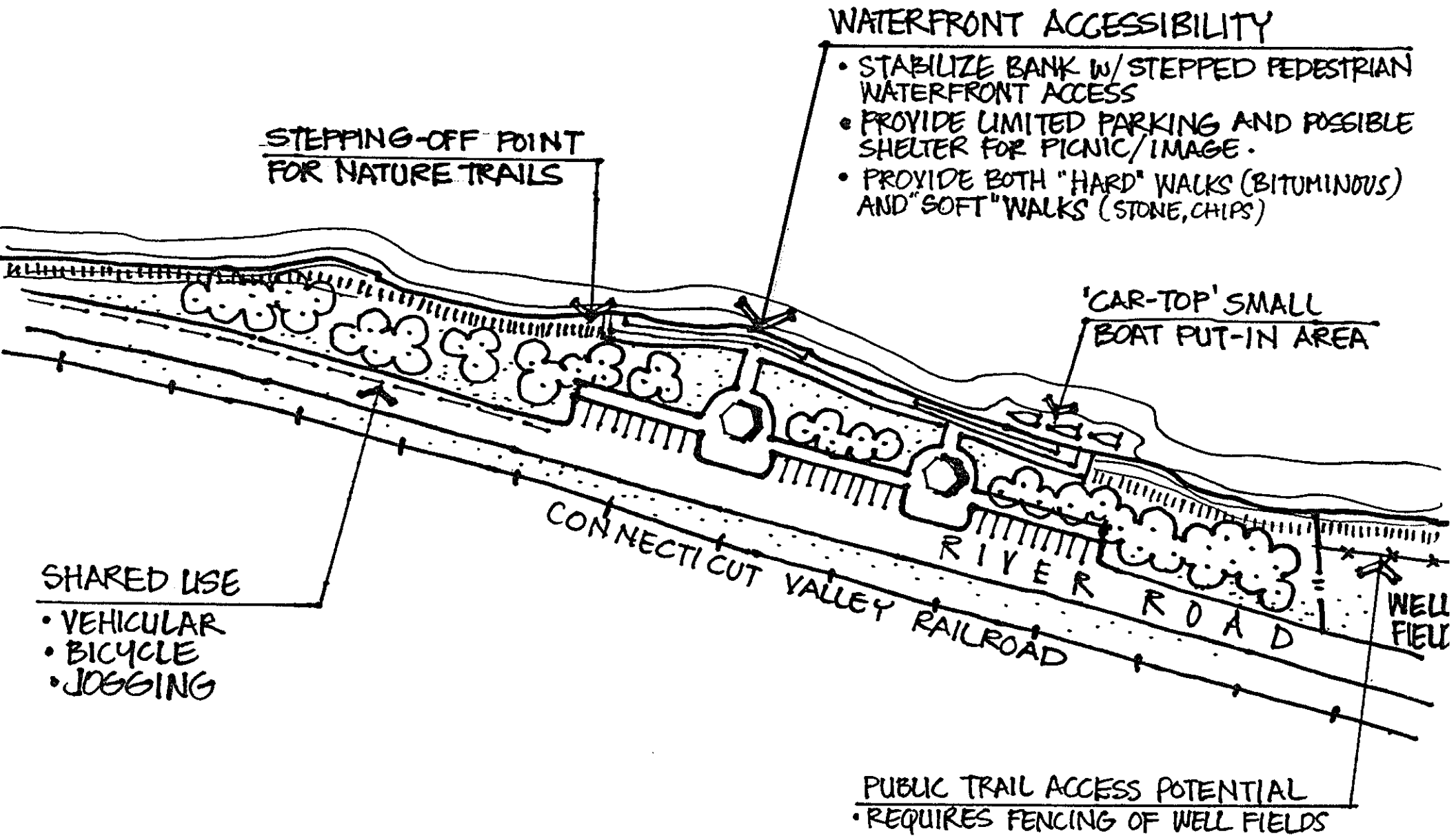
Riverbank reconstruction will enable the public to gain direct access to the water and yield more useable land for trails and paths. The general theme for these areas is passive recreation and a jumping-off point for nature trails that lead east and west into otherwise inaccessible lands such as the Active Well Field (See Figures 20 & 21). A protective fence must be provided between the well field and the proposed nature trail along the river.

Connecticut Valley Hospital Lands

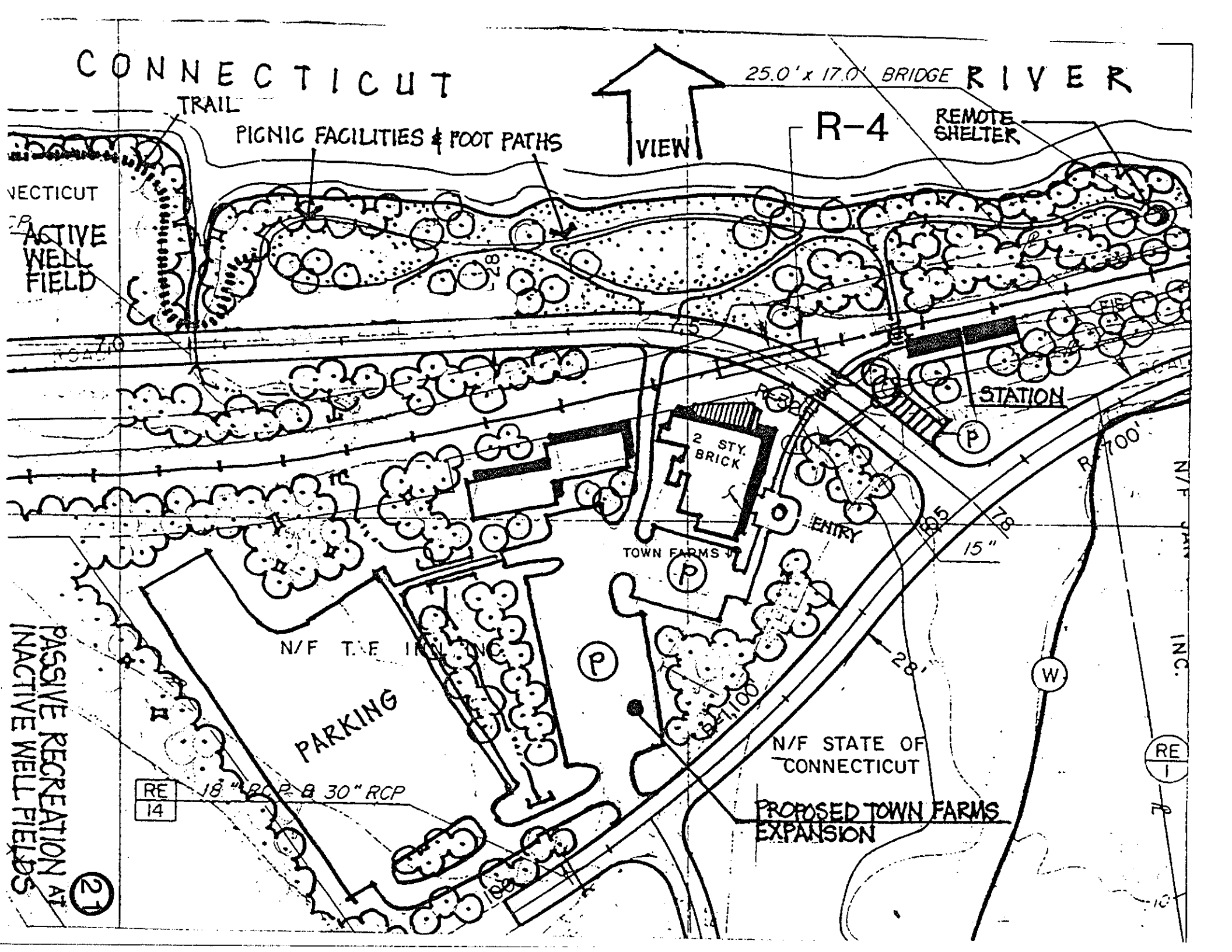
As a 35+ acre contiguous land parcel with over 2,500 l.f. of uninterrupted riverfront, this piece is the easterly counterpart of the intown park corridor terminus and offers a potential that easily rivals that of the Tomasso/Peterson parcel.

While acquisition (as with the Tomasso/Peterson parcel) is necessary, the land as it now exists is ready for development and is not contingent on the complexities of road realignment and watercourse modifications.


N/F JACKSON REALTY CORP.
RIVER
RIVER
N/F JACK VOGAL & WILBERT KAUFMAN
MEADOWN MEAT CO.
EASTERN DRIVE
POTENTIAL LIGHT COMMERCIAL OR OFFICE ON 1st LEVEL.
BUFFER
PARKING
N/F JACKSON REALTY
RIVER VIEW
PROPERTY IN
PEDESTRIAN ACCESS
POTENTIAL MULTI-LEVEL STRUCTURE - PRIVATE USE ON UPPER LEVEL (RESIDENTIAL)
N/F GLORIA M. HOMAS & JOSEPHINE LOMBARDO
JACKSON BLDG. DEVELOPMENT (19)



CITY MID-CORRIDOR PARK


CONNECTICUT
TRAIL
PICNIC FACILITIES & FOOT PATHS
VIEW
25.0' x 17.0' BRIDGE
RIVER
R-4
REMOTE SHELTER
ACTIVE WELL FIELD
STATION
2 STY. BRICK
TOWN FARMS
ENTRY
15"
N/F T.E. INC.
PARKING
18" RCP & 30" RCP
RE 14
N/F STATE OF CONNECTICUT
PROPOSED TOWN FARMS EXPANSION
PASSIVE RECREATION AT INACTIVE WELL FIELDS
21
N/F INC.
RE 1

Topography is varied, vegetation is mixed and cover is sporadic with some open, some wooded expanses. A major ravine offers the opportunity to create an exclusive "inland" marina. The Connecticut Valley Railroad skirts the base of the property and offers an additional public access opportunity.

Considered as a recreation resource, this former chicken farm would be the easterly corridor anchor and final link of the linear park concept. There is sufficient land to provide a wide variety of recreational activity. Because the river channel comes closest (with exception of the intown park area) to the riverbank at this point in the river, the "chicken farm" offers the best opportunity for a public boat landing. There is also more than sufficient land area to accommodate the required parking and maneuvering room for vehicle and trailer.

The 35-acre tract can simultaneously support a private housing development. Sited sensitively relative to public facilities, the natural topography and potential marina location, such a prestigious housing development would add to the municipal grand list and tax base and reflects an overall need for housing in the regional Middletown area. (Figure 22- 25)

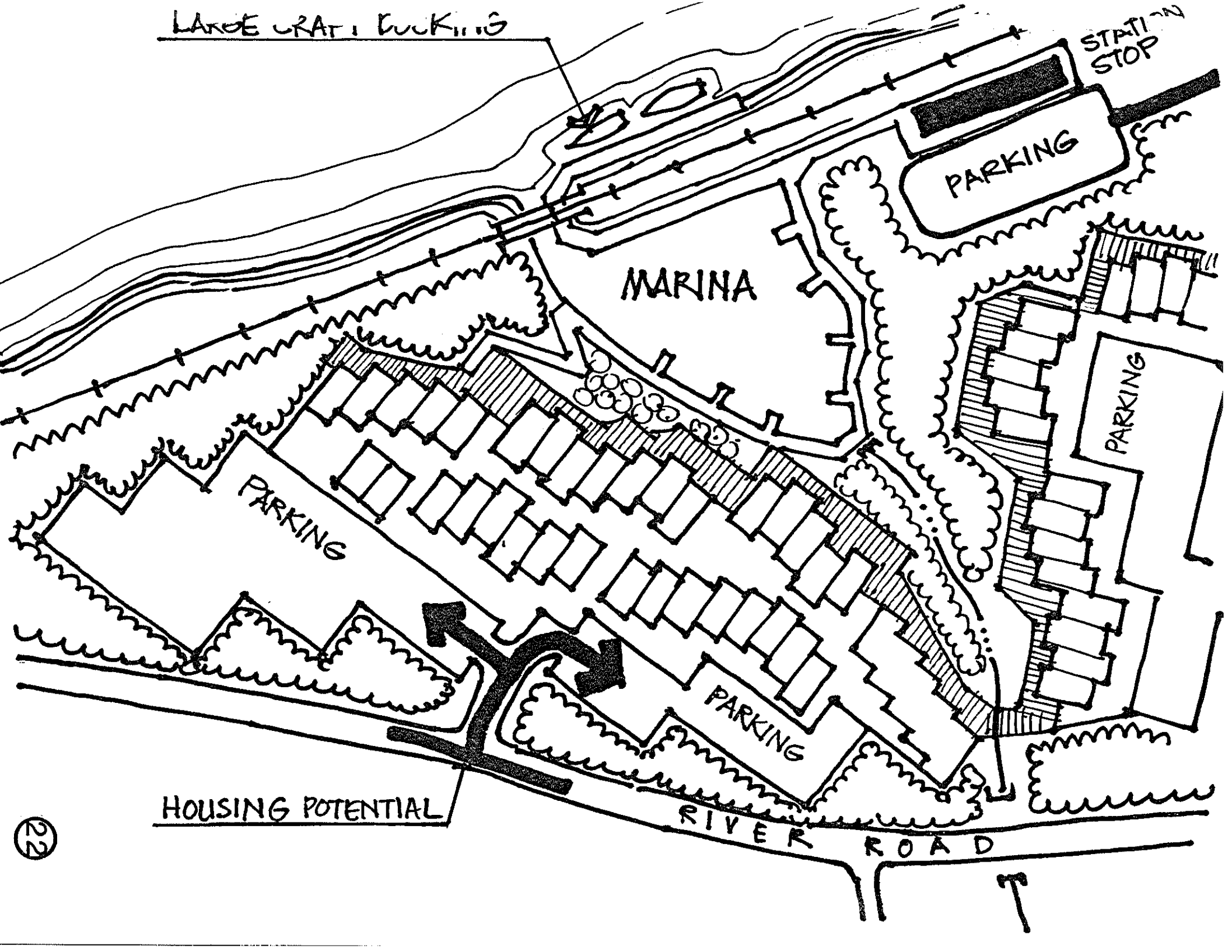
E. EROSION CONTROL AND BANK STABILIZATION

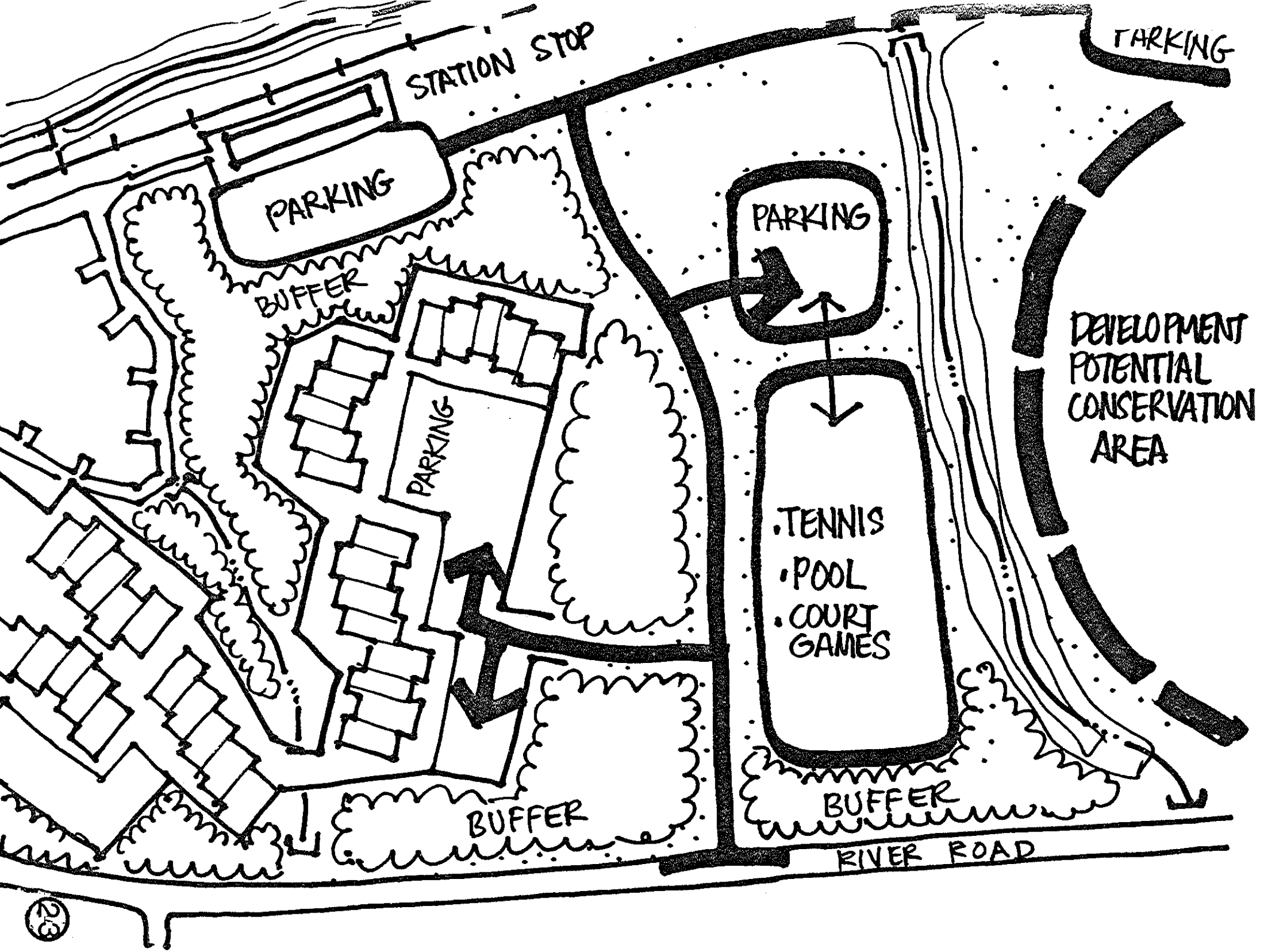
Route 9 Embankment

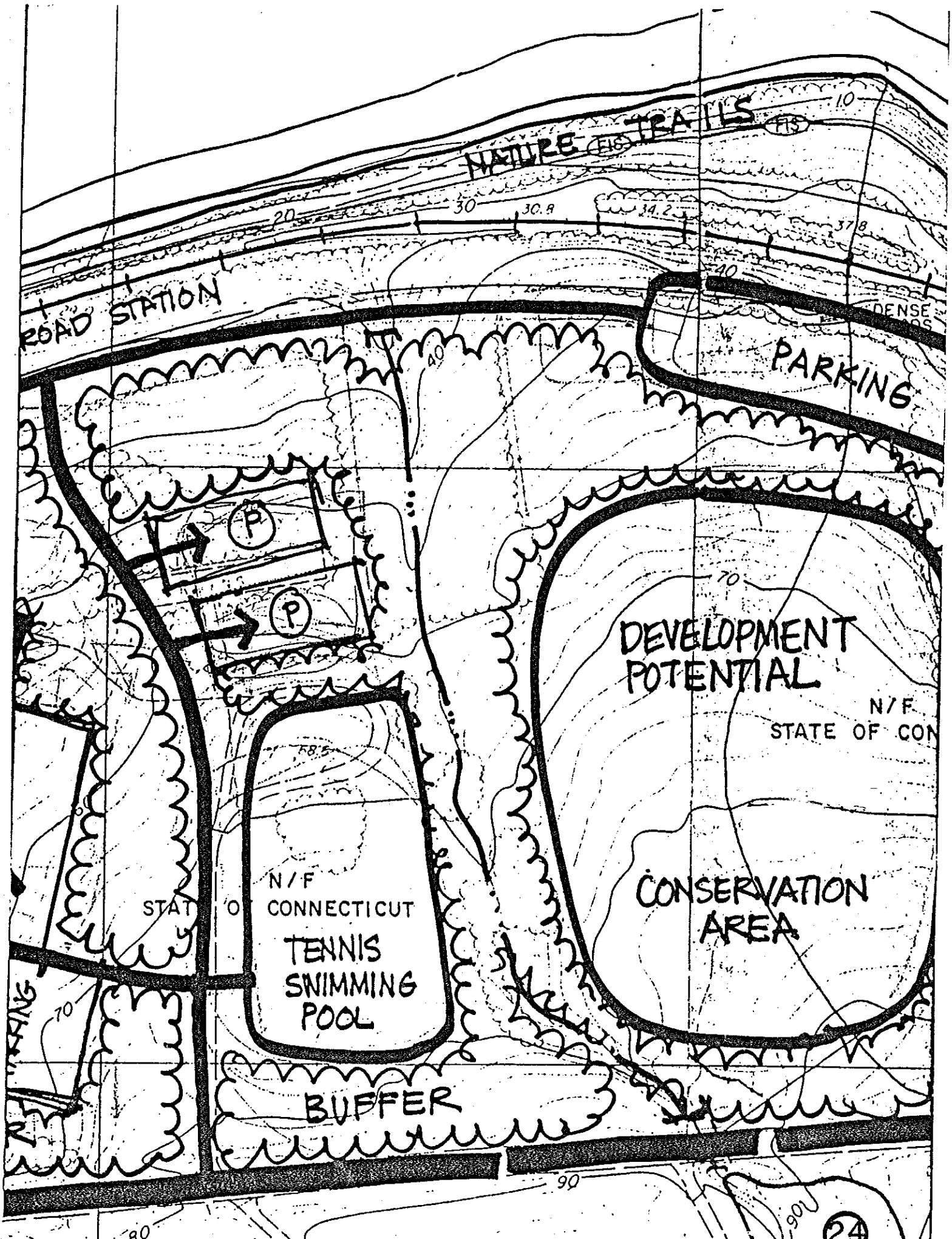
The Route 9 embankment adjacent to the intown river park area is generally stable at 1:1 and 2:1 slope gradients. However, the vegetative groundcover which aids this stability is very coarse in appearance and requires annual maintenance to maintain the growth at acceptable levels.

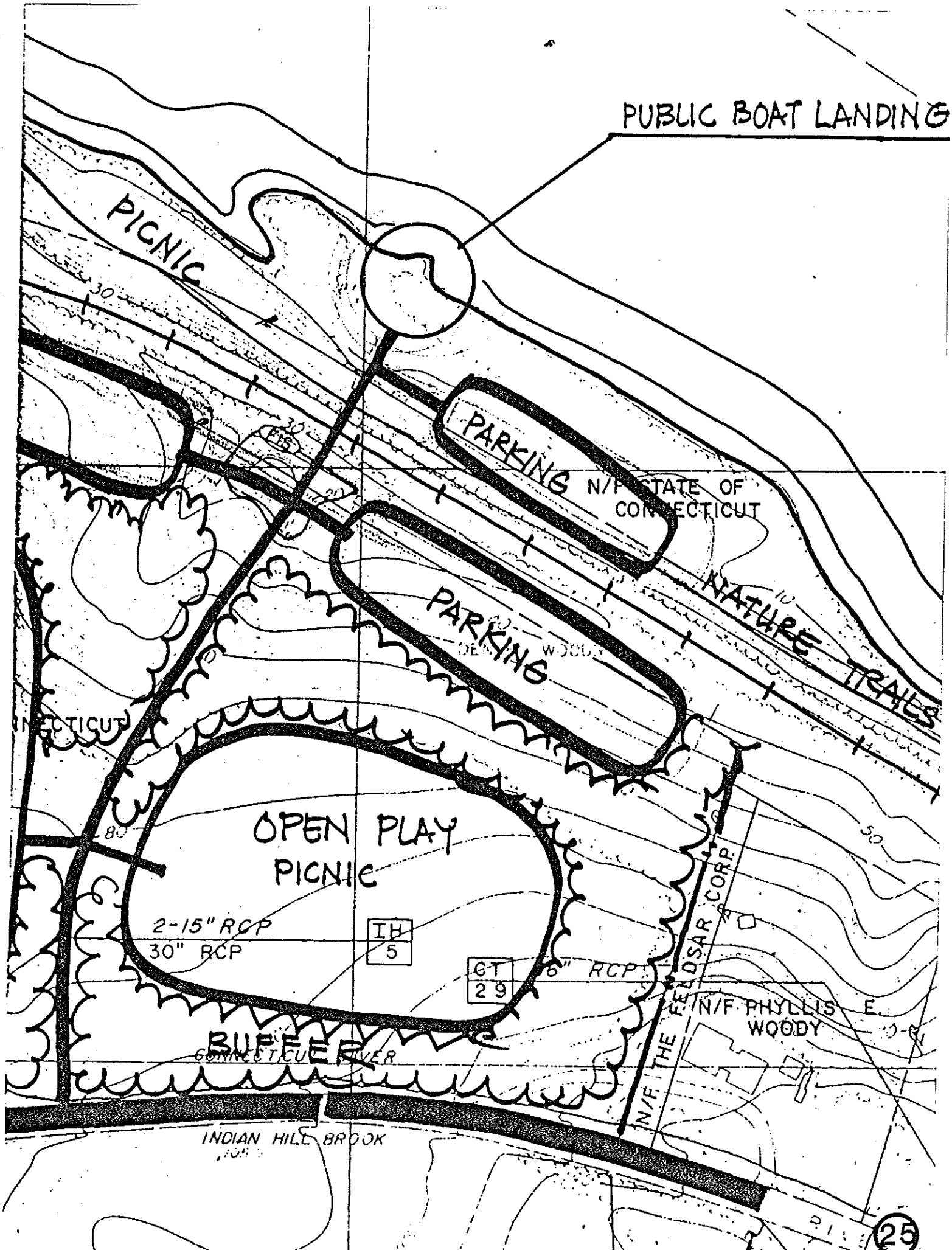
For purposes of aesthetics and a reduction in maintenance costs, it is recommended that the existing growth be removed and substituted with a more formal and refined groundcover of mixed evergreen and deciduous (nursery-grown) shrubs appropriate for bank planting. This should be accomplished by first developing a specific planting plan and then either bidding the work to a professional landscape contractor or having the work accomplished by city forces.

Following is a list of suggested plants that are well suited for bank planting and hardy to a Route 9 type environment:


LARGE CRAFT DOCKING
STATION STOP
PARKING
MARINA
PARKING
PARKING
PARKING
PARKING
HOUSING POTENTIAL
RIVER ROAD


STATION STOP
PARKING
PARKING
BUFFER
PARKING
PARKING
DEVELOPMENT POTENTIAL CONSERVATION AREA
TENNIS
POOL
COURT GAMES
BUFFER
BUFFER
RIVER ROAD


NATURE TRAILS
ROAD STATION
PARKING
DENSE
DEVELOPMENT POTENTIAL
N/F
STATE OF CON
CONSERVATION AREA
N/F
CONNECTICUT
TENNIS SWIMMING POOL
BUFFER
10
20
30
30.8
34.2
37.8
40
70
78.5
80
90
24


PUBLIC BOAT LANDING
PICNIC
PARKING
N/F STATE OF CONNECTICUT
PARKING
NATURE TRAILS
OPEN PLAY
PICNIC
2-15" RCP
30" RCP
IH 5
CT 29
6" RCP
BUFFER
N/F THE EDSAR CORP.
N/F PHYLLIS E.
WOODY
INDIAN HILL BROOK

Shrub Type

Botanical Name	Common Name	Evergreen	Deciduous
Berberis	Barberry		X
Juniperus	Juniper	X	
Lonicera	Honeysuckle		X
Cotoneaster	Cotoneaster	X	X
Viburnum	Viburnum		X
Myrica	Bayberry		X

An evaluation of erosion areas along the entire study corridor as well as several bank stabilization alternatives are contained in Appendix E.

CHAPTER 7: Conclusions and Implementation Plan

CONCLUSION AND IMPLEMENTATION PLAN

The implementation of the Middletown Riverfront Development Plan will require funding and actions from both the public and private sectors. The intention of this chapter is to depict the major conclusions of the Riverfront Plan as well as a proposed sequential implementation strategy.

I. CONCLUSIONS

- Riverfront clean-up should be an on-going priority including upkeep of the Harborpark and major clean-up of the small city park located at the mid-point of the project area.

- City commitments for improvements to River Road should be initiated in concert with current expansion of Town Farms Inn. Alternative C, as presented in this report, is recommended. This River Road option provides a clear commitment (gravel based from Eastern Drive to Silver Street) to limiting vehicular traffic on a dangerous section of River Road and including it as an integral element of a passive recreational theme of the overall linear riverfront plans. The recommended Road alignment still includes the major relocation at the Union Street and River Road intersection which is paramount to the land use potential adjacent to Harborpark. Coordination with Connecticut Department of Transportation, as well as with proposals to place a gas line (Northeast Utilities) and water/sewer lines (City of Middletown) should be incorporated in the riverfront development plan.

- Cooperation with plans of Connecticut Valley Railroad should be fixed to facilitate the introduction of this revenue producing and unique tourism attraction to the Middletown riverfront. Near term development should include station stops near the municipal buildings and near Town Farms Inn to occur with the introduction of CVR's "Brille Car" operation.

- The importance of the relocation of the Union St./Harbor Drive/River Road intersection to the overall development plan should be presented to the Connecticut Department of Transportation and the Mid-State Regional Planning Agency to enhance the relative priority of this road project.

- Improvements to the small City Park on River Road including bicycle/jogging trail to/from the intersection of Silver Street should be made in the near term.

- A formal proposal for land acquisition including potential private developer involvement should be made to the Connecticut Valley Hospital and private owners of the cement plant, oil tank farm, and adjacent properties as these locations serve as significant development anchors for the four mile Riverfront corridor.

II. IMPLEMENTATION

The total vision of this four mile corridor requires significant commitments of resources. Certain activities can and should be started in the near term to demonstrate the City commitment to Riverfront development. The matrix depicted in this section illustrates a possible sequence of events. The resulting information projects probable development scenarios including who would be responsible for funding. This latter point is significant to a realistic implementation strategy as governmental sources of funding that were significant in the development of Harborpark are no longer readily available.

The first priority of implementation is clean-up. Continuation of the Harborpark beautification program should be augmented by upgrading and plantings along the Route 9/Harborpark buffer area. Trash removal along River Road should be emphasized with particular concern for the City owned park. This latter area is currently littered with large amounts of solid waste including discarded household appliances. While the City should provide leadership and resources, civic organizations should be encouraged to participate in clean-up. (It could be an annual event; and similar to efforts that have been previously lead by the Middletown Rotary Club.)

The River Road corridor must be perceived as a beautiful and pleasant place. Its current neglect and abuse must be stopped, if future development plans are to be realized.

IMPLEMENTATION MATRIX

SEQUENTIAL EVENT	ESTIMATED COST (1986)	PRIMARY ACTOR[1] CITY	STATE	PRIVATE	TIMING NEAR TERM	LONG RANGE
1. Clean-Up	NA	*1		*2	*	
2. River Road Upgrade (Gravel Base)	$180,000	*			*	
3. Train Stops[2] (Downtown & Town Farms Inn)	$ 60,000 (Covered platform)	*2		*1	*	
4. City Park[3] . Slope Stabilization[4] . Natural Trails[5] . Bike Trails[6]	(see notes)			*	*	
5. Redevelopment of Mid-River Road Properties				*	*	
6. Acquisition of CVH Property	NA	*1		*2	*	
7. Development Package for "Chicken Farm" (35 acres)	NA	*2		*1		*
8. Relocation of River Road	$1,740,000	*2	*1			*
9. Acquisition of Tomasso/Peterson Properties	NA		*			*
10. Extend Harborpark Development	NA	*1		*2		*

1 Numbers refer to lead in joint responsibility.
2 A more permanent structure (enclosed platform building) with heat and utilities would be in the $80/sq.ft. range.
3 The City Mid-corridor park including gravel parking area, gravel walk, shelter, and some passive equipment will cost approximately $50,000.
4 It is estimated that over 500 linear feet should be stabilized along the City Mid-corrido park. Based on $200-$400/linear feet, the cost of slope stabilization could range betwee $100,000 - $200,000.
5 Nature Trails (1200' from Mid-corridor park to Silver St.) - Wood Chip - $2.50/sy ($2,00C - Gravel trails - $3.50/sy ($2,800)
6 Bike Trails (1,000' from Mid-corridor park to Silver St.) - Bituminous concrete $8/sy ($5,360) - Stone dust $5/sy $3,350)

Another near-term implementation step would be the upgrading of River Road from Eastern Drive to Silver Street. The option recommended is the low-cost alternative of not relocating the route and changing the road bed to gravel-based. The roadway would continue to be in the flood plain although maintenance would be less costly than if it was hard covered. The gravel based section of road would de-emphasize the River Road route as a main traffic thoroughfare. Alternately, this section would provide a natural link between the Town Farms Inn, the improved City park, the reserve wells fields, and the River as a passive recreational resource.

It is assumed from discussions with representatives of the Connecticut Valley Railroad that the "Brille Car" will soon provide service between downtown and Town Farms Inn. Extension of the full tourist train from Essex may take a few more years. To endorse the introduction of the "Brille Car", the City should support CVR by providing clearance for the construction of platforms to accommodate train customers.

In concert with other improvements along the Mid-River Road project area, the City should upgrade the park located adjacent to the wells fields. it is felt also that several properties along the bluffs of River Road will be renovated in the near term. The vistas along this section are beautiful with visual overlooks of Harborpark, the River and marina facilities in Portland. The combination of private/public sector actions should be coordinated for the overall betterment of the Middletown Riverfront.

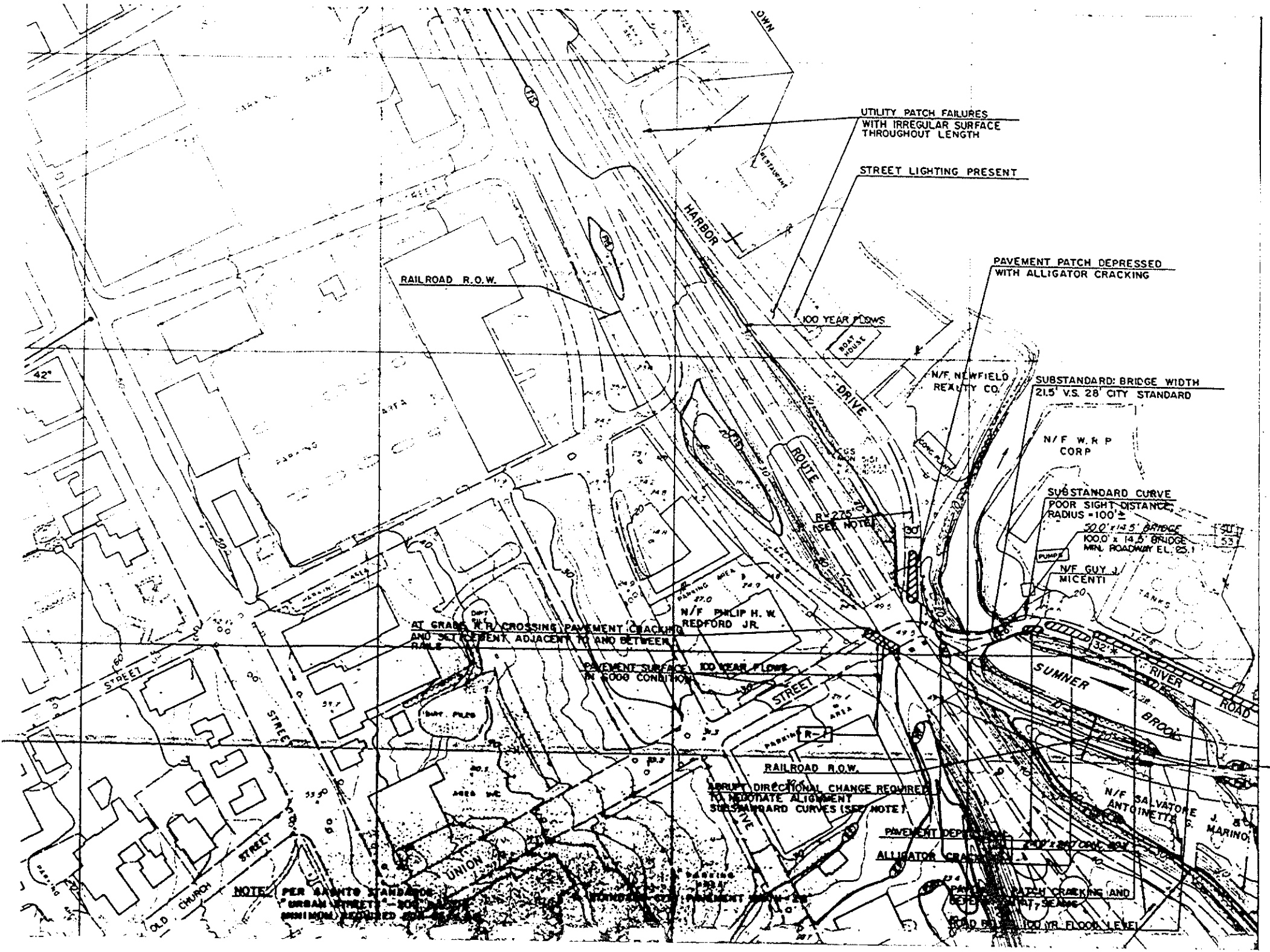
The acquisition and development of key properties at both ends of the project area will require extensive efforts. While the City should lead the initial planning and should support development proposals with appropriate zoning, major fundings should emanate from private developers. A combination of funding sources where public funds serve as leverage for private monies is possible. Initially, the City needs to approach the State concerning development possibilities of the thirty-five acre parcel owned by the Connecticut Valley Hospital.

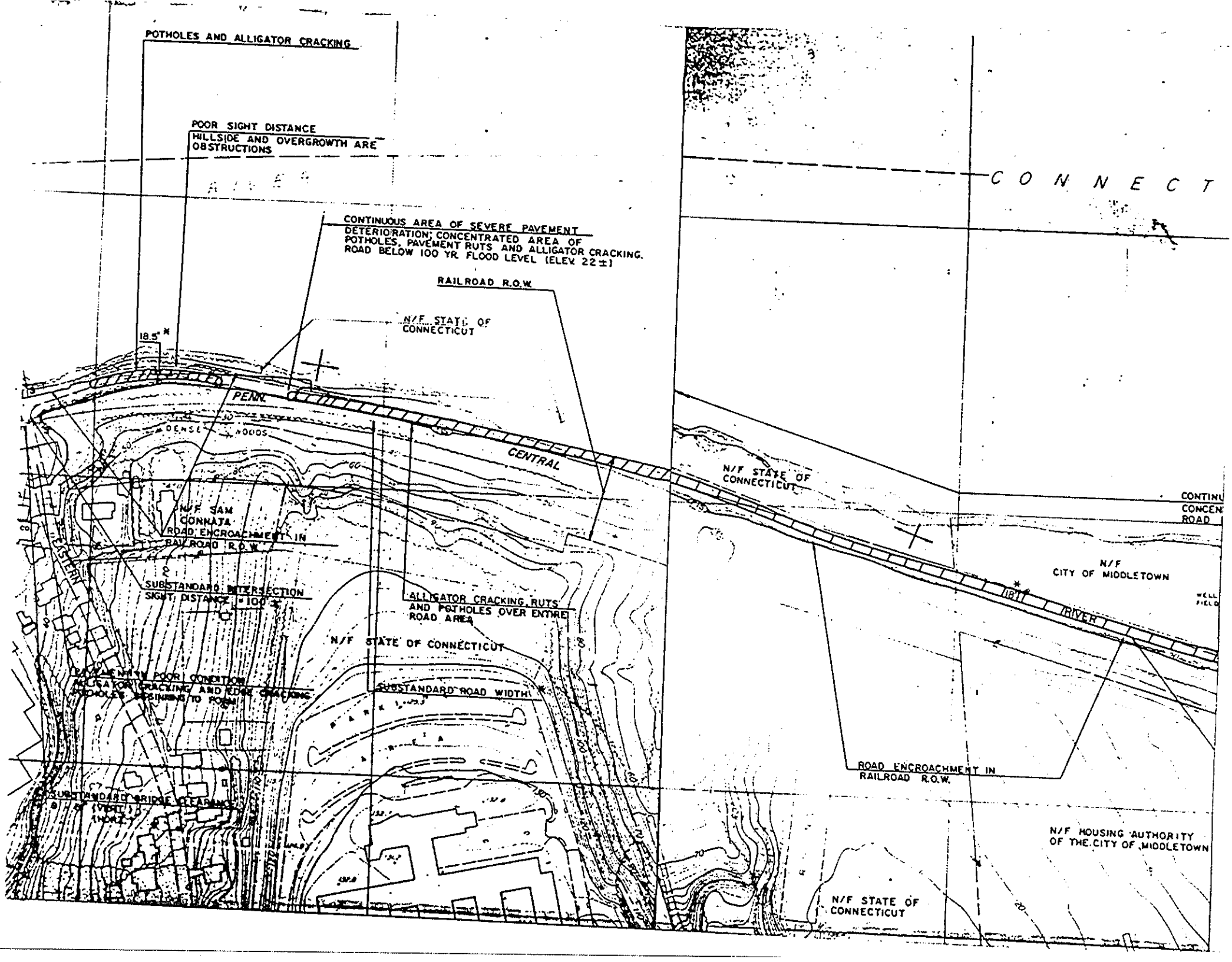
The major relocation of River Road including the relocation of Sumner Brook and creation of a "Tee" intersection at Union Street may be eligible for State funding. Recent discussions with ConnDOT officials indicate that these improvements may be part of a long range plan to upgrade Route 9. This plan, however, does not currently have either high visibility or priority. The City should highlight the importance of this relocation to the overall Riverfront Development Plan. The timing of these improvements is directly tied to the redevelopment of the industrial properties currently located between the sewage treatment plant and Harborpark. The extension of Harborpark will require major relocation and demolition of existing structures. The resulting five acre

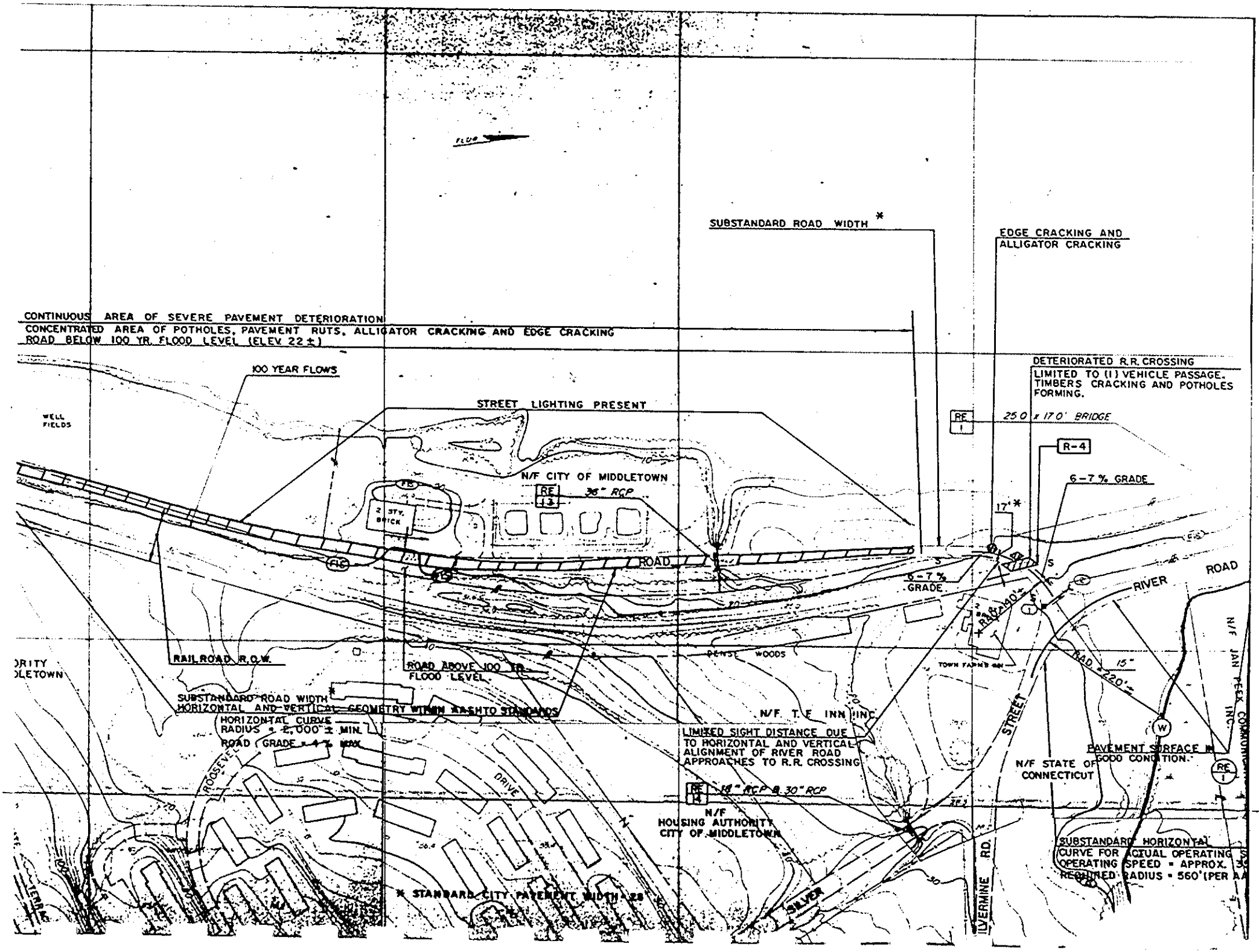
parcel will be very attractive for commercial development. To ensure public access to the waterfront, the City should specify development requirements as it guides the future use of these valuable Riverfront properties. A new zoning ordinance for a "Riverfront District" is possible which would mandate types of uses (water dependent or enhanced) and public access.

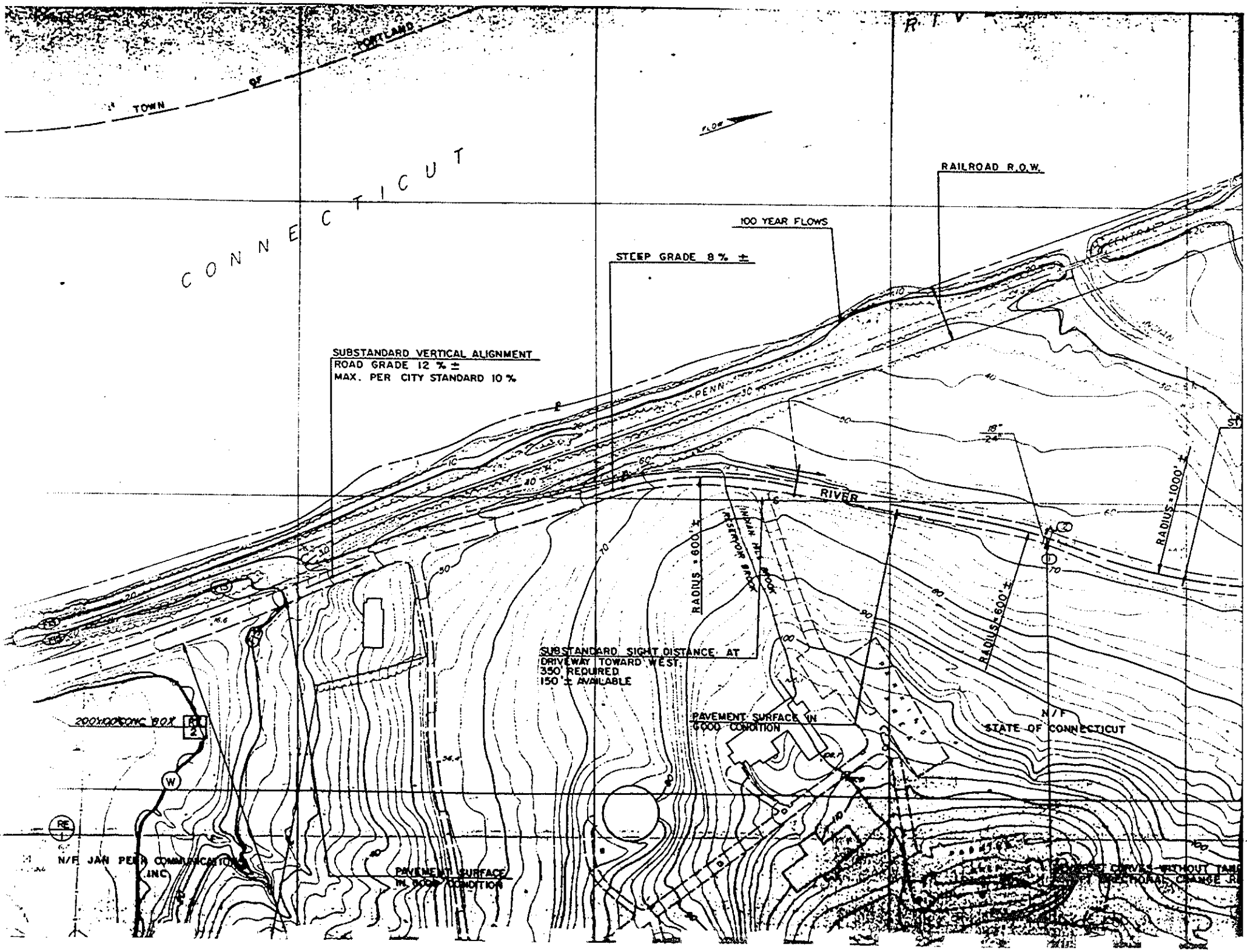
APPENDICES

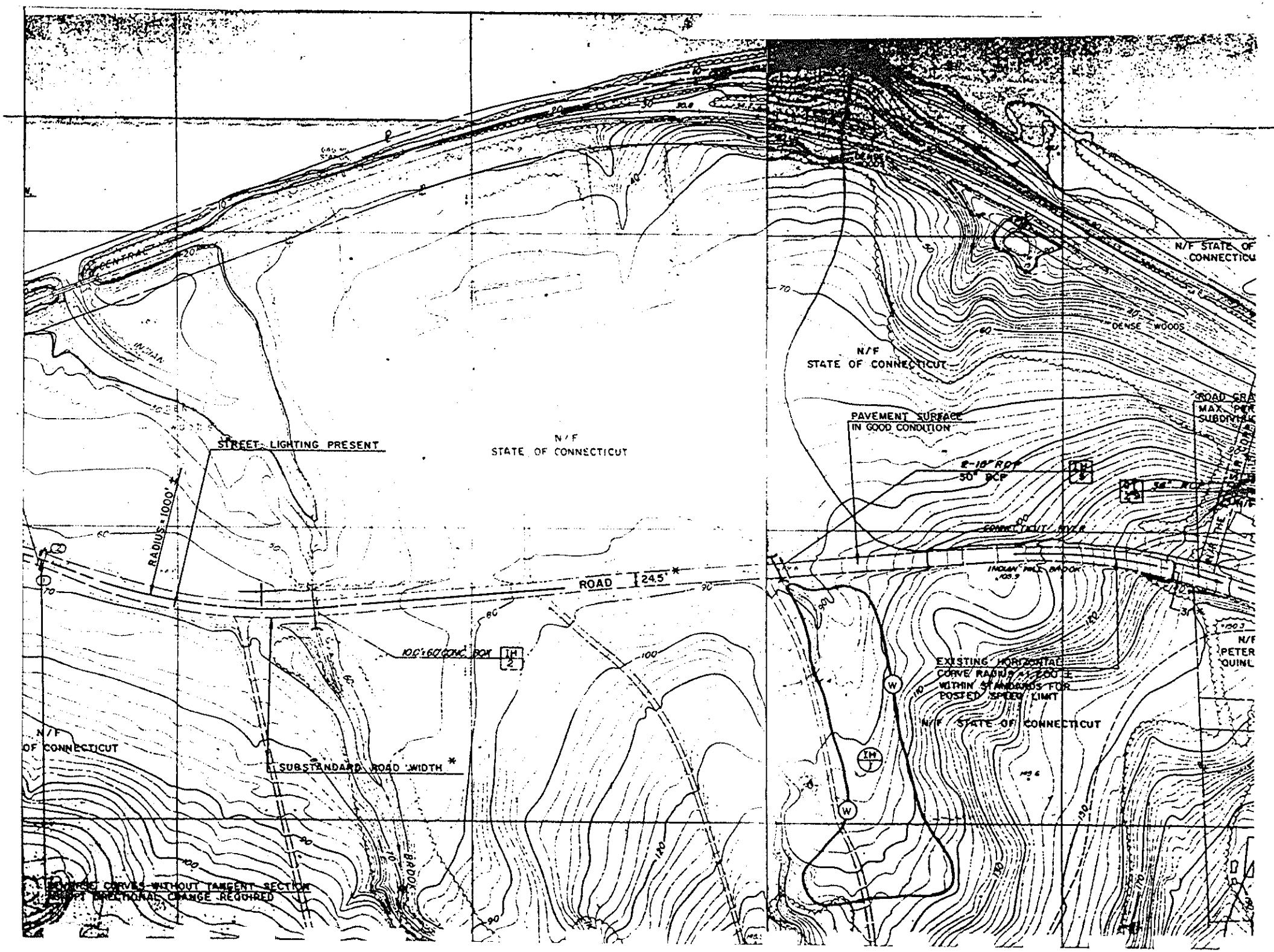
Appendix A
River Road Existing Conditions

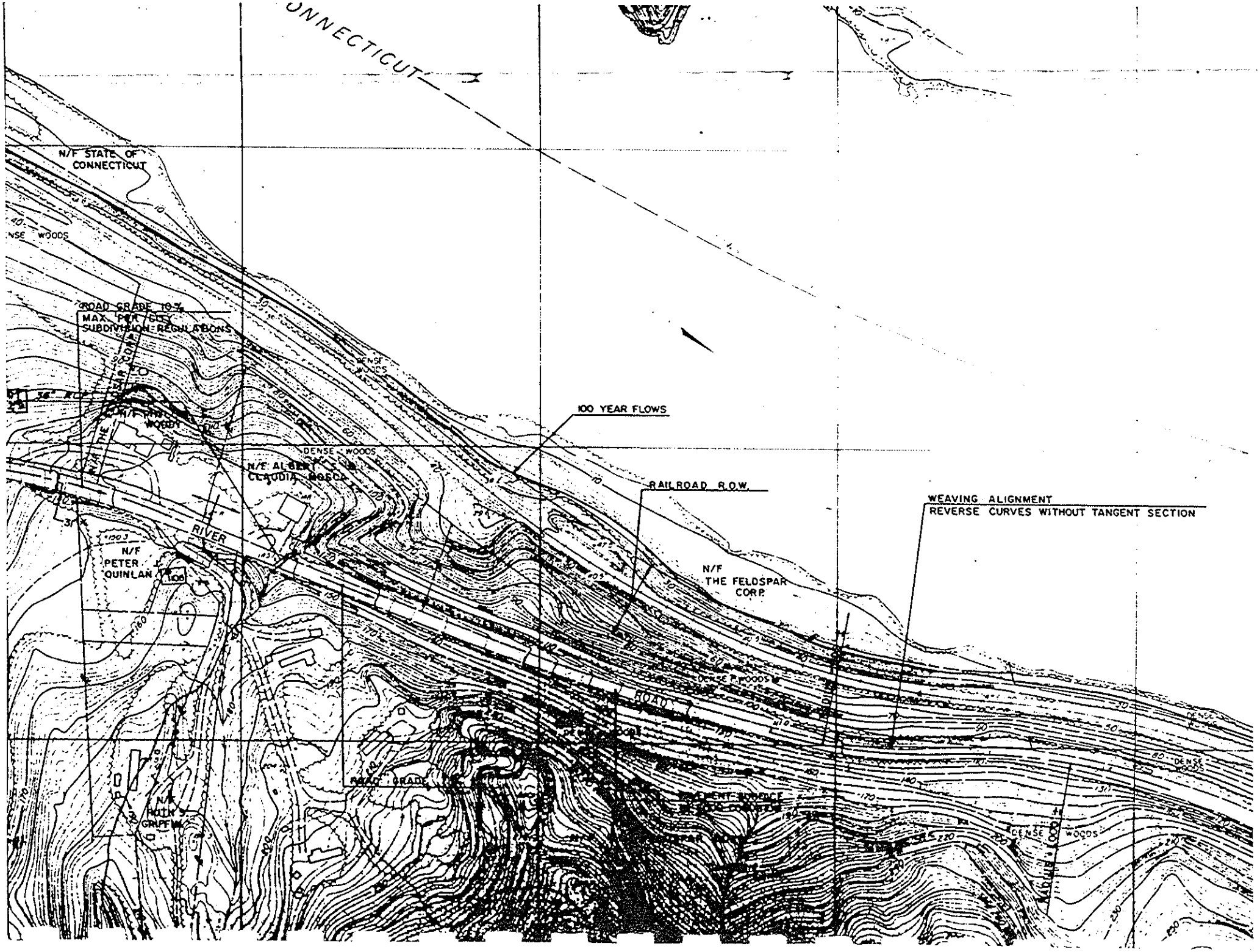

UTILITY PATCH FAILURES WITH IRREGULAR SURFACE THROUGHOUT LENGTH
STREET LIGHTING PRESENT
PAVEMENT PATCH DEPRESSED WITH ALLIGATOR CRACKING
RAILROAD R.O.W.
100 YEAR FLOWS
HARBOR
DRIVE
ROUTE
N/F NEWFIELD REALTY CO.
SUBSTANDARD: BRIDGE WIDTH 21.5' V.S. 28' CITY STANDARD
N/F W.R.P CORP
SUBSTANDARD CURVE POOR SIGHT DISTANCE RADIUS = 100'±
30.0' x 14.5' BRIDGE
100.0' x 14.5' BRIDGE
MIN. ROADWAY EL. 23.1
N/F GUY J. MICENTI
N/F PHILIP H. W. REDFORD JR.
AT GRADE R.R. CROSSING PAVEMENT CRACKING AND SETTLEMENT ADJACENT TO AND BETWEEN RAILS
PAVEMENT SURFACE IN GOOD CONDITION
100 YEAR FLOWS
SUMNER
RIVER
BROOK
ROAD
STREET
RAILROAD R.O.W.
ABRUPT DIRECTIONAL CHANGE REQUIRED TO NEGOTIATE ALIGNMENT SUBSTANDARD CURVES (SEE NOTE)
N/F SALVATORE ANTOINETTE G. J. & MARINO
PAVEMENT DEPRESSION
ALLIGATOR CRACKING
PATCH CRACKING AND
100 YR FLOOR LEVEL
UNION
OLD CHURCH
NOTE: PER AASHTO STANDARDS


POTHOLES AND ALLIGATOR CRACKING
POOR SIGHT DISTANCE
HILLSIDE AND OVERGROWTH ARE OBSTRUCTIONS
CONTINUOUS AREA OF SEVERE PAVEMENT DETERIORATION; CONCENTRATED AREA OF POTHOLES, PAVEMENT RUTS AND ALLIGATOR CRACKING. ROAD BELOW 100 YR. FLOOD LEVEL (ELEV. 22±)
RAILROAD R.O.W.
N/F STATE OF CONNECTICUT
18.5'
PENN CENTRAL
DENSE WOODS
N/F SAM CONNATA
ROAD ENCROACHMENT IN RAILROAD R.O.W.
SUBSTANDARD INTERSECTION SIGHT DISTANCE = 100'±
ALLIGATOR CRACKING, RUTS AND POTHOLES OVER ENTIRE ROAD AREA
N/F STATE OF CONNECTICUT
PAVEMENT IN POOR CONDITION ALLIGATOR CRACKING AND EDGE CRACKING POTHOLES BEGINNING TO FORM
SUBSTANDARD ROAD WIDTH
SUBSTANDARD BRIDGE CLEARANCE (VERT.) (HORIZ.)
N/F STATE OF CONNECTICUT
ROAD ENCROACHMENT IN RAILROAD R.O.W.
N/F CITY OF MIDDLETOWN
RIVER
N/F HOUSING AUTHORITY OF THE CITY OF MIDDLETOWN
N/F STATE OF CONNECTICUT


SUBSTANDARD ROAD WIDTH *
EDGE CRACKING AND ALLIGATOR CRACKING
CONTINUOUS AREA OF SEVERE PAVEMENT DETERIORATION
CONCENTRATED AREA OF POTHOLES, PAVEMENT RUTS, ALLIGATOR CRACKING AND EDGE CRACKING
ROAD BELOW 100 YR. FLOOD LEVEL (ELEV 22 ±)
100 YEAR FLOWS
DETERIORATED R.R. CROSSING
LIMITED TO (1) VEHICLE PASSAGE. TIMBERS CRACKING AND POTHOLES FORMING.
STREET LIGHTING PRESENT
WELL FIELDS
RE 1
25.0 x 17.0' BRIDGE
R-4
6-7% GRADE
N/F CITY OF MIDDLETOWN
RE 13
36" RCP
17' *
2 STY. BRICK
ROAD
5-7% GRADE
RIVER ROAD
RAD = 90'±
RAD = 220'±
15"
RAILROAD R.O.W.
ROAD ABOVE 100 YR. FLOOD LEVEL
DENSE WOODS
TOWN FARMS RD.
SUBSTANDARD ROAD WIDTH *
HORIZONTAL AND VERTICAL GEOMETRY WITHIN AASHTO STANDARDS
HORIZONTAL CURVE RADIUS = 2,000'± MIN.
ROAD GRADE = 4% MAX.
N/F T. E. INN INC.
LIMITED SIGHT DISTANCE DUE TO HORIZONTAL AND VERTICAL ALIGNMENT OF RIVER ROAD APPROACHES TO R.R. CROSSING
STREET
PAVEMENT SURFACE IN GOOD CONDITION.
N/F STATE OF CONNECTICUT
RE 1
RE 14
18" RCP @ 30" RCP
N/F HOUSING AUTHORITY CITY OF MIDDLETOWN
ROOSEVELT DRIVE
SILVER
VERMINE RD.
SUBSTANDARD HORIZONTAL CURVE FOR ACTUAL OPERATING OPERATING SPEED = APPROX. REQUIRED RADIUS = 560' (PER
* STANDARD CITY PAVEMENT WIDTH = 28'
N/F JAN PEEK COMMUNITY


TOWN
PORTLAND
CONNECTICUT
FLOW
RAILROAD R.O.W.
100 YEAR FLOWS
STEEP GRADE 8% ±
SUBSTANDARD VERTICAL ALIGNMENT
ROAD GRADE 12 % ±
MAX. PER CITY STANDARD 10 %
PENN
RIVER
RADIUS = 600' ±
RADIUS = 1000' ±
SUBSTANDARD SIGHT DISTANCE AT DRIVEWAY TOWARD WEST.
350' REQUIRED
150' ± AVAILABLE
PAVEMENT SURFACE IN GOOD CONDITION
N/F STATE OF CONNECTICUT
N/F JAN PEER COMMUNICATIONS (INC)
PAVEMENT SURFACE IN GOOD CONDITION


N/F
STATE OF CONNECTICUT
STREET LIGHTING PRESENT
RADIUS = 1000'
ROAD
245'*
100'x60' CONC. BOX
IH 2
SUBSTANDARD ROAD WIDTH *
N/F
OF CONNECTICUT
BROOK
N/F STATE OF CONNECTICUT
DENSE WOODS
PAVEMENT SURFACE
IN GOOD CONDITION
8'-10" RCP
50" RCP
IH 3
IH 4
IH 5
IH 6
IH 7
EXISTING HORIZONTAL
CURVE RADIUS = 1,100'±
WITHIN STANDARDS FOR
POSTED SPEED LIMIT
N/F STATE OF CONNECTICUT
W
W
CURVES WITHOUT TANGENT SECTION
DIRECTIONAL CHANGE REQUIRED


UNNECTICUT
N/F STATE OF CONNECTICUT
ROAD GRADE 10%
MAX. PER CITY SUBDIVISION REGULATIONS
100 YEAR FLOWS
RAILROAD R.O.W.
WEAVING ALIGNMENT
REVERSE CURVES WITHOUT TANGENT SECTION
N/F THE FELDSPAR CORP.
N/F PETER QUINLAN
RIVER
ROAD
DENSE WOODS

Appendix B
Pavement Distress Types

APPENDIX ' '

The following enumeration of asphalt pavement distress types is taken from "Pavement Maintenance Management for Roads and Parking Lots", published by the U.S. Dept. of Commerce, October 1981.

DISTRESS TYPE - ASPHALT

A. Name of Distress: Alligator Cracking

Description: Alligator or fatigue cracking is a series of interconnectiong cracks caused by fatigue failure of the asphalt concrete surface under repeated traffic loading. Cracking begins at the bottom of the asphalt surface (or stabilized base) where tensile stress and strain are highest under a wheel load. The cracks propagate to the surface initially as a series of parallel longitudinal cracks. After repeated traffic loading, the cracks connect, forming many-sided, sharp-angled pieces that develop a pattern resembling chicken wire or the skin of an alligator. The pieces are less than 2 ft. (.6 m) on the longest side.

Alligator cracking occurs only in areas subjected to repeated traffic loading, such as wheel paths. Therefore, it would not occur over an entire area unless the entire area were subjected to traffic loading. (Patterntype cracking which occurs over an entire area that is not subjected to loading is called block cracking, which is not a loadassociated distress.)

Alligator cracking is considered a major structural distress and is usually accompanied by rutting.

Severity Levels: L - Fine, longitudinal hairline cracks running parallel to each other with none or only a few interconnecting cracks. The cracks are not spalled.

M - Further development of light alligator cracks into a pattern or network of cracks that may be lightly spalled.

H - Network or pattern cracking has progressed so that the pieces are well defined and spalled at the edges. Some of the pieces may rock under traffic.

B. Name of Distress: Edge Cracking

Description: Edge cracks are parallel to and usually within 1 to 2 ft. (.3 to .6 m) of the outer edge of the pavement. This distress is accelerated by traffic loading and can be caused by frost weakened base or subgrade near the edge of the pavement. The area between the cracks and pavement edge is classified as raveled if it breaks up (sometimes to the extent that pieces are removed).

Severity Levels: L - Low or medium cracking with no breakup or raveling.

M - Medium cracks with some breakup and raveling.

H - Considerable breakup or raveling along the edge.

C. Name of Distress: Patching and Utility Cut Patching

Description: A patch is an area of pavement which has been replaced with new material to repair the existing pavement.

A patch is considered a defect no matter how well it is performing (a patched area or adjacent area usually does not perform as well as an original pavement section). Generally, some roughness is associated with this distress.

Severity Levels: L - Patch is in good condition and satisfactory. Ride quality is rated as low severity or better.

M - Patch is moderately deteriorated and/or ride quality is rated as medium severity.

H - Patch is badly deteriorated and/or ride quality is rated as high severity. Patch needs replacement soon.

D. Name of Distress: Potholes

Description: Potholes are small [usually less than 3 ft (.9 m) in diameter], bowl-shaped depressions in the pavement surface. They generally have sharp edges and vertical sides near the top of the hole. Their growth is accelerated by free moisture collection inside the hole. Potholes are produced when traffic abrades small pieces of the pavement surface. The pavement then continues to disintegrate because of poor surface mixtures, weak spots in the base or subgrade, or because it has reached a condition of high-severity alligator cracking. Potholes are generally structurally related distresses and should not be confused with raveling and weathering. Thus, when holes are created by high-severity alligator cracking, they should be identified as potholes, not as weathering.

Severity Levels: The levels of severity for potholes under 30 in. (762 mm) in diameter are based on both the diameter and the depth of the pothole according to the following table:

Maximum Depth of Pothole	Average Diameter (in.) (mm)		
	4 to 8 in. (102 to 203 mm)	8 to 18 in. (203 to 457 mm)	18 to 30 in. (457 to 762 mm)
1/2 to 1 in. (1.27 to 2.54 cm)	L	L	M
1 to 2 in. (2.54 to 5.08 cm)	L	M	H
2 in. (5.08 cm)	M	M	H

If the pothole is over 30 in. (76 mm) in diameter, the area should be determined in square feet and divided by 5 sq ft (.47 m^2) to find the equivalent number of holes. If the depth is 1 in. (25 mm) or less, they are considered medium severity. If the depth is over 1 in. (25 mm), they are considered high severity.

E. Name of Distress: Railroad Crossing

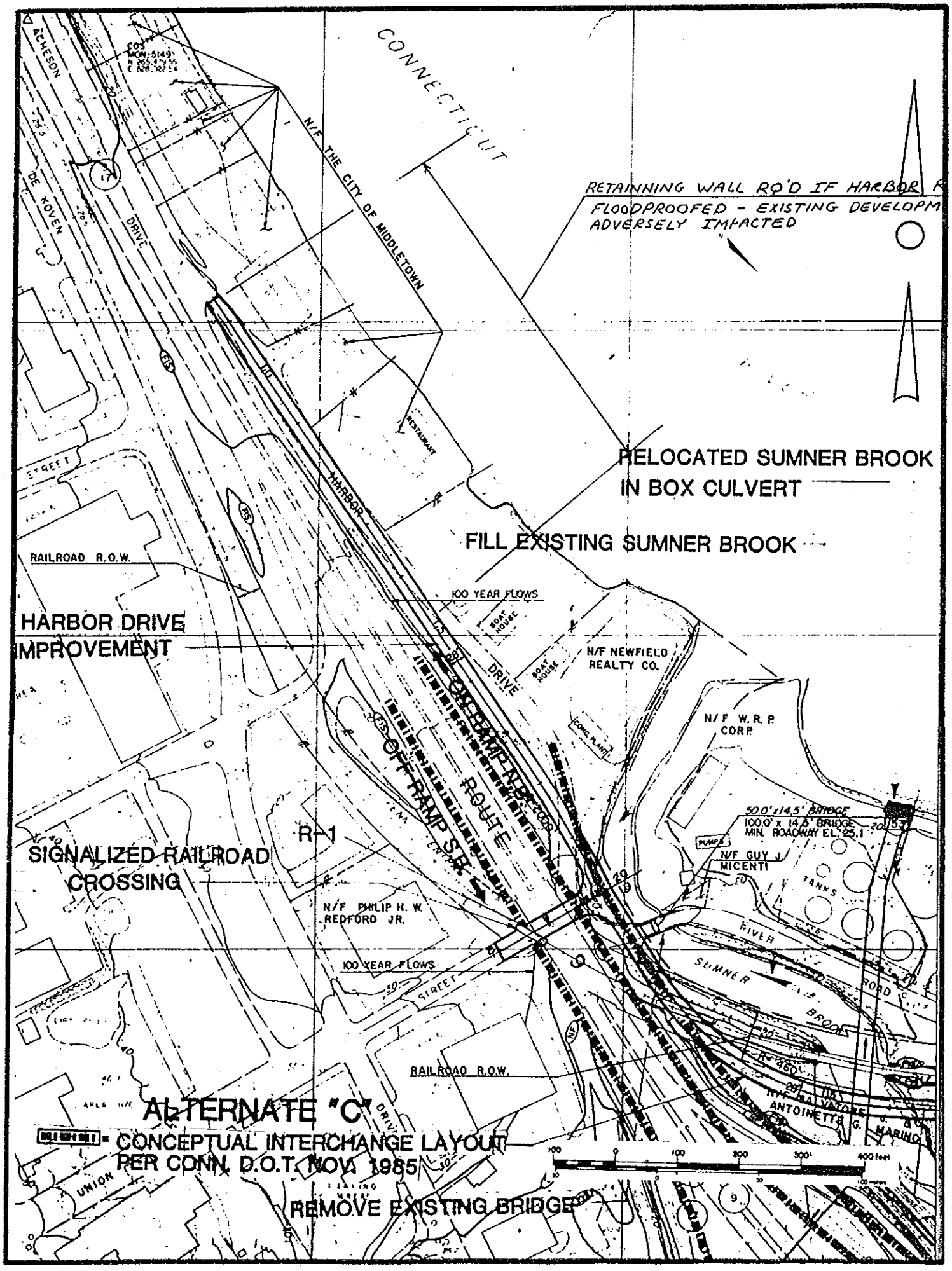
Description: Railroad crossing defects are depressions or bumps around and/or between tracks.

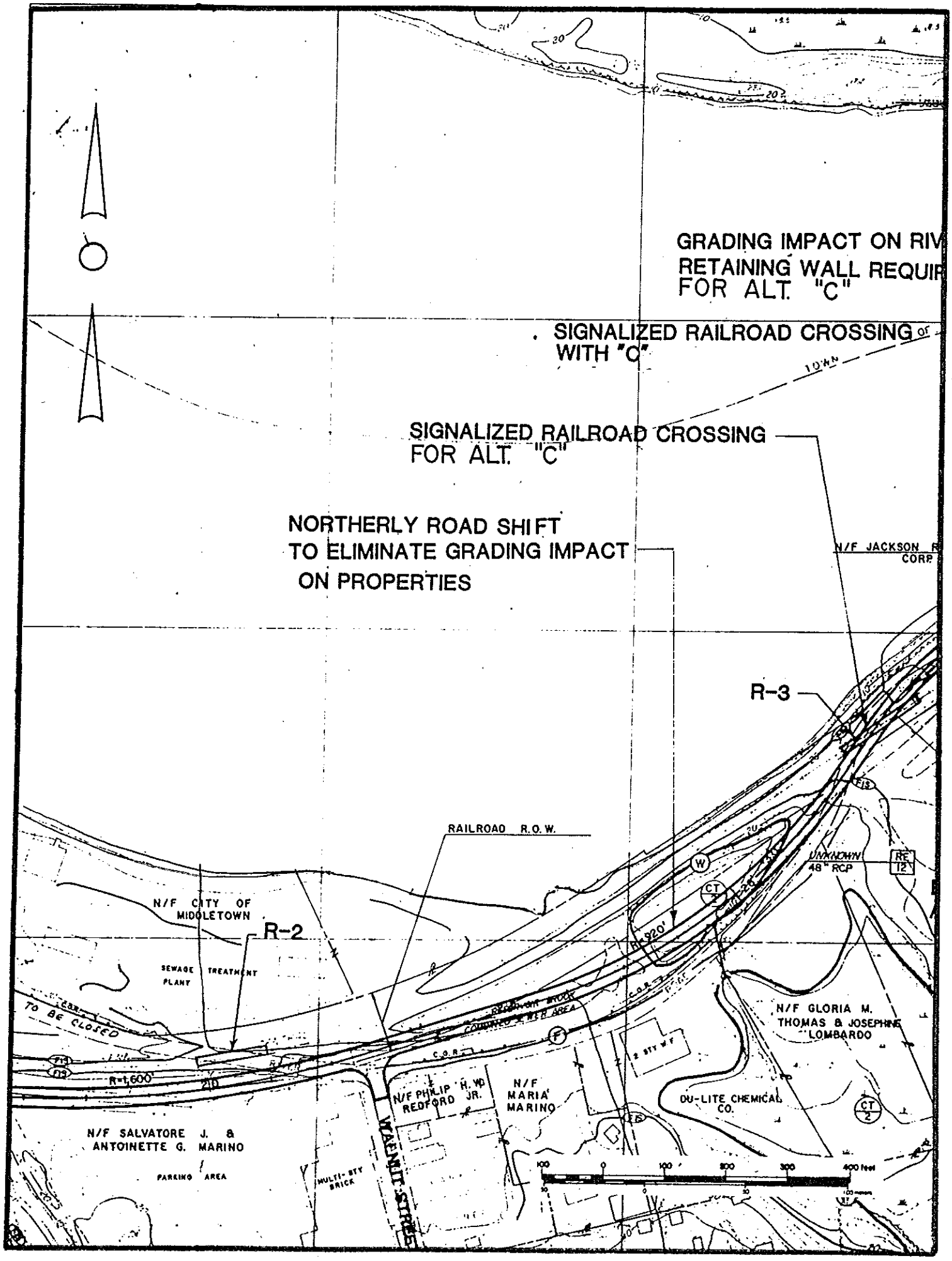
Severity Levels: L - Railroad crossing causes low-severity ride quality.

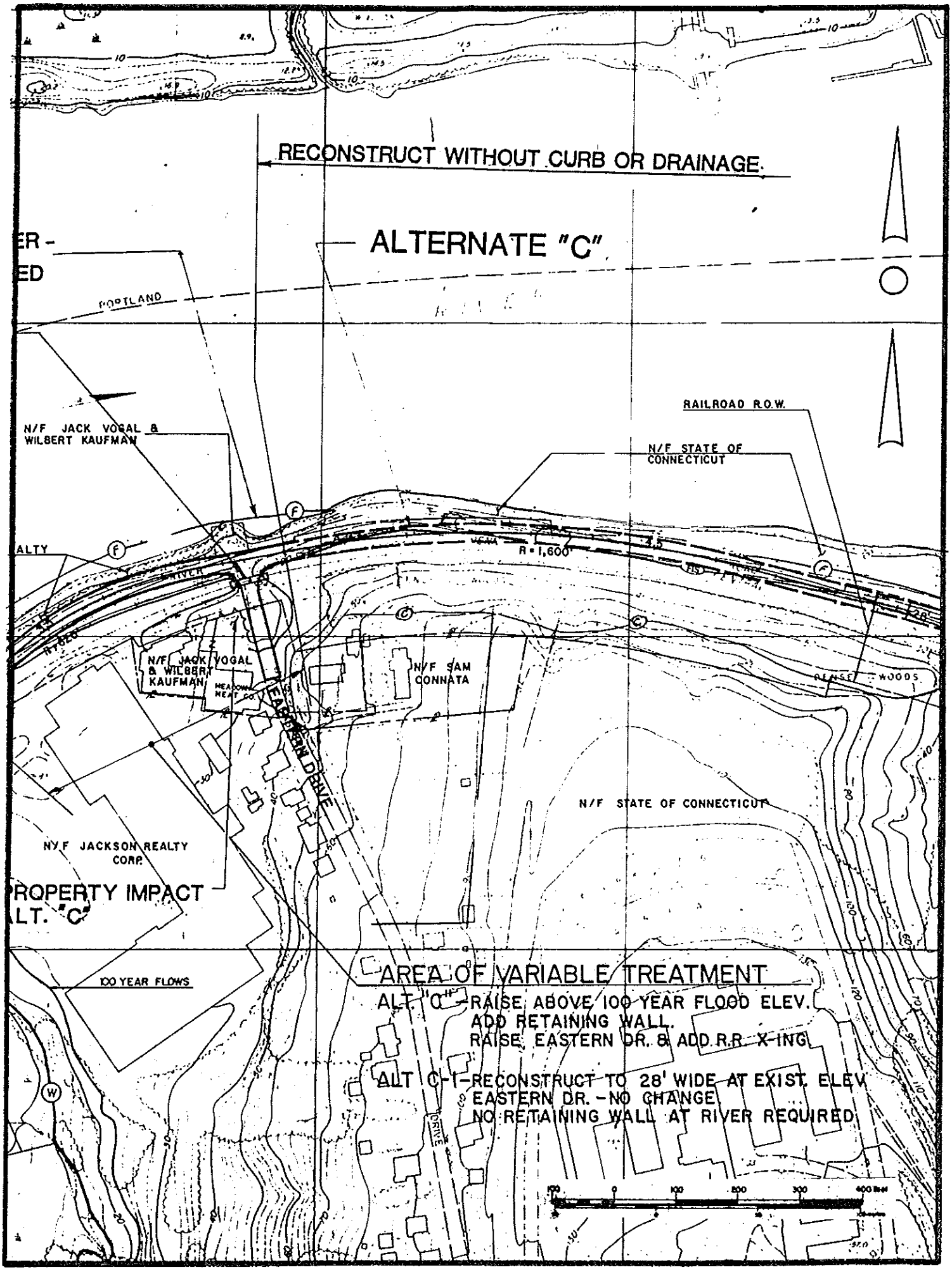
M - Railroad crossing causes medium-severity ride quality.

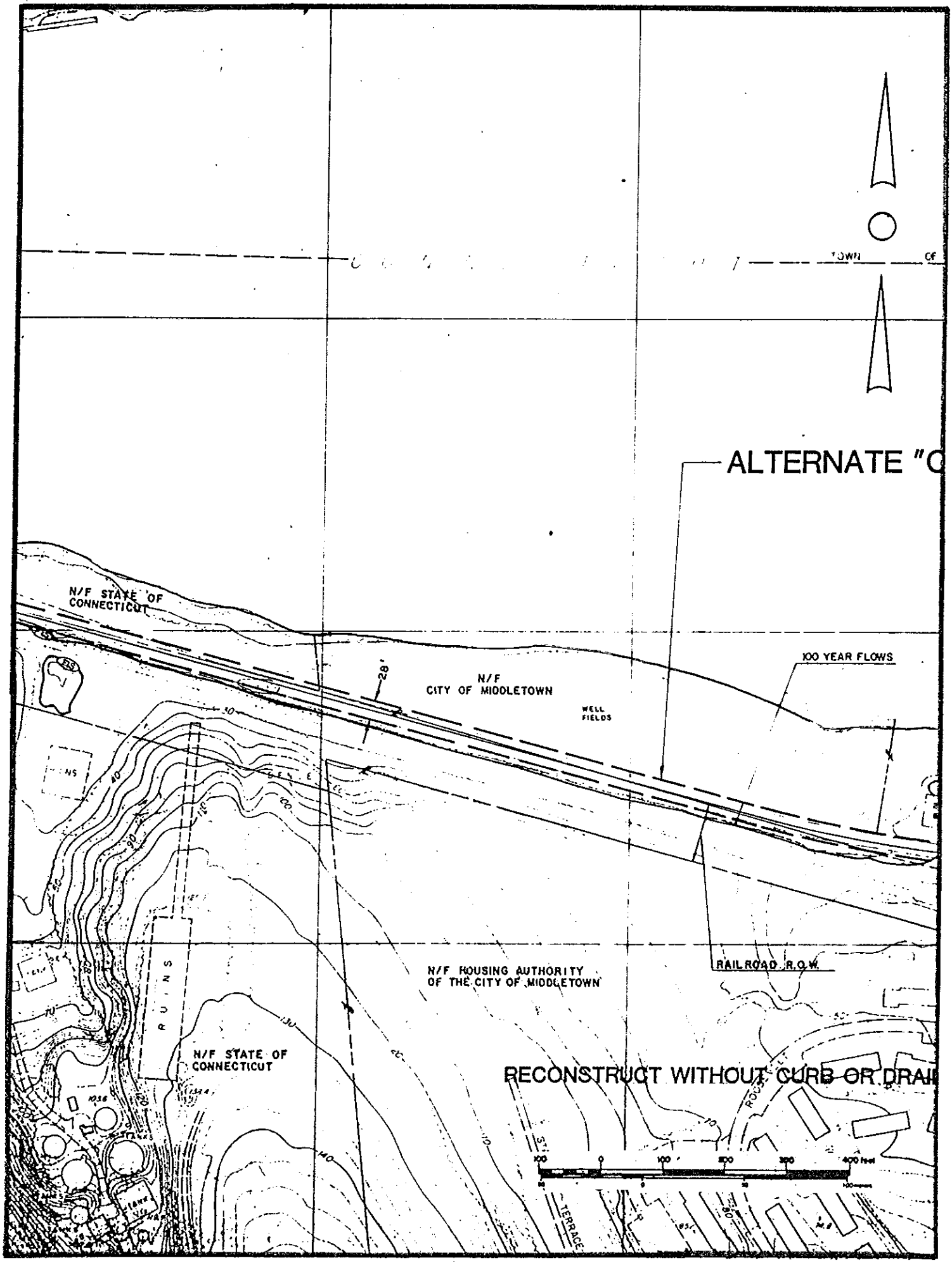
H - Railroad crossing causes high-severity ride quality.

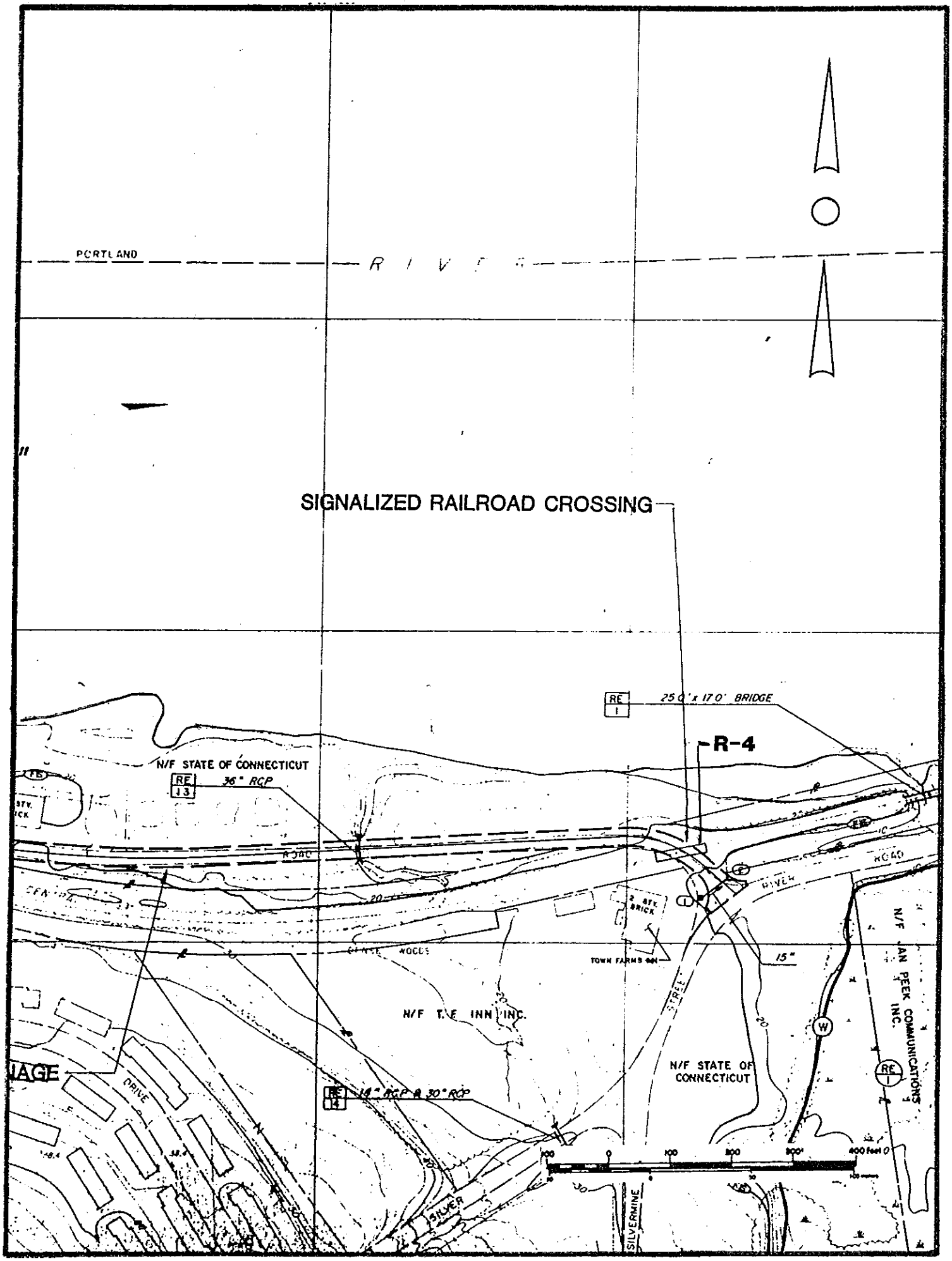
Appendix C
River Road – Alternate C


CONNECTICUT
ACHESON
DE KOVEN
DRIVE
N/F THE CITY OF MIDDLETOWN
RETAINNING WALL REQ'D IF HARBOR R
FLOODPROOFED - EXISTING DEVELOPM
ADVERSELY IMPACTED
RESTAURANT
HARBOR
STREET
RELOCATED SUMNER BROOK
IN BOX CULVERT
FILL EXISTING SUMNER BROOK
RAILROAD R.O.W.
100 YEAR FLOWS
HARBOR DRIVE
IMPROVEMENT
BOAT HOUSE
N/F NEWFIELD
REALTY CO.
N/F W.R.P.
CORP
CONC. PLANT
OFF RAMP SB
ROUTE
SIGNALIZED RAILROAD
CROSSING
R-1
50.0'x14.5' BRIDGE
100.0' x 14.5' BRIDGE
MIN. ROADWAY EL. 25.1
PUMP
N/F GUY J.
MICENTI
TANKS
N/F PHILIP H. W.
REDFORD JR.
RIVER
SUMNER
BROOK
ROAD
100 YEAR FLOWS
STREET
RAILROAD R.O.W.
N/F SALVATORE
ANTOINETTE G.
MARINO
ALTERNATE "C"
CONCEPTUAL INTERCHANGE LAYOUT
PER CONN. D.O.T. NOV. 1985
REMOVE EXISTING BRIDGE
UNION
100 0 100 200 300 400 feet


GRADING IMPACT ON RIV
RETAINING WALL REQUIR
FOR ALT. "C"
SIGNALIZED RAILROAD CROSSING or
WITH "C"
SIGNALIZED RAILROAD CROSSING
FOR ALT. "C"
NORTHERLY ROAD SHIFT
TO ELIMINATE GRADING IMPACT
ON PROPERTIES
N/F JACKSON R
CORP
R-3
RAILROAD R.O.W.
N/F CITY OF
MIDDLETOWN
R-2
SEWAGE TREATMENT
PLANT
TO BE CLOSED
R=1,600'
R=920'
UNKNOWN
48" RCP
N/F GLORIA M.
THOMAS & JOSEPHINE
LOMBARDO
N/F PHILIP H. WD
REDFORD JR.
N/F
MARIA
MARINO
DU-LITE CHEMICAL
CO.
N/F SALVATORE J. &
ANTOINETTE G. MARINO
PARKING AREA
MULTI-STY
BRICK
MAGNOLIA STREET
100 0 100 200 300 400 feet


RECONSTRUCT WITHOUT CURB OR DRAINAGE.
ALTERNATE "C"
PORTLAND
RAILROAD R.O.W.
N/F JACK VOGAL & WILBERT KAUFMAN
N/F STATE OF CONNECTICUT
R = 1,600'
N/F JACK VOGAL & WILBERT KAUFMAN
N/F SAM CONNATA
EASTERN DRIVE
N/F STATE OF CONNECTICUT
N/F JACKSON REALTY CORP.
100 YEAR FLOWS
AREA OF VARIABLE TREATMENT
ALT. "C" - RAISE ABOVE 100 YEAR FLOOD ELEV.
ADD RETAINING WALL.
RAISE EASTERN DR. & ADD R.R. X-ING.
ALT C-1 - RECONSTRUCT TO 28' WIDE AT EXIST. ELEV.
EASTERN DR. - NO CHANGE
NO RETAINING WALL AT RIVER REQUIRED.


ALTERNATE "C
N/F STATE OF CONNECTICUT
N/F CITY OF MIDDLETOWN
WELL FIELDS
100 YEAR FLOWS
RAILROAD R.O.W.
N/F HOUSING AUTHORITY OF THE CITY OF MIDDLETOWN
N/F STATE OF CONNECTICUT
RUINS
RECONSTRUCT WITHOUT CURB OR DRAI
TERRACE


PORTLAND
R I V E R
SIGNALIZED RAILROAD CROSSING
RE 1
250'x 170' BRIDGE
R-4
N/F STATE OF CONNECTICUT
RE 13
36" RCP
RIVER
ROAD
TOWN FARMS RD
STREET
15"
N/F T.V.E INN INC.
N/F JAN PEEK COMMUNICATIONS INC.
N/F STATE OF CONNECTICUT
RE 14
18" RCP & 30" RCP
DRIVE
SILVER
SILVERMINE
100 0 100 200 300 400 Feet

Appendix D
Bikeway Facility Standards

BICYCLE FACILITY STANDARDS

I. GENERAL DESIGN PHILOSOPHY

A. The design standards are intended to be a guide to illustrate how existing road systems may be supplemented with facilities to enhance the safety and feasibility of bicycle travel.

1. Experience and research in this area is limited, thus the standards are based on theory, analysis and judgement.

2. Designers should be aware that cyclists are adaptable to a range of conditions.

II. GEOMETRIC DESIGN STANDARDS

A. Most geometric features of shared routes and bike lanes, including design speed, sight distance, alinement, etc., are the same as the highway of which these facilities are a part and thus are usually adequate.

1. Following standards apply primarily to separated bicycle paths.

2. These standards should be considered where applicable in the establishment of shared routes and bike lanes.

B. The cross sectional requirement of bicycle facilities may vary by the type of facility.

1. Widths of on-street bike lanes may vary depending on its operational use.

a. A street that has a curb lane in the range of 14 to 17 feet (4.3 to 5.2 m) can accommodate both a motor vehicle as well as a bicycle.

b. One way bike lane at the curb requires a desirable width of 6 feet (1.8 m) measured from the face of the curb. (Graphic 1).

c. One-way bike lane next to the parking lane requires a distance between the curb and the outer edge should be desirably 13 feet (4 m). (Graphic 2)

2. Widths of independent bike paths may be dependent on the number of users, type of users, and speeds (Graphic 3).

   a. Off street paths may have good edge condition permitting bikeway width to be based solely on maneuvering allowance. Thus a 2 way path should be built to a minimum of 8.0 feet (2.4 m) wide.

   b. Bicyclists tend to trevel in groups or in pairs, Thus, it may be desirable to provide a width of 10 to 12 feet (3 to 3.7 m) for two way operation.

   c. A 10 foot (3 m) width provides the minimum required to comfortably accommodate a maintenance and/or emergency vehicle.

3. A sidewalk bike path should be built to the same minimum standard as a two way bike path, namely 8 feet (2.4 m).

4. Highway Bike Lanes - Special attention to motor vehicle/bicycle clearances should be considered in the provision of bicycle lanes or paths in conjunction with highways. (Graphic 4)

   a. A bicycle or bicycle lane can be accommodated on a ten foot (3 m) shoulder, with the 5 foot (1.5 m) or shoulder furthest away from the traveling surface being used by the bicycle.

5. A summary of the bikeway cross-section dimensions is given in Table 1.

C. Design Speed - The design speed of a bicycle facility is dependent upon the type of use it is intended for and the types of bicycle users that will be utilizing it.

1. Avid bicyclists along with commuter bicyclists can achieve speeds of 18 to 25 mph (29 to 40 kph).

2. Whereas, the general bicycling public may only achieve speeds of 10 - 15 mph (16 - 24 kph).

3. Graphic 5 provides guidelines for the minimum design speeds of bicycle facilities.

SUMMARY OF BIKEWAY CROSS-SECTIONAL REQUIREMENTS

Bicycle Facility		Width	Use	Location
Class	Type			
I	Path	6'	One-way travel	Off-street
I	Path	8'(MIN)	Two-way travel	Off-street
I	Path	10'(DES)	Two-way travel	Off-street
II	Lane	5'-6'	One-way travel	Next to curb
II	Lane	5'-6'	One-way travel	Outside of curbside parking
	Street	14'-17'*	One-way travel	Next to curb or parking lane

*Bicycle mix with motor vehicle traffic

Note: 1 foot=0.305 meters

Table 1

D. Stopping sight distance is the length of route ahead visible to the bicyclist including intersecting roads and driveways (Graphic 6) (Table 2).

1. Sufficient sight distances must be provided for a bicyclist to stop or take evasive maneuvers.

2. An adequate lateral view must be available at intersection and driveway connections.

3. Passing sight distance is not considered due to the relatively low speeds of bicyclists.

E. In order to provide a better sense of bikeway continuity and riding quality it is suggested that the use of vertical curves be used where changes in grades are encountered (Figure 5).

1. Stopping sight distance at grade crests can be checked using the following equations:

When $S<L$, $L = \frac{AS^2}{1040}$

When $S>L$, $L = 2S - \frac{1040}{A}$

When S = Sight distance in feet

L = Length of vertical curve in feet

A = Algebraic difference in grade rate in percent.

F. Where a high embankement or wall is on the inside of a right hand curve the sight distance for a bicyclist may be insufficient (Graphic 7).

1. This sight distance normally considers a motorist looking for an object in the center of a lane, just visible along a line of sight beside a steep embankement or wall.

2. Graphic 8 is developed to check horizontal sight distance for motor vehicles. In developing a horizontal sight distance for bicycles, on a roadway, the bicycle has to be positioned 6 feet (1.8 m) further to the right than a motor vehicle. (See Graphic 9)

G. Horizontal curvature - The minimum radius of curvature for horizontal curves must be consistent with design speed, safety, grade profile, type of facility, topography and construction cost. (Graphic 10) (Table 3)

1. The minimum radius can be decreased approximately 2% for each 1% increase in superelevation.

2. The angle that a bicycle can lean will determine the radius curvature a bicycle can safely negotiate on an independent bicycle facility.(Graphic 11)

3. Usually using a superelevation rate value of 2% to allow for drainage is sufficient for most bicycle facilities.

4. Bicycle facilities utilizing roadways usually have curvature dictated by the street system since these curves were designed to accommodate the motor vehicle, they will be adequate for bicycles.

5. At the bottom of hills more liberal radius of curvature should be used due to the higher down hill speeds.

H. Horizontal Alinement - To minimize the possibility of interaction between bicyclists moving in opposite directions at curves, additional pavement widths should be provided to the inside edge of the curve. (Graphic 12)

1. On curves, of less than 100 feet (30.4 m) radius, widening is recommended up to a maximum value of 4 feet (1.2 m).

2. The amount of widening required is directly proportional to the radius of sharpening the curvature.

I. Railroad Crossings - An at-grade railroad crossing presents a potential hazard for bicyclists.

1. When a bikeway must cross a railroad track, a right angle crossing is desirable. (Graphic 13)

2. Bikeways that cross railroad tracks at angles less that 45° should widen the bikeway just prior and just beyond the track crossing. This allows the bicyclist to cross the track at an angle closer to 90°

J. Grades - The grades and their lengths that a bicyclist can negotiate is dependent upon the bicyclist characteristics (age, weight conditioning, oxygen intake, etc.), the bicycle and characteristics (gears ratio, type of bicycle, tire weight, etc.) and the road surface. (Graphic 14)

1. Usually the maximum grades that can be tolerated is 4 to 5% for most designs.

2. It is desirable that sustained grades be held at 2% to 3% if a wide range of riders are to be accommodated.

DESIGN OF THE STRUCTURAL ELEMENTS OF BICYCLE FACILITIES

A. To ensure that surface water and debris do not accumulate on bikeways a 2% to 3% cross slope should be provided.

1. The slope may be established to either side of a separate bikeway.

2. Where a bikeway path is cut into a hillside, a drainage ditch should be placed on the high side of the path.

3. Drainage Grates - The presence of drainage grates presents a hazard to bicyclists. To meet hydrodynamic requirements for optimum storm water system grates are designed and installed with openings 3/4 of an inch (1.9 cm) lying parallel to the curb (Graphics 15 & 16).

B. Overpasses and Underpasses - The most effective way to prevent conflict between bicyclists and motor vehicles is to provide a grade separation.

1. Grade separations should be considered where bicycle trails cross a fully access controlled highway.

2. Underpasses are preferred to overpasses by bicyclists.

3. Pedestrian bridge standards are satisfactory in construction of bikeway overpasses. (Graphic 17)

   a. The structure width should be a minimum of 8 feet (2.4 m) to allow for stopping or passing maneuvers.

   b. Ramp grade should not exceed 15%.

   c. Parapet walls or railings should be at least 4.5 feet (1.4 m) high.

   d. When falling objects are considered a hazard to vehicles below, a screen enclosure is recommended.

   e. When the overpass structure is independent of other highway structures, the vertical clearance of the overpass over the roadway should be slightly higher than the minimum clearance required for vehicular structures.

4. Where bikeway paths are located on or adjacent to streets and highways it may be necessary to carry the path across the highway structure.

C. Ancillary Structures - The development of a bikeway requires that a number of related problems be addressed in order to provide route continuity and safety.

1. When sidewalk bikeways are utilized it may be necessary to provide ramped connections from various types of bikeways either to roadway level from the sidewalks or to sidewalk levels from the roadway. (Graphic 18)

   a. Such a transition will be approximately 6 inches (15 cm) in height.

2. Bikeway Lighting - Proper illumination of bicycle facilities is necessary for provision of minimum levels of safety, security and visibility. Presently, limited information exists on appropriate levels of illumination for bicycle facilities.

   a. The level of illumination required on a bicycle facility is dependent upon the amount of night time use that is expected and the nature of the area the facility is expected to pass.

      1) Usually existing roadways illumination should be adequate fo provide for safe bicycle travel.

      2) It is recommended that approximately 0.6 to 1.0 foot candles (6.5 to 11 lumens/sq. meter) be provided for on off-street bikeways, with higher up to 2.0 foot candles (21.5 lumens/sq. meter) provided at intersections.

3. Other ancillary structural facilities. Specific conditions may dictate a variety of other structural facilities.

   a. In areas where bicyclists and pedestrians share the same right-of-way special vertical transitions may be required where stair or steps serve the pedestrian.

   b. A variety of topographic conditions may require the construction of retaining walls.

   c. The use of landscaping and plants material as a barrier between separate bicycle facilities and adjacent land use or motor vehicular traffic.

BIKEWAY MATERIAL

A. A variety of subgrade, base and surface materials are available for use in the construction of bicycle facilities.

1. The most appropriate combination of material to be used is dependent upon the type of facility being considered, local topography and soil conditions.

2. The basic design considerations in construction of adequate bicycle facilities are the loads that will be applied.

3. If a roadway has a signed bicycle route or a designated bicycle lane, the roadway surface is more than adequate structurally to carry bicycle traffic.

4. Gravel surfaced driveways should be paved at the point where the bikeway crosses them to at least five feet beyond the edge of the bikeway.

B. The design and construction of bike paths totally separated from the roadway surface involves the consideration of a variety of construction materials and techniques.

1. A variety of materials are applicable for use and construction of bikeway bases and surfaces.

   a. Stabilized earth

   b. Stone chips

   c. Soil cement

   d. Hot-mix asphaltic concrete

   e. Cold mix asphalt

   f. Concrete

2. Regardless which type of material is used the surface must be stable, and rideable in wet weather and easily maintained.

3. The recommended depth of base and surface course for alternate structural section are as follows: (Graphic 19)

   a. Full depth hot mix asphalt is laid directly on the subgrade.

b. Asphalt - Aggregate mix consists of 3 to 4 inch (7.6 to 10 cm) aggregate base of gravel or crushed stone with a 1.5 to 2 inch (3.8 to 5.1 cm) asphaltic surface course.

c. Portland cement may be used for surfacing bicycle paths. The structural quality used for sidewalks is adequate to support bicycle traffic, but a heavier section is needed where maintenance vehicles will use the facility.

d. Stabilized soil surfacing may be used where local soil and aggregate conditions permit a good compacting mixture.

e. Gap-graded aspahlt - The use of a porous asphalt overlaid on a base of crushed stone may provide a significant saving in cost and riding quality.

3. In designing and construction of independent bicycle facilities major consideration should be given to the cost implications of man versus maching laid surfaces as well as maintenance practices.

a. Mechanical spreader provides a paving width from 8 to 12 feet (2.4 to 3.6 m) which may result in a substantial savings of a narrower width laid by hand.

b. In determining the width and clearance to be provided along the path the size and clearance dimensions of maintenance equipment must be considered.

1) Overhead clearance of 10 feet (3 m).

2) Lateral clearance of 3 feet (0.9 m).

Appendix E

Evaluation of Erosion Areas and Bank Stabilization Alternatives

Evaluation of Erosion Areas

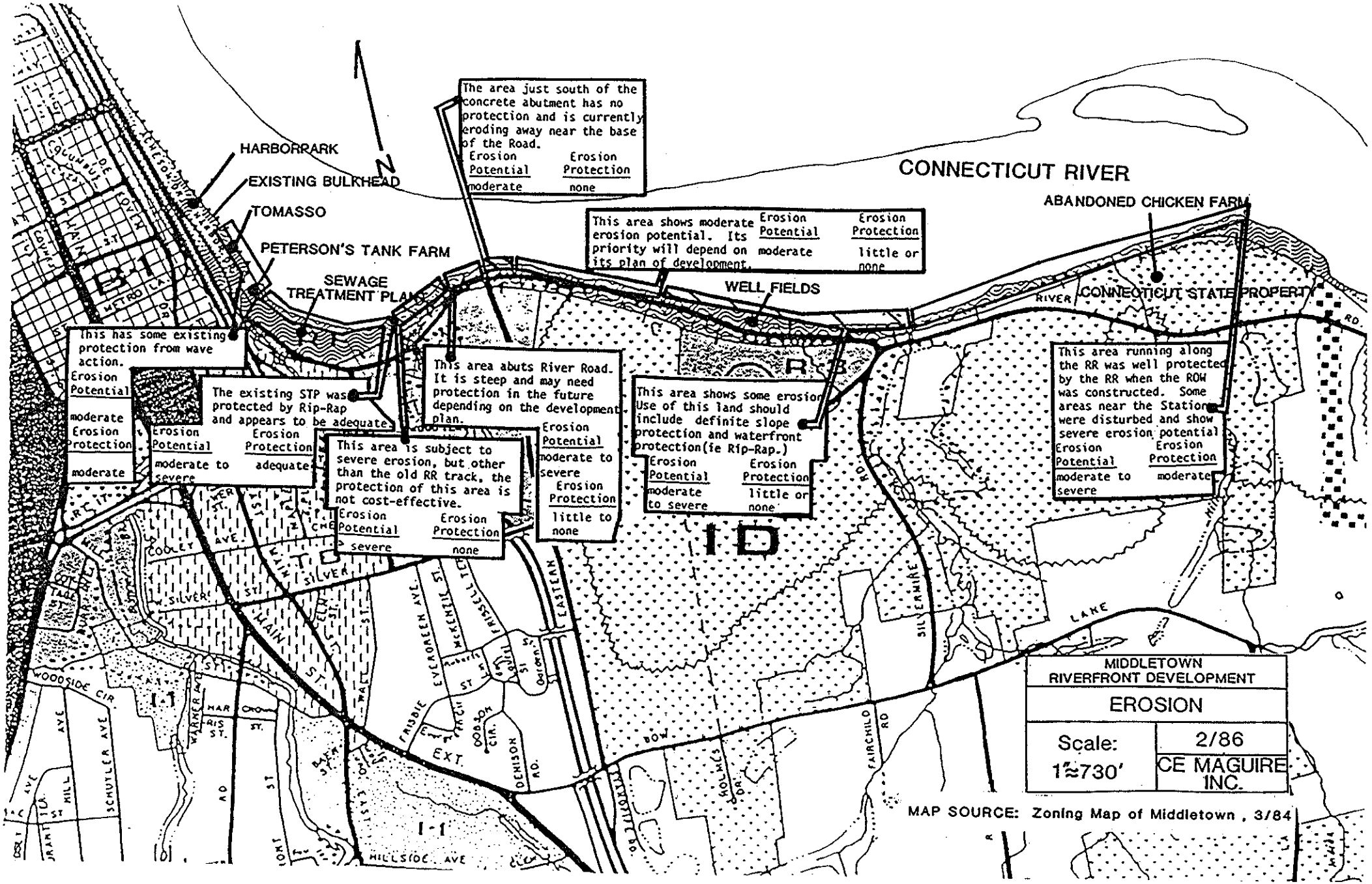
Location	Erosion Potential	Erosion Protection	Priority*	Comments
Tilcon/Tomasso Plant and immediate area (Peterson Tank Farm, etc.)	moderate	moderate	1	This has some existing protection from wave action. Should this area be acquired in the future, suggest a continuation of the Bulkhead used at River to protect this area.
Middletown Sewage Treatment Plant	moderate to severe	adequate	2	The existing STP was protected by Rip-Rap and appears to be adequate.
Area South of STP	severe	none	2	This area is subject to severe erosion, but other than the old RR track, the protection of this area is not cost-effective.
Land of Jackson Realty Corp.(N/F)	moderate to severe	little to none	2	This area abuts River Road. It is steep and may need protection in the future depending on the development plan.
Land of Kaufman and immediately south	moderate	none	1	The area just south of the concrete abutment has no protection and is currently eroding away near the base of the Road.
State of Conn. Property	moderate	little or none	3	This area shows moderate erosion potential. Its priority will depend on its plan of development.
City of Middletown	moderate to severe	little or none	1	This area shows some erosion. Use of this land should include definite slope protectio and waterfront protectio (ie Rip-Rap).
Well fields	Same as above		1	Same as above
Chicken Farm	moderate to severe	moderate	3	This area running along the RR was well protected by the RR when th ROW was constructed. Some areas near the Gage Station were disturbed and show severe erosion potential.

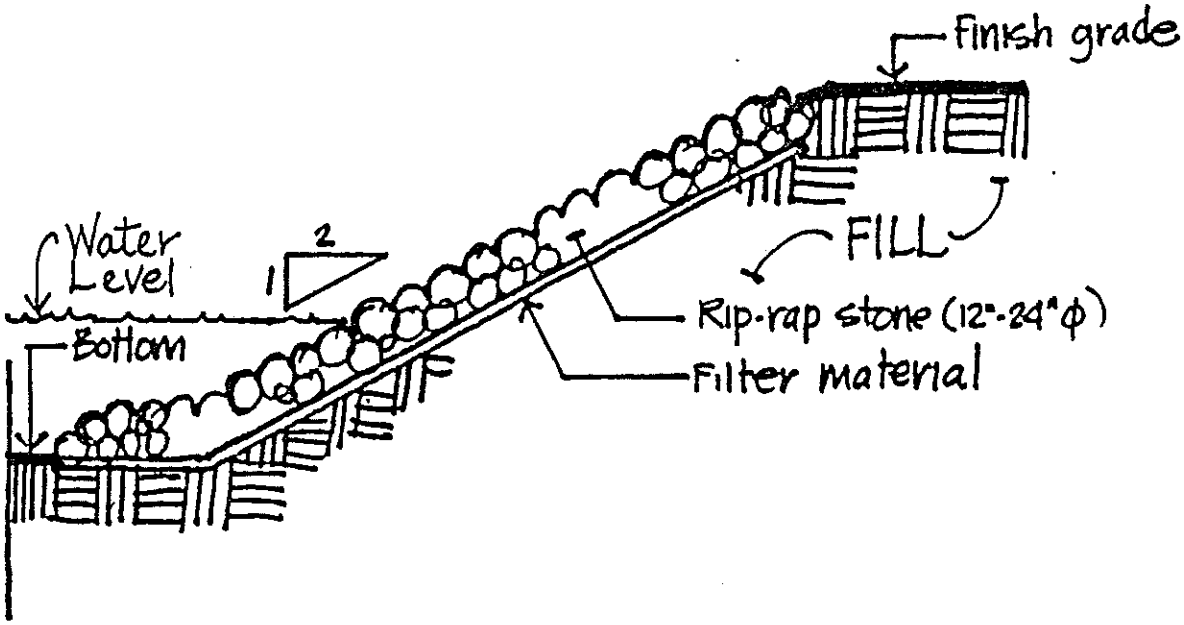
*Priority "1" identifies areas requiring attention immediately or in the near future. Priority "3" represents areas requiring moderate protection. However, any of the identified areas can be listed as Priority "1" depending on how the riverfront is developed.

The two most important areas that should be considered for protection schemes are:

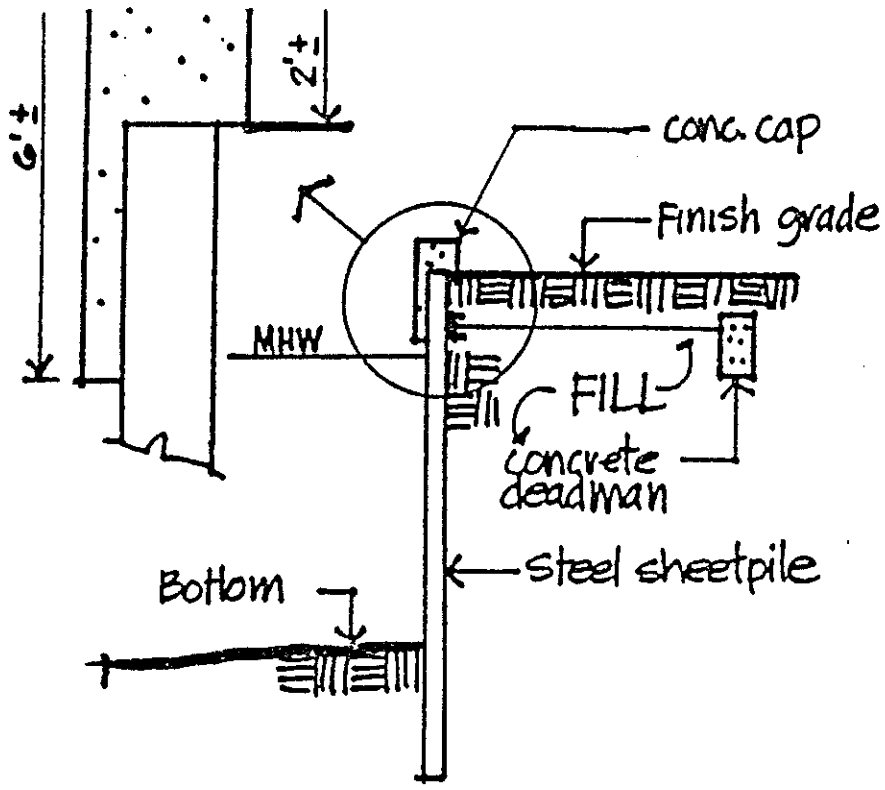
A. The area around the potential Park to protect any work to be done in this area.

B. The area immediately south of the Kaufman property shows erosion spots working their way into the road bed. This is a small stretch and several truck loads of the proper sized stone may provide adequate protection.

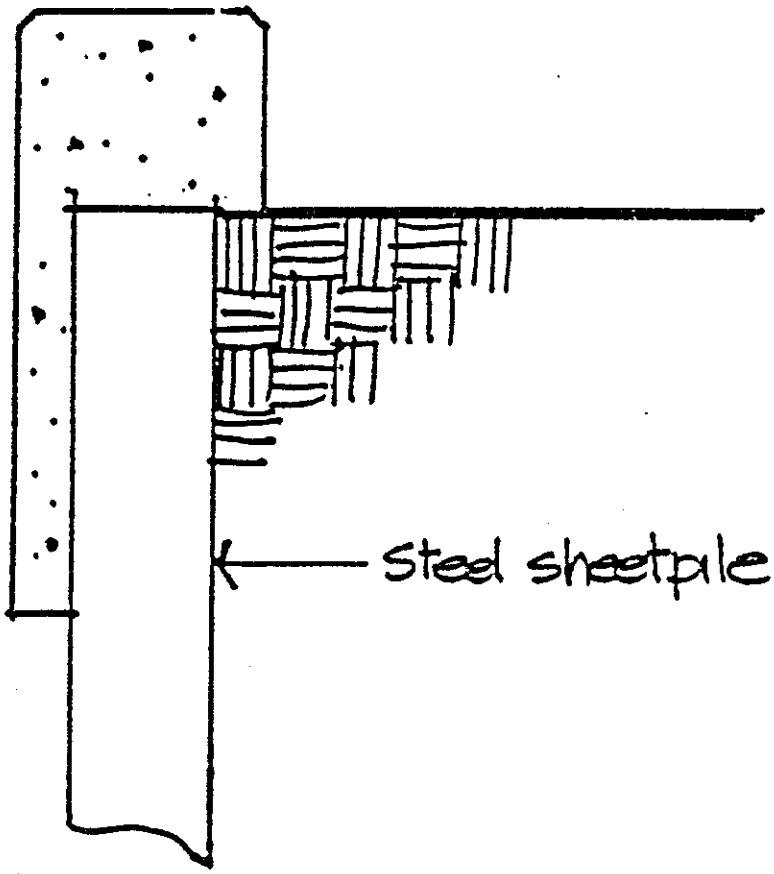

HARBORPARK
EXISTING BULKHEAD
TOMASSO
PETERSON'S TANK FARM
SEWAGE TREATMENT PLANT
CONNECTICUT RIVER
ABANDONED CHICKEN FARM
WELL FIELDS
CONNECTICUT STATE PROPERTY
The area just south of the concrete abutment has no protection and is currently eroding away near the base of the Road.
Erosion Potential: moderate
Erosion Protection: none
This area shows moderate erosion potential. Its priority will depend on its plan of development.
Erosion Potential: moderate
Erosion Protection: little or none
This has some existing protection from wave action.
Erosion Potential: moderate
Erosion Protection: moderate
The existing STP was protected by Rip-Rap and appears to be adequate.
Erosion Potential: moderate to severe
Erosion Protection: adequate
This area abuts River Road. It is steep and may need protection in the future depending on the development plan.
Erosion Potential: moderate to severe
Erosion Protection: little to none
This area is subject to severe erosion, but other than the old RR track, the protection of this area is not cost-effective.
Erosion Potential: severe
Erosion Protection: none
This area shows some erosion. Use of this land should include definite slope protection and waterfront protection (ie Rip-Rap.)
Erosion Potential: moderate to severe
Erosion Protection: little or none
This area running along the RR was well protected by the RR when the ROW was constructed. Some areas near the Station were disturbed and show severe erosion potential.
Erosion Potential: moderate to severe
Erosion Protection: moderate
1D
R-3
I-1
I-2
B-1
MIDDLETOWN RIVERFRONT DEVELOPMENT
EROSION
Scale: 1"≈730'
2/86
CE MAGUIRE INC.
MAP SOURCE: Zoning Map of Middletown, 3/84



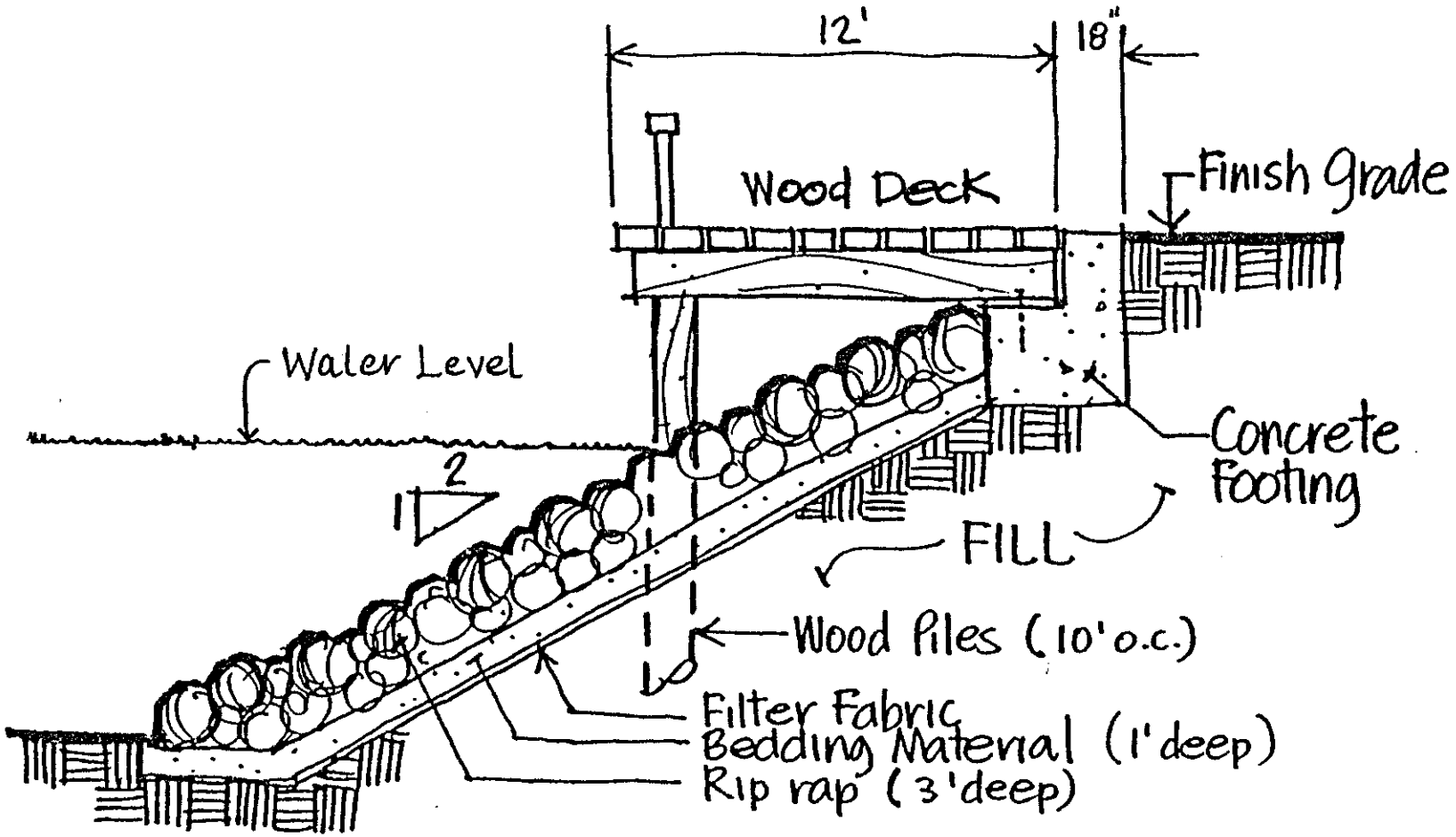
I RIP-RAP



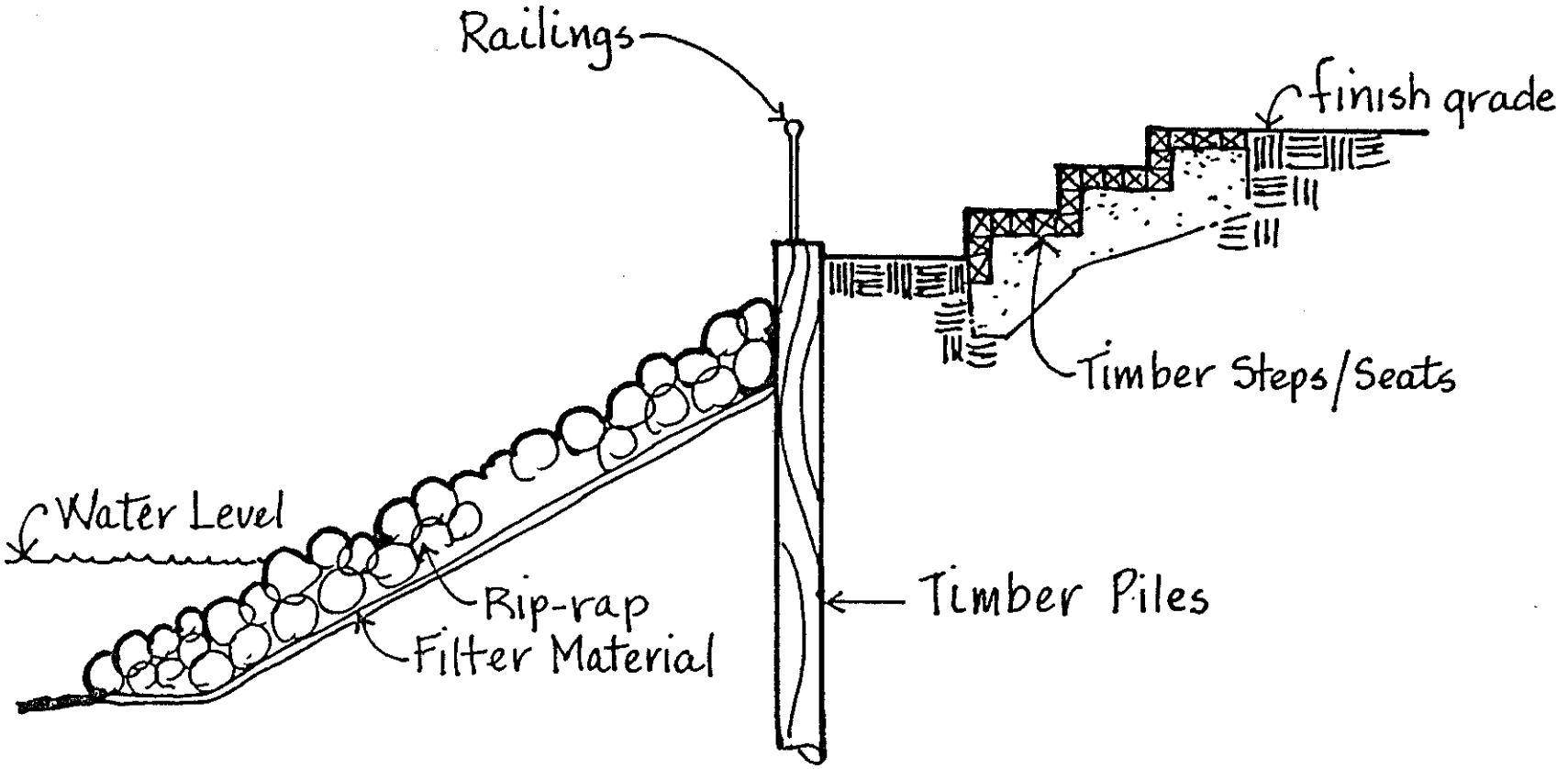
II STEEL SHEETPILE w/ CAP



III CONCRETE CAP



RIP RAP with WOOD DECK



VARIATIONS ON A THEME