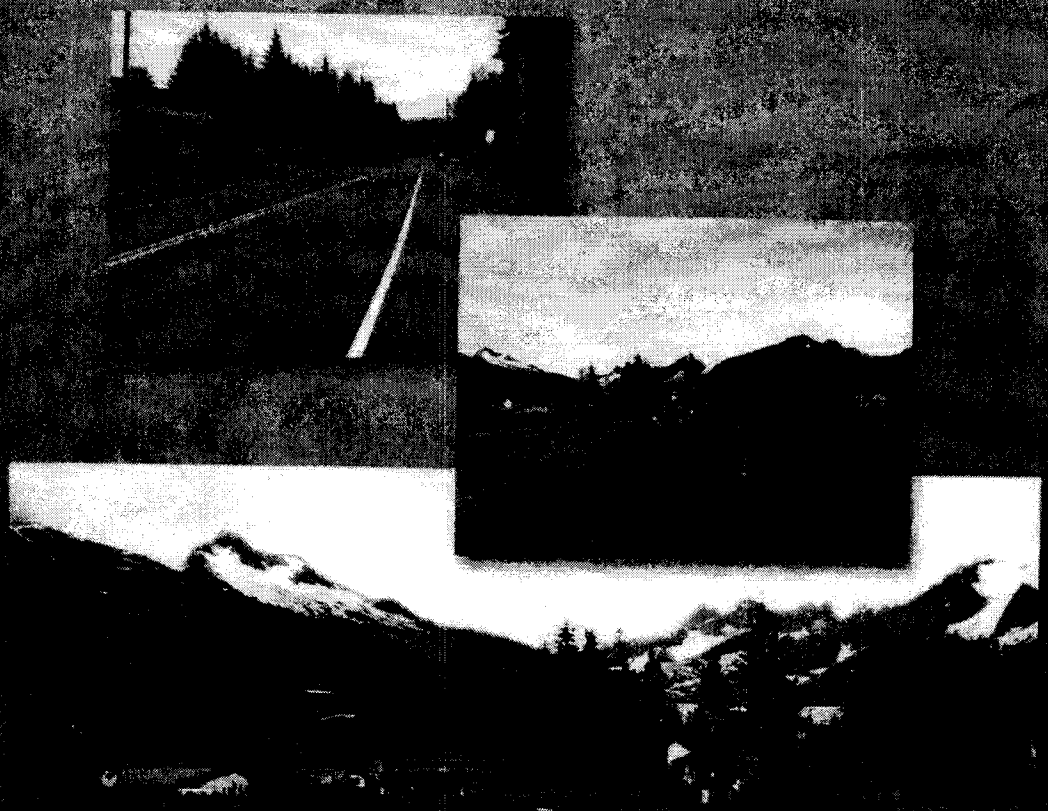


Riverside Drive Corridor Transportation Study and Plan

submitted to

City and Borough of Juneau

prepared by

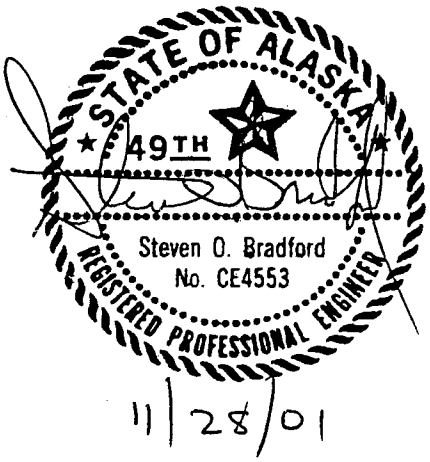
CH2MHILL

August 2001

Riverside Drive Corridor Transportation Study and Plan

Prepared for

CITY/BOROUGH OF JUNEAU
ALASKA'S CAPITAL CITY



Prepared by

CH2MHILL

December 2001

Contents

Figure

Glossary

Source: Pedestrian Facilities Guidebook; Sponsored by OTAK, WSDOT, PSRC, AWC, CRAB

access management
the principles, laws and techniques used to control access to a highway

ADT
average daily traffic; the measurement of the average number of vehicles passing a certain point each day on a highway, road or street

bicycle
a vehicle having two tandem wheels, a minimum of 14" (35 cm) in diameter, propelled solely by human power, upon which any person or persons may ride. A three-wheeled adult tricycle is considered a bicycle

bicycle facility
any facility provided for the benefit of bicycle travel, including bikeways and parking facilities as well as all other roadways not specifically designated for bicycle use

bicycle lane
a portion of the roadway which has been designated by traffic-control devices for

crosswalk[1]
portion of a roadway designated for pedestrian crossing, marked or unmarked; unmarked crosswalks are the natural extension of the shoulder, curb line or sidewalk

crosswalk[2]
the marked or unmarked portion of the roadway designated for pedestrians to cross the street

crosswalk beacon
amber flashing lights, usually accompanied by a sign, used to notify motorists of a pedestrian crosswalk

cul de sac
a street closed at one end that is enlarged to provide turn around space for motor vehicles

dead-end street
street-end formed when an existing right-of-way is not platted through from street to street, or when topography or other conditions preclude a street from being improved to its full length

driveway
the portion of the street or alley area which provides vehicle access to an off-street area through a depression in the curb

effective sidewalk width
the width of the sidewalk area available for walking or wheelchair travel, unobstructed by street furniture or other impediments

green time
the length of time a traffic signal indicates a green light

HCM
Highway Capacity Manual

highway
a general term denoting a public way for purposes of travel, including the entire area within the right-of-way

intersection
a place or area where two or more roads cross

ITE
Institute of Transportation Engineers

lane line
a solid or broken point line or other marker separating lanes of traffic moving in the same direction

legend
works, phases or numbers appearing on all or part of a traffic control device; also the symbols that appear on maps

load and unload zone
a portion of the street or alley, designated by a sign and white paint markings, reserved for picking up and dropping off people or property

local street
a street designated to provide access to and from residences or businesses

loop detector
a wire buried in the street and connected to a traffic signal allowing the signal to sense the presence of vehicle traffic

marked crosswalk
any portion of the roadway distinctly indicated for pedestrian or bicycle crossing by lines, marking, or other traffic control devices

median
a physical barrier, or a solid yellow or cross hatched pavement marking at least 18" in width, which divides any street into two or more roadways

multi-use path
a path physically separated from motor vehicle traffic by an open space or barrier and either within a highway right-of-way
or within an independent right-of-way, used by bicyclists, pedestrians, joggers, skaters and other non-motorized travelers

MUTCD
Manual on Uniform Traffic Control Devices; approved by the Federal Highway Administration as a national standard for placement and selection of all traffic control devices on or adjacent to all highways open to public travel

off-street parking
publicly or privately owned parking located outside the street right-of-way

open space
land and/or water area with its surface open to the sky or predominantly undeveloped, which is set aside to serve the purposes of providing park and recreation opportunities, conserving valuable resources, and structuring urban development and form

pavement markings
painted or applied lines or legends placed on a roadway surface for regulation, guiding or warning traffic

pedestrian
a person on foot, in a wheelchair or walking a bicycle

pedestrian detectors
devices, usually push-button activated, that allow pedestrians or bicycles to change the signal light at a crosswalk

pedestrian facility
a facility proved for the benefit of pedestrian travel, including walkways, crosswalks, signs, signals, illumination and benches

pedestrian half signal
a traffic control signal often located at the junction of an arterial and a residential street, which provides pedestrian signals for crossing the arterial but not for crossing the residential street

pedestrian overpass
a pedestrian walkway above the grade of the roadway, which allows pedestrian s to cross the roadway without interacting with motor vehicles

pedestrian scale lighting
overhead street lighting which is typically over the sidewalk instead of the roadway, and at a lower height than typical street light fixtures; providing illumination for pedestrians instead of motorists

pedestrian signals
electronic devices used for controlling the movement of pedestrians at signalized mid-blocks or intersections, which may include the "walk, don't walk" messages or the symbolic walking person/hand message

pedestrian walkway
a surfaced walkway, separated from the roadway, following the existing ground surface (not at permanent grade)

pedestrian friendly
describing an environment that is pleasant and inviting for people to experience on foot; specifically, offering sensory appeal, safety, street amenities such as plantings and furniture, good lighting, easy visual and physical access to buildings, and diverse activities

planting strip
the street right-of-way area lying between the constructed curb and the sidewalk

residential parking zone
a designated zone in which on-street parking for the general public is restricted. Residents of the area are exempted from the parking restrictions by permit

residential street
a non-arterial street that provides access to residential land uses, and connects to higher level traffic streets; also called residential access street

right-of-way
a strip of land platted, dedicated, condemned, established by prescription, or otherwise legally established for the use of pedestrians, vehicles or utilities; the legal right of one vehicles, bicycle, pedestrian or device to proceed in a lawful manner in preference to another vehicle, bicycle, pedestrian or device

roadway
the paved portion of the highway

rules of the road
the portion of a motor vehicle law that contains regulations governing the operation of vehicular and pedestrian traffic

safety index
indicator of relative severity of accident experience as determined by comparing the accident rate for a facility with the critical accident rate which indicates the need for remedial action

school crossing
a crossing adjacent to a school or on established school pedestrian routes, designated as a preferred crossing for school users

school zone
an established reduced speed area; installed around established school crossing; speed limits are posted at 20 mph or lower

shared roadway
a type of bikeway where bicyclists and motor vehicles share a travel lane

sidewalk[1]
a walkway separated from the roadway with a curb, constructed of a durable, hard and smooth surface, designed for preferential or exclusive use by pedestrians

sidewalk[2]
the improved portion of a street or roadway between the curb lines and the adjacent property lines, intended for use by pedestrians

sight distance
the length of roadway visible to a driver; the distance a person can se along an unobstructed line of sight

signal timing
the green time allotted each direction of travel; the time between start of green for adjacent/sequential traffic signals

signs
provide information to motorists, pedestrians and bicyclists; black and white regulatory signs provide information on legal requirements; black and yellow warning signs advise about potentially hazardous roadway conditions; green or white guide/destination signs provide navigational information along streets, and inform about intersecting routes and important destinations

speed hump
rounded raised areas of pavement typically 12 to 14 feet in length used to control traffic speed

speed table (traffic table)
long raised speed humps with a flat section in the middle and ramps on the ends; sometimes constructed with brick or other textured materials on the flat section sometimes called flat top speed humps, trapezoidal humps, speed platforms, raised crosswalks, or raised crossings

street improvement
an improvement in the public right-of-way whether above or below ground, such as pavement, sidewalks, or a storm water drainage system

street-end
formed where an existing right-of-way ends or is not platted through from street to street, often due topographical conditions(such as bluffs or shorelines)

T-intersection
the meeting of two streets, usually perpendicular, where on of the streets does not continue through; approximately resembling the letter "t"

traffic actuated signal
a signal that responds to the presence of a vehicle or pedestrian (for motor vehicles, loop detectors; for pedestrians, usually push buttons)

traffic calming
of or relating to transportation techniques, programs, or facilities intended to slow the movement of motor vehicles

traffic control device
any sign, signal, marking, or device placed or erected for the purpose of regulating , warning, or guiding vehicle traffic and/or non-motorized traffic

traffic signal
any traffic device, whether manually, electrically or mechanically operate, which assigns right-of-way to vehicles and pedestrians at intersections

traffic table
see speed table

traffic volume
the given number of vehicles that pas a given point for a given amount of time (hour, day, year); see "ADT"

transit stop
a regular stopping place on a transit route that may include transit shelter and parking

transportation corridor
land used for transit systems, classified as:

arterial
street intended to carry large volume of traffic at steady speeds with minimum interruptions to traffic flow

collector
street which forms the boundary of a major block of land and is intended primarily for inter-neighborhood traffic; can function as a feeder road to commercial areas

local
street designed to provide vehicular access to abutting properties and discourage through traffic

mass transit
land used for common carrier passenger transportation service that is available to any person who pays a prescribed are and which operates on established schedules along designated routes with specific stops (bus, light rail, rapid transit)

travel lane
roadway lane on which vehicular traffic moves

two-way left turn lane
a lane near the center of the roadway set aside for use by vehicles making left turns in both directions from or into the roadway

uncontrolled intersection
an intersection where the right-of-way is not controlled by a stop sign, yield sign, or traffic signal

urban area
the area immediately surrounding an incorporated city or rural community that is urban in character, regardless of size

urban trails
off-road trails, special bike lanes, and signed routes in the street right-of-way

VMT
vehicle miles traveled; describes the number of miles traveled during a typical trip, i.e., a commute trip

walkway
a transportation facility built for use by pedestrians, including persons in wheelchairs; walkways include sidewalks, paths and paved shoulders

Executive Summary

The Riverside Drive Corridor is a multimodal transportation corridor serving the west side of the Mendenhall River Valley (see Figure ES-1). Designed and constructed to its current dimensions by Alaska Department of Transportation & Public Facilities (ADOT&PF) in the 1980's and early 1990's, it is a two-lane road with bike lanes and sidewalks along most of its 2.3 mile length. North of Division Street at Melvin Park, residences face onto Riverside Drive and driveways access directly to the road. South of Division Street, Riverside Drive is limited-access collector-arterial serving neighborhoods via neighborhood collector streets.

Riverside Drive has been included in many studies and planning efforts conducted by the City and Borough of Juneau (CBJ) and others over the last 15 years including the Non-motorized Transportation Plan, Transit Development Plan, and the Area Wide Transportation Plan (AWTP). A new high school is planned at the Dimond Park area, next to the existing Riverbend Elementary School. Included in the plan for Dimond Park is a Community Recreational Center.

Currently, Riverside Drive is functioning well with highly used bike lanes and sidewalks along most of the length of the corridor. Traffic lanes, built wide (12-feet) and to a 40 m.p.h. design speed, have provided for generally safe operation. However, there are citizen concerns about existing safety, future traffic impacts following development of the Dimond Community Complex, as well as an ongoing controversy between the concept of completing a Riverside Drive extension to Back Loop Road to complete that connection and the maintenance of the northern Riverside Drive as a local residential street. In response to these concerns and issues as well as a need to validate and prioritize amongst the existing study and plan recommendations, the CBJ initiated an assessment of existing and future traffic conditions along Riverside Drive.

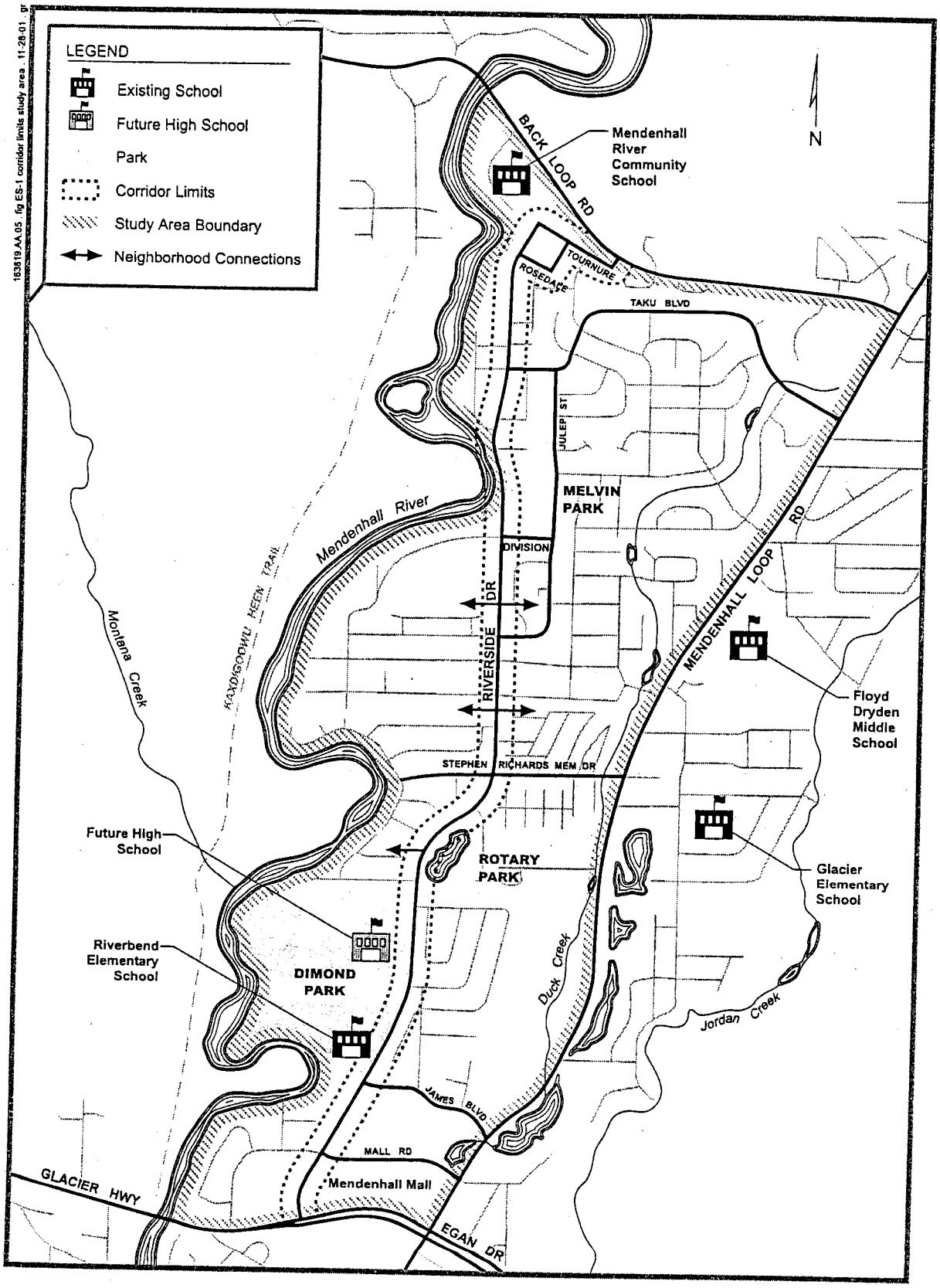
The primary purpose of the study is to identify deficiencies and, if any are found, to develop near-, mid-, and long-term solution concepts for improving safety and maintaining the quality of Riverside Drive as a multimodal transportation corridor while preserving the existing neighborhood character and livability.

The goals of the project are:

1) To work with CBJ and their contracted planners and architects of the Dimond Community Complex to develop a viable and safe access plan for the complex,

2) To conduct an objective evaluation of existing and projected traffic issues in the existing Riverside Drive Corridor from Egan Drive to Back Loop Road, and,

3) If deficiencies were found, to evaluate and recommend possible short-term, mid-term, and long-term solutions. These solutions would be presented to CBJ as planning-level package alternatives for approval by the CBJ Assembly and submitted to ADOT&PF for consideration in the Statewide Transportation Improvement Program (STIP).



Riverside Drive Corridor

Figure ES-1

Corridor Limits and Study Area Boundary

The Riverside Drive Corridor Study methodology included a review of prior study and planning documents and data including the recently adopted AWTP traffic volume and accident data; a public involvement process; an analysis of existing traffic operations; an assessment of safety and multimodal service conditions including ADOT&PF's recent traffic data; and an evaluation of anticipated future conditions.

Findings

Today, Riverside Drive generally serves the residents of the West Mendenhall Valley well as a functional multimodal arterial corridor. The relatively high traffic volumes along the southern portion of the road during peak commute periods, the high number of pedestrians, bicyclists, and joggers combined with a relatively low accident history for most of the corridor attest to its current functional condition. There are, however, a number of deficiencies, which will be exacerbated by future growth or changes in the corridor such as development of the Dimond Complex. These deficiencies should be addressed with a number of short-term, mid-term, and potential long-term solutions to ensure that the corridor continues to operate safely and efficiently.

During this study of the Riverside Drive corridor, deficiencies and issues were identified in three categories:

- Traffic operations and safety
- Pedestrian and bicycle safety and comfort
- Other deficiencies and issues such as transit service

Findings of this study are summarized in Table ES-1.

TABLE ES-1
Riverside Drive Corridor Study— Identified Motorized and Non-motorized Transportation Issues and Deficiencies

Category	Deficiencies and Issues
Traffic Operations and Safety	Existing peak-hour intersection level of service deficiency at the Mall Road/Vintage Road intersection
	Emerging peak-hour level of service issue at the Stephen Richards Memorial Drive intersection
	Traffic volumes exceeding lane capacity in the a.m. Peak Period for the southbound direction between Dimond Park and Egan Drive
	Inadequate sight distances due to overgrown foliage and two instances of potential geometric deficiencies (Stephen Richards Memorial Drive and the Riverside Drive, Mall Road, and Vintage Blvd. Intersection.)
	Inadequate lighting in a number of roadway segments along the corridor
	Perceived speeding near schools, parks and residential neighborhoods
	High accident experience at the intersection of Mall Road/Vintage Drive
	Pavement deterioration south of James Blvd.
	Expected safe driveway use in the northern corridor neighborhoods.
	Unsafe vehicle passing in a two lane roadway (e.g., unsafe use of bike lanes

TABLE ES-1
Riverside Drive Corridor Study— Identified Motorized and Non-motorized Transportation Issues and Deficiencies

Category	Deficiencies and Issues
	as a right-side passing lane).
Pedestrian Safety and Comfort	Shortage of street crossing opportunities along the corridor at major intersections and park locations
	Lack of direct and convenient connections between mid-corridor neighborhoods and Riverside Drive (see Figure ES-1)
	Inadequate sight distances due to overgrown foliage and one instance of a potential geometric deficiency (Stephen Richards Memorial Drive)
	Inadequate lighting (perceived) at several crossing locations and a number of roadway segments along the corridor
	Gaps in the sidewalk system between Mall Road and Egan Drive and north of Division Street
	Need for sidewalk extensions around corner onto minor streets
	Cut-through traffic using small side streets in the north end of the Riverside Drive corridor where there are no sidewalks.
Other Deficiencies	Inadequate transit service

In addition to the analysis of the Riverside Drive Corridor, analysis and recommendations were prepared for access to the planned Dimond Community Complex. Working with the Dimond Park High School Project Team, a recommendation was developed to minimize the number of access points along Riverside Drive, develop the intersection of Riverwood Drive as the main access point to the complex and construct a traffic signal at this location. The Dimond Park High School Project team will also work with the bus company and transit department to ensure adequate accommodations for transit vehicles that will not adversely impact traffic operations along Riverside Drive.

Recommendation

The short-, mid-, and long-term recommended packages of options for consideration by CBJ are described below. The emphases of these planning-level solutions are safety and maintenance of the roadway per standards for this type of roadway. Riverside Drive is a local residential street from Tournure Street to Division Street (Melvin Park) and an urban collector-arterial street south from Division Street to its junction with Egan Drive. Each of the solution packages assumes the construction of the Riverwood Drive signal as part of the Dimond Park Complex access package.

Short-Term Solution Options

Short-term options are considered to be implementable quickly, within three years time. The short-term package of potential solutions addresses some of the most critical needs in the corridor. The solutions offered are consistent with the traffic and safety analysis performed

as part of the study and with the concerns raised by many of the citizens. These improvements are mapped, where possible on Figure 6-1.

In the short term, the CBJ could consider a number of actions including:

- Develop well-lit and well-marked pedestrian crosswalks at the Riverwood Drive (when the Dimond Complex signal is developed), the north end of the Dimond Complex (Parkwood Drive), and the south end of Melvin Park (Killewich Drive/Division Street). The Parkwood Drive and Killewich Drive crosswalks are needed now.
- Repave road between James Blvd. and Egan Drive
- Quantify road-specific cut-through traffic in the northern corridor neighborhood (e.g., Rosedale, Pinedale, and Taku Blvd.) and, if warranted, consider appropriate traffic slowing mechanisms.
- Establish school zone improvements in the vicinity of Mendenhall River and Riverbend schools to improve pedestrian safety and comfort. Enlist School District representatives and a pedestrian safety expert to work with the community to define what these improvements may include.
- Install "Right Lane Bike Only" signing along corridor.
- Develop neighborhood connections for pedestrians and bicycles along both sides of Riverside Drive between Parkwood Drive and Division Street.
- Establish a vegetation control program for all appropriate intersections beginning with the overgrown foliage north of Division Street and the vegetation limiting the sight distance for eastbound movements on Stephen Richards Memorial Drive.
- Reduce the speed limit along Riverside Drive to 25 miles per hour (m.p.h.) north of Division Street (existing 20 m.p.h. section to remain).
- Deploy a random speed monitoring system that detects the speed of oncoming vehicles and displays the recorded speed on a display visible to the driver of the vehicle.
- Increase the number of Public Service Announcements and information spots in community newspapers to highlight school zone driving rules, bicycle rules of the road, adverse weather driving guidance and other timely releases to improve road safety throughout CBJ.
- Increased enforcement of motor and non-motor vehicle rules of the road.
- In addition, the CBJ should consider supporting actions such as:
  - Continuing the spot speed study to address school year and other seasonal variations in spot speeds,
  - Continuing conducting origin-destination studies to better quantify traffic using side streets as through-fares;
  - Initiating a corridor illumination study to define the precise lighting levels needed and design a system that will meet corridor lighting requirements.
  - Supporting an increase in transit service along Riverside Drive that would include regular daily bus service along the entire length of Riverside Drive.

Mid-Term Solution Options

Mid-term solutions are expected to be implementable within four to nine years following a moderate amount of planning and design. This package of mid-term solutions has been assembled to complement or upgrade the near-term solutions listed above. These improvements are mapped, where possible on Figure 6-2. Mid-term actions proposed include:

- Completion of the sidewalk system from Sharon to Back Loop Road, including Tournure Street. In some sections this would require curb, gutter, and sidewalk. In other sections, curb and gutter are already in place.
- Initiate additional actions to improve pedestrian crossing safety progressing from installing median refuge islands to consideration of signal flashers and rumble strips in advance of intersections. The most immediate needs and appropriate locations for these actions are (1) at the NW corner of Killewich Drive to the NE corner of Division Street, (2) from the NW corner to the NE corner of Stevens Richards, and (3) at the school crossing at James Blvd.
- Improve roadway illumination through installation of new lighting systems and upgrades to existing systems. Improvements to be made at specific intersections identified during a specific lighting deficiency analysis.
- Rehabilitate the southern section of Riverside Drive between Egan and James. That project could include:
  - Completion of the sidewalk system from Egan to the Vintage/Mall intersection.
  - Expansion of Riverside Drive to 2 lanes in the southbound direction between James Boulevard and Egan Drive.
  - Realignment of the Mall Road / Vintage Drive intersection to improve roadway geometrics and provide a more safe and operationally efficient intersection.
  - Add a new one-way entrance to the Post Office directly off the southbound, right-hand lane of Riverside Drive.
- Install a traffic signal at Stephen Richards Memorial Drive.
- Asphalt pavement overlay of the corridor from James to Back Loop Road to rehabilitate roadway surface, address drainage issues and re-stripe traffic lanes to 11-feet wide. Consider adding textured pavement treatments for pedestrian crossings and rumble strips in advance of school zones.

Long-Term Solution Options

Long-term options are those that require significant planning, design, and funds. These could be implemented in 10 to 20 years. The long-term package of potential solutions addresses some of the anticipated future transportation needs in the corridor. A solution could include (Figure 6-3):

- Construction of a bridge crossing of the Mendenhall River in the vicinity of Melvin Park.

or

- Extending CBJ's ROW at the northern end of Riverside Drive and completion of a direct roadway connection to Back Loop Road and development of a controlled intersection.

To minimize unwanted traffic in the northern residential neighborhoods of the Riverside Drive Corridor following implementation one of these major projects, closure of Mint Way at the Back Loop Road could be considered.

- During public meetings additional east-west connectivity issues were raised as potential long-term needs. We recommend that any evaluation of future connections between the east side and the west side of Mendenhall River include non-motorized connections and transit-supportive treatments. One such concept would be to add a pedestrian bridge across the river near the Killewich Drive neighborhood linking to the existing trail (Kaxdigoowu Heen Dei or Brotherhood Park trail).

As indicated above, these long-term options are independent options that could be considered as the transportation needs grow and change in the Valley over time. The bridge and completion of Riverside Drive are both listed in the approved Area Wide Transportation Plan (April 2001) as are improvements to the Back Loop and Mendenhall Loop Roads. We recommend that the bridge or the Riverside Drive completion projects be considered only after the planned improvements of Back Loop and Mendenhall Loop Roads are made. If additional traffic improvements are still warranted, an assessment of the engineering costs and constraints and the environmental impacts of a bridge or road completion project compared to no action would be mandatory.

The option to construct a new bridge assumes that there is a reasonable ROW to link bridge traffic to the Back Loop Road and existing neighborhoods on both sides of the river are avoided as much as possible. The option to complete Riverside Drive to Back Loop would require additional ROW and a land use change for the park area between Back Loop Road and the existing terminus of Riverside Drive. To implement this option, the northern portion of Riverside Drive would change from a local residential street to an arterial. Provisions would be necessary to allow for safe use of driveways fronting onto Riverside Drive

A preliminary engineering feasibility study conducted for CBJ found more engineering difficulties with the road completion plan compared to a new bridge across the Mendenhall River[1]. During the environmental documentation of any major project such as the bridge or Riverside Drive connection, the engineering feasibility, effectiveness, costs, and environmental impacts of these options can be more thoroughly compared both to each other and to a No Action alternative.

[1] Riverside Drive Extension Feasibility Report, R&M Engineering, 1996.

SECTION 1

Introduction

The City and Borough of Juneau (CBJ) authorized an assessment of the Riverside Drive Corridor in response to multiple inputs including the need to develop an access plan for the new Dimond Community Complex, safety concerns from area residents, and traffic congestion and accident data. CH2M HILL conducted this assessment beginning in March 2001 and concluding in November 2001. This report contains the information used in the assessment, study methodology, public input, and the recommendations that have resulted.

The Riverside Drive Corridor assessment was divided into two components:

- Riverside Drive Corridor Multimodal Transportation Study and Plan
- Dimond Community Complex Access Evaluation and Recommendation

Schedules required that the Dimond Community Complex portion of the project precede the corridor-wide assessment. The access plan developed for the Dimond Community Complex has undergone review at multiple levels of CBJ and will be implemented as part of that complex development. During the evaluation of the long-term deficiencies in the Riverside corridor, the assumption was made that, at a minimum, when the Dimond Community Complex was built the proposed traffic controlling measures associated with the complex would be in-place.

The goals of the project are:

1. To work with CBJ and their contracted planners and architects of the Dimond Community Complex to develop a viable and safe access plan for the complex
2. To conduct an objective evaluation of existing and projected traffic issues in the existing Riverside Drive Corridor from Egan Drive to Back Loop Road
3. If deficiencies were found, to evaluate and recommend possible short-term, mid-term, and long-term solutions. These solutions would be presented to CBJ as package alternatives for approval by the CBJ Assembly and submitted to DOT for consideration in the Statewide Transportation Improvements Program (STIP).

Contained in this report and its appendices are summaries of existing Riverside Drive Corridor data, pertinent information from the Area Wide Transportation Plan (AWTP), data collected in support of this assessment, summary of the deficiencies and issues found, and the solutions considered to resolve deficiencies and issues. The report concludes with a recommended plan for the corridor that includes Dimond Community Complex access, short-term (0 to 3 years) and cost effective solutions as well as a discussion of potential mid-term (4 to 9 years) and long-term (10 to 20 years) options to consider implementing as the corridor matures and additional lands become developed.

SECTION 2

Background

Study Area

The Riverside Drive Corridor serves multimodal transportation in the Mendenhall Valley along the east side of the Mendenhall River. The roadway corridor connects Egan Drive at the south end of the valley with the Back Loop road via Tournure Street and Mint Way north up the valley. The roadway cross-section is typically a twelve-foot traffic lane in both directions, six- to eight-foot bicycle paths, and five-foot sidewalks. Traffic signals are installed at the intersection of Egan Drive and Mall Road/Vintage Drive. All other intersections are two-way stop sign-controlled, with stop signs located on the minor intersecting streets. Other than school zone related controls, there are no traffic controls on the Riverside Drive corridor between the Mall Road signal and the stop sign at Mint Way and Back Loop Road.

The extent of the analysis was generally limited to the immediate roadway corridor (roadway right of way and areas of influence along side streets). Potential traffic diversion impacts were considered for a larger area that included several of the local and neighborhood collector streets in the Mendenhall Valley including Rosedale Street, Pinedale Street and Taku Boulevard. See Figure ES-1 for an illustration of the roadway corridor and traffic diversion study areas.

Recommendations included in the Riverside Drive Corridor Study and Plan are limited to the immediate corridor unless as part of a mitigation measure for a specific element of a solution package. Other recommendations are referenced per the Area Wide Transportation Plan.

Land Use and Zoning

Land use zoning along Riverside Drive include:

- Light commercial (LC) zoned from Egan to the edge of Mendenhall Mall
- Residential D-15 (multifamily development at 15 units /acre) zoned from the Mall to James, and again from Pinedale to Back Loop Road. Rotary Park and Park Place are also zoned D-15.
- Residential D-5 (single family and duplex residential development at 5 units / acre) zoned along the rest of the corridor.

In addition to residential areas, there are two elementary schools, two parks, one community recreation area, and a cemetery. Riverbend Elementary School is in the southern portion of the corridor with vehicle access directly off of Riverside Drive. The Mendenhall River Community School is built off of the Back Loop Road but with pedestrian access to Riverside Drive via a foot path at the intersection of Riverside Drive and Tournure Street. Vehicle access to this school is via a separate entrance off Back Loop Road.

Other land uses are:

- The community recreational fields at Dimond Park with vehicle access through the existing driveway and parking in the Riverbend Elementary School parking lot and in undeveloped areas.
- Rotary Park at Riverside Drive and Rivercourt Way with vehicle access off Riverside Drive to a small parking area.
- Melvin Park at Division Street
- Smith Park, a local cemetery on the west side of Riverside Drive surrounded by the residences off Killewich and Sharon Streets.
- On the north side of Tournure Street adjacent to the Mendenhall River Community School there is a triangle-shaped lot zoned as D-5 but is restricted for use only as a parkland.

Construction History

The construction history along Riverside Drive includes a number of projects, the most recent projects that pertain to Riverside Drive as it is currently configured are listed in Table 2-1.

TABLE 2-1
Riverside Drive Construction History

Action	Time
Removal of roadway gap at Rotary Park to improve emergency vehicle access	Mid 1980s
Connection of Riverside Drive to Egan Drive via Vintage Boulevard	1984
Current roadway design constructed with realignment, expansion and improvements between Egan Drive and Mall Road, installation of traffic signal	1987-1989
Reconstruction from Melvin Park to Back Loop Road	1988-1989
Reconstruction from Mall Road to Melvin Park (Division Street)	1991
Installation of speed humps on Riverside and Tournure near Mendenhall River Community School	1997

Prior Studies and Plans

A number of planning and feasibility studies have been performed which include the Riverside Drive Corridor. These include the recently adopted Area Wide Transportation Plan (AWTP) that contains recommendations for improvements in the corridor. Table 3-1 summarizes those documents and lists the components of the plans that are still valid for the Riverside Drive Corridor.

Anticipated Traffic Growth

Growth in vehicular traffic long Riverside Drive has been consistent with residential development in the valley and along the Back Loop Road including the new developments along and off of Montana Creek Road and others. Traffic growth due to residential development and population growth is expected to continue at the historic rate of 2.5 percent annually.

An additional source of traffic expected to impact Riverside Drive is the development of the Dimond Complex that will include a new high school and community recreation center. Some funding is available for the high school, however the timing of this project as well as funding and timing of the planned recreation center are not yet determined. Traffic anticipated to be associated with Dimond Complex Development is summarized in Table 3-2.

Dimond Community Complex

In 2000, CBJ embarked on the initial phases of the development of a new high school in Mendenhall Valley. The selected site is Dimond Park, an existing recreational area adjacent to the new Riverbend Elementary School. The City with its architect consultant, Minch Ritter Voelckers, began building layouts in the fall of 2000 and continued in the conceptual design and review process until the 1st quarter 2001. Final selection of the building layouts required the analysis and development of appropriate and safe vehicle and non-motorized traffic access to the park. CH2M HILL was hired to work with the Dimond Community Complex team to develop that access plan that would include major entrances to the Park, traffic control systems, pick-up drop-off zones, transit stops, and pedestrian crossings. Figure 2-1 shows the conceptual site plan being carried forward by the Dimond Park High School Planning Team.

The recommended solution for the Complex access system as well as the proposed crosswalks and other additions is described in Section 4 of this report. The plan will create a safe and functional multi-modal system intended to work with the overall plans for the Riverside Drive Corridor.

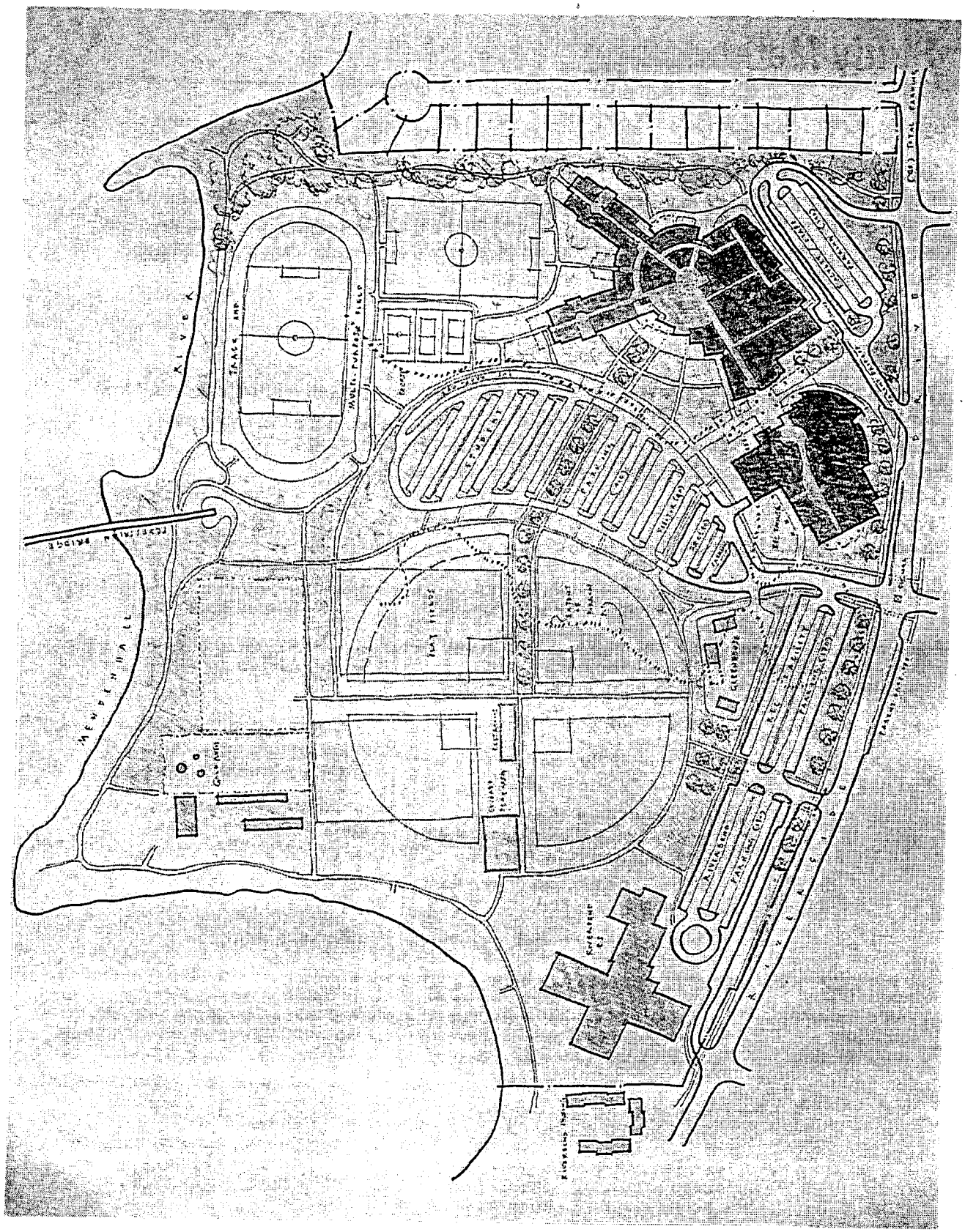


Figure 2-1
Dimond Complex Conceptual Site Plan

SECTION 3

Study Methodology

The Riverside Drive Corridor Study methodology included three steps: a review of prior study documents and data, a public involvement process, and a technical analysis of the entire corridor. The technical analysis included characterizing existing traffic operations, accessing the safety and multimodal service conditions, and evaluating the anticipated future conditions. Each of these steps is described in detail below.

Review of Prior Studies

The Riverside Drive Corridor has been addressed over the years in a number of planning and feasibility studies that focused on traffic and safety needs as well as community concerns. Table 3-1, below, lists the documents that were reviewed in this study and summarizes the pertinent Riverside Drive Corridor information.

TABLE 3-1.
Summary of Applicable Studies and Plans

Study or Plan	Riverside Drive Transportation Component	Current Applicability
CBJ Comprehensive Plan, 1995 Update	Provides for pedestrian access to schools, parks, and shopping areas.	This continues as a priority
	ADOT&PF plans for interchanges at Egan Drive.	The AWTP calls for some grade-separated intersections. A study is underway evaluating interchanges.
	Recommends that Riverside Drive intersect at Back Loop Road, replacing the Tournure St. connection	The AWTP includes this component as well as a bridge connection.
	Recommends proceeding with Dimond Park project	This is still a component
	Encourages beautification and buffering along major roadways	This is still a component
Riverside Drive Extension Feasibility Report, R&M Engineering, 1996	Analyzed four alternatives that would extend Riverside Drive to Mendenhall Loop Road that differed in right-of-way and the location of a student drop-off zone and/or paved pathways. Recommended improving Tournure Street and the area by: -adding curb, gutter, sidewalk, and bike lanes on both sides; and a vehicle turnout near the Riverside Drive intersection	Alternatives of creating safer pedestrian and bicycle entry and exit methods from Mendenhall Elementary were addressed during this study. These included: – the addition of sidewalk on one or both sides along Tournure Street – Creating, removing, or moving existing bike paths in the school's vicinity

TABLE 3-1.
Summary of Applicable Studies and Plans

Study or Plan	Riverside Drive Transportation Component	Current Applicability
R&M, 1996 (cont.)	Study recommended a bridge connection over a direct connect between Riverside Drive and Back Loop at Tournure because of engineering issues.	Both bridge and connection still considered as options per the approved AWTP. Environmental documentation would be required for either option.
Juneau Parks & Recreation Comprehensive Plan, 1996	Proposes to dedicate Dimond and Melvin Parks into Juneau Park System Recommended:	Recommended land uses for Dimond and Melvin Parks could significantly change the trips generated and thus the corridor needs.
	Completing development of Dimond Park as a community park. Potential facilities include an ice rink, gymnasium, swimming pool, and a covered concert pavilion.	Dimond Community Complex is also an alternative site for the Mendenhall Valley Public Library.
	Promoting development of a performing arts facility in the new Dimond Park high school.	
	Developing a skateboard park or open area at Dimond or Melvin Parks.	
	Creating a pedestrian/bike trail from Dimond Park to the Airport Dike Trail.	
Capital Transit / Transit Development Plan, 1996	Existing service on Riverside is one a.m. commuter route that links to downtown buses at Nugget Mall. No p.m. service provided along Riverside Drive	Transit service has not changed.
	Hourly service is recommended.	Hourly service is still recommended
Juneau Non-Motorized Transportation Plan, 1997	Bike path on Riverside Drive consists of a 6' wide designated area with a length of 2.3 miles. Improvements called for include;	No change
	a new paved shoulder lane along Tournure Street to Back Loop and	Currently under consideration
	a separated paved path between Egan Drive to Dimond Park.	Recommended as a mid-term solution in this plan.
CBJ Transportation Vision, 2000	No specific recommendations for Riverside Drive	
Area Wide Transportation Study, 1998 - 2001	Following are the approved AWTP components for Riverside Drive Corridor:	
	Evaluate appropriate intersection control at the new Dimond Park intersection	This was accomplished during phase one of the CH2M HILL contract with CBJ
	Maintain existing bicycle lane striping	No alternate plan
	Provide bus pullouts/shelters	As transit is added, this should be evaluated, provided that conflicts with other transportation modes are not

TABLE 3-1.
Summary of Applicable Studies and Plans

Study or Plan	Riverside Drive Transportation Component	Current Applicability
		affected.
Area Wide Transportation Study, 1998 – 2001 (cont.)	Develop strong pedestrian connections from neighborhoods to Dimond Park area and the retail areas to the south.	No alternate plan
	Extend Riverside Drive to Back Loop Road via an extension of the existing alignment or	Continued option to consider if traffic warrants. Lesser cost compared to bridge option. Extending Riverside Drive straight to Back Loop not recommended by earlier feasibility study (R&M, 1996); not recommended if intent is to maintain a residential neighborhood
	by crossing Mendenhall River in the vicinity of Melvin Park	River crossing is highest cost alternative but would have multiple benefits and is recommended over Back Loop link.
	North of Melvin Park maintain as a local street with traffic calming treatments to maintain lower speeds consistent with the surrounding residential homes.	See discussion above regarding completing Riverside Drive link to Back Loop.

Public Input

Public input was solicited during three public meetings as well as during a public review period of the draft plan. Each meeting was well attended and citizens provided insightful input into the study process.

Dimond Complex Meeting

On March 13th, a public meeting was held at the Riverbend Elementary School to discuss the status of the Dimond Community Complex planning activities and obtain feed back from the public about their traffic and safety concerns regarding that project. Twelve citizens attended this meeting. Appendix D contains the meeting summary, public notices, sign-in sheet, and written comments from that meeting. During that meeting the public voiced their issues and concerns as follows:

- Adequate parking to keep people from parking in the neighborhoods
- Appropriate and easy access for pedestrians and drop-offs and pick-ups.
- Minimize traffic control conflicts with commuters
- Safety for school children at crossings
- Speed along the corridor
- Need for adequate lighting
- Use of a signal at main Park entrance may be needed

Riverside Drive Corridor Meeting

On July 19, 2001 a public meeting was held in the Mendenhall Valley Public Library to discuss the status of the Riverside Drive Corridor study and obtain the public's input regarding deficiencies found and possible solutions. Approximately 50 people were in attendance. The meeting summary notes, sign-in sheets, copies of hand-outs and displays, as well as written comments received are contained in Appendix D.

The major points made by the public during that meeting are:

- Northern Riverside Drive neighborhood residents have been concerned since the current road was built that the design speed and designated speed limits in that area create unsafe conditions
- The neighborhood experiences excessive speeds where there is a combination of multiple driveways, high pedestrian use, parks, schools, and bicycle paths.
- The preferred short term solutions are to lower posted speed limits and add traffic calming measure (one suggestion is to allow cars be parked along the road)
- Long-term solutions, including a new bridge, dead-ending at Tournure, or extending Riverside Drive through to Back Loop, are encouraged, however, there are differences of opinion about the "best" solution. No matter what solution, there was a strong request to maintain Riverside Drive north of Melvin Park as a residential neighborhood.
- Line-of-sight at several locations is poor. Stephen Richards is the main one of concern because of the speeds at that location.
- Crossing areas are either not marked, poorly lit, or ignored by vehicles. Improvements are needed.
- The school crossing at the juncture of Riverside Drive and Tournure must be made safe.

Final Project Public Meeting

On September 27th, following a regular Public Works Commission meeting held at Riverbend Elementary School, the public was invited to comment on the final draft plan for the Riverside Drive Corridor Transportation Study and Plan. Appendix D contains the details of this meeting. The major points made by the public during that meeting are:

- The plan generally was viewed as a good one.
- The lowered speed limit in the northern corridor should be enacted as soon as possible, not in a year or two. Also need immediate increase in lighting in the north end at one particularly low light location (near 4523 Riverside Drive).
- Cut-through traffic on Rosedale is not directly addressed by this plan. Consider speed humps or a road block at the curve on Rosedale.
- Put in a more aggressive warning system before the speed humps to slow people down.
- Allow parking on one side of Riverside to slow traffic down
- The plan should put more emphasis on transit along this corridor
- The public continued to have differences of opinion about completing Riverside through the park or school grounds versus a new bridge.

A direct outcome of this meeting was that the Public Works Commission acted on the request for a lowered speed limit and increased lighting at the location suggested. Both of these actions have been completed. Other comments and suggestions have been considered and discussed as part of this final report.

Multimodal Transportation Analyses

The analyses performed for the Riverside Drive Corridor were designed to address and enable measurements of the unique and complex multimodal issues and conditions that exist in the corridor. Analyses were performed to assess existing and future traffic operations, existing and historical traffic safety conditions, existing spot speeds along the corridor, and existing vehicular travel patterns through the valley. Field reconnaissance was performed to survey existing physical conditions in the corridor.

Of critical importance to this study was to understand the affects of potential solutions on traffic diversion so that resolving issues at one location will not create unsafe or congested conditions at other Valley locations. For this reason, a dynamic- assignment traffic simulation model was selected to evaluate existing and future traffic conditions.

Assumptions

A number of assumptions went into the development of the traffic model and future traffic forecasts in conducting the multimodal transportation and safety analysis. These assumptions allowed us to develop a reasonable picture of the future in order to establish a likely level of travel demand and the associated impacts on multimodal travel and safety in the corridor.

In terms of growth in travel demand, it was assumed that historic rates in the valley would continue based on land use and population forecasts prepared as part of the Area Wide Transportation Plan (AWTP). This growth rate was established at 2.5 percent annually.

It was assumed that, for the sake of analysis, no major transportation projects involving changes to the basic Riverside Drive system were in the pipeline to be constructed by 2020. Major transportation projects such as additional crossings of the Mendenhall River were evaluated as part of the preliminary concept development process.

For the purpose of evaluating the "worst case" for traffic operations along Riverside Drive, the a.m. peak period of 7:00 a.m. to 9:00 a.m. was used for level of service (LOS) analysis at major intersections along the corridor. In addition, the origin/destination (OD) study performed in support of this effort was conducted during the same time period.

Completion of the master plan for the Dimond Park complex was assumed for all future scenarios. Travel demand, trip generation and trip distribution by mode for the Dimond Complex were developed as part of this study. Total trips at buildout are summarized in Table 3-2 below.

TABLE 3-2.
Dimond Park Trip Generation and Distribution

Total a.m. Peak Hour Trips *Assumes 60% trip origins in Mendenhall Valley*		Buildout Distribution	
	Build Out	NB	SB
Riverbend Elementary	325	130	195
Community Center	110	45	65
High School	810	325	485
TOTAL		500	745

NB = northbound
SB = southbound

Source: CH2M HILL, 2001

Model Description

The INTEGRATION model was developed at Queens University in Ontario, Canada and the Virginia Institute of Technology by Michel Van Aerde. It is based on advanced traffic flow theory and provides a unique and powerful capability to model driver route-selection behavior at the micro and mesoscopic levels.

The Riverside Drive Corridor Study presents the ideal domain of application for the INTEGRATION model. It is useful to model and view decisions that travelers make, both pre-trip and en-route. Since INTEGRATION is a full microscopic simulation model, it tracks the movements of individual vehicles. This permits the analysis of many dynamic traffic phenomena not addressed by other models such as shock waves, gap acceptance, and weaving. The INTEGRATION model can also consider continuous time varying traffic demands, routings, link capacities, and traffic controls.

What makes the INTEGRATION model also mesoscopic is its incorporation of macroscopic traffic features that traffic engineers use to evaluate operations and service. These are link speed-flow relationships, multi-path equilibrium traffic assignment, uniform, random or over-saturation delay, as well as weaving capacities. The combination of these microscopic and macroscopic features into a "mesoscopic" model allows us to more accurately represent the dynamics of the transportation system.

The model consists of a set of networks (representing the existing condition and alternate future scenarios), and a set of origin - destination (O-D) matrices (representing current and future travel demand). The base and alternate scenario model networks are illustrated on Figures E1-E2, and provided in Appendix E. The O-D matrices for the existing (2001) condition and 2020 conditions are also provided in Appendix E.

Data Sources

Data were acquired from a number of sources for the analysis of Riverside Drive corridor deficiencies. Where existing data was not available, it was collected in the field by CBJ staff, CH2M HILL and others. Table 3-3 contains a summary listing of the data used in analysis

and the source from which they were acquired. A complete presentation of references is contained in Section 8.

TABLE 3-3
Summary of Analysis Data by Source

Alaska Department of Transportation and Public Facilities (ADOT&PF)	
Average Daily Traffic Volumes	Turning Movement Counts
Signal Timing and Phasing Worksheets	Intersection Geometrics
Planned and Programmed Projects	Historical Accident Data
City and Borough of Juneau	
GIS Base Data	Traffic Control and Sidewalk Inventory
Pedestrian Crossing Counts	Preliminary Spot Speed Study Results
Prior Studies and Reports	Future Land Use and Population Forecasts
School Bus Walk Areas	Transit Route and Service Information
CH2M HILL	
Origin – Destination Study	Sight Distance Deficiency Analysis
Traffic Volume Forecasts	Future Intersection Turning Movement Count Estimates

These data are provided for reference and posterity in Appendix E.

SECTION 4

Findings

Riverside Drive corridor currently provides effective, multimodal access to the residents of Riverside Drive. Traffic lanes, built wide (12-feet) and to a high design speed, have provided for generally safe operation. The six-foot wide bike lanes and sidewalks along most of the length of the 2.3-mile corridor are highly used by pedestrians, bicyclists, and joggers. The relatively high traffic volumes along the southern portion of the road during peak commute periods combined with a relatively low accident history for most of the corridor attest to its current functional condition. Corridor users appreciate Riverside Drive yet want to see improvements aimed at current operations as well as anticipated conditions following the build-out of Dimond Park.

Perceived conditions and opinions about appropriate changes to the corridor operation must be validated to determine if any changes are warranted. This section summarizes the findings of our technical study of Riverside Drive Corridor.

Summary of Riverside Drive Corridor Deficiencies and Issues

Based upon a review of existing data, analysis, field reconnaissance, staff interviews and public input, the following deficiencies were found to exist along the Riverside Drive Corridor. The deficiencies listed below represent existing conditions at the time of this study. The table below (Table 4-1) indicates the range of conditions found to exist in the corridor and how they were identified as deficient. Following the table are summary descriptions of these deficiencies as they occur. Graphics depicting these deficiencies and issues are provided in Appendix A.

TABLE 4-1.
Deficiency and Issue Criteria and Thresholds

Deficiency/Issue	Criterion	Threshold
Traffic		
Intersection Operations	Level of Service 1	LOS D or below
Roadway Segment Capacity	Volume to Capacity Ratio	1.0
Speed Limit Compliance	85% percentile spot speed	Posted Speed Limit
Accident Experience	Accident Rate (Accidents / Million vehicle miles)	Approaches (within 0.25) of Critical Average
Pedestrian		
Pedestrian Safety	Adequate clearance gap for pedestrian crossing	Below minimum design standards
Pedestrian Connectivity	Distance between crossings. Accessibility to Community Resources (e.g. Parks and Schools)	Directness of access, existence of "ad hoc" connection

TABLE 4-1.
Deficiency and Issue Criteria and Thresholds

Deficiency/Issue	Criterion	Threshold
Other		
Cut-through Traffic	Annual Daily Traffic (Residential Streets Only)	Exceeds Traffic Generated solely by Neighborhood
Inadequate Sight Distances	Existing Sight Distances	Below Minimum Design Standards (per AASHTO)
Inadequate Lighting	Existing Lighting Conditions	Below Desirable Levels of Illumination (subjective analysis)
Transit Service	Service Frequency and Coverage	Seats available to serve 5 percent of commuters within travelshed

1. See Table 4-2A and 4-2B for Level of Service (LOS) Definitions.

Traffic Congestion / Intersection Level of Service

Traffic growth along the Riverside Drive corridor is impacting traffic operations at intersections along Riverside Drive. The quality of traffic operations on roadway facilities is described in terms of level of service (LOS), a measure of operational conditions and the perception of those conditions by motorists. The latest *Highway Capacity Manual* (HCM 2000) methodology is used for calculating LOS at the study signalized intersections. At this intersection, level of service is related to the average delay experienced by all vehicles as they approach the intersection. Level of service (LOS) ratings range from A to F. LOS A represents the best operation and LOS F the poorest operation. LOS D is usually considered the minimum acceptable standard in urban areas. Tables 4-2 A and B summarize the relationship between level of service and average delay at the intersections.

TABLE 4-2A
Level of service criteria for signalized intersections

Level of Service	Average Delay (seconds per vehicle)	Traffic Flow Characteristics
A	≤ 10	Most vehicles arrive during the green phase and do not stop at all.
B	> 10 - ≤ 20	More vehicles stop, causing higher delay.
C	> 20 - ≤ 35	Vehicles stopping is significant, but many still pass through the intersection without stopping
D	> 35 - ≤ 55	Many vehicles stop, and the influence of congestion becomes more noticeable.
E	> 55 - ≤ 80	Very few vehicles pass through without stopping.
F	> 80	Considered unacceptable to most drivers. Intersection is not necessarily over capacity even though arrivals exceed capacity of lane groups.

Source: Highway Capacity Manual (HCM), 2000

TABLE 4-2B
Level of service criteria for unsignalized intersections

Level of Service	Average Delay (seconds per vehicle)	Traffic Flow Characteristics
A	≤ 10	Little or no traffic delays
B	> 10 - ≤ 15	Short traffic delays
C	> 15 - ≤ 25	Average traffic delays
D	> 25 - ≤ 35	Long traffic delays
E	> 35 - ≤ 50	Very long traffic delays
F	> 50	Queuing on minor approaches and not enough gaps of suitable size to allow safe crossing of major street. Signalization should be investigated at this point, but warrant must be satisfied before implementation.

Source: Highway Capacity Manual (HCM), 2000

The table below summarizes existing and future p.m. Peak Hour level of service for arterial intersections along Riverside Drive. Similar levels of service are experienced at these intersections in the a.m. peak period.

TABLE 4-3
p.m. PEAK Intersection Level of Service Summary

Intersection	1998		2020	
	LOS	Delay (secs.)	LOS	Delay (secs.)
Riverside Drive at Egan Drive[1]	C	21.1	C	27.5
Riverside Drive at Mall Road / Vintage Drive[2]	D	35.7	C	33.4
Riverside Drive at Stephen Richards Memorial Drive[2] (unsignalized – AVG delay for minor street and turning traffic only)	C	28.7	D	47.5

Source: 1. Area Wide Transportation Plan – Background Document—1998 data, April 2001
2. CH2M HILL, 2001 analysis using 1998 data

Other, periodic congestion occurs intermittently throughout the day along the corridor from the Stephen Richards Memorial Drive intersection to the intersection of Egan Drive.

Roadway Segment Capacity

Capacity for each segment along Riverside Drive was determined in accordance with the standard procedures of the *Highway Capacity Manual* (HCM 2000). Using HCM redirection factors, Riverside Drive capacity north from Egan Drive to Stephen Richards Memorial Drive was determined to be 1,700 vehicles per hour (vph). Riverside Drive north of Stephen Richards Memorial Drive to its terminus with Tournure Drive was determined to have a reduced capacity of 1,500 vph due to the high number of access points along the route. Peak hour volumes were extrapolated from existing annual daily traffic (ADT) counts. Morning peak hourly volumes were taken to be ten percent of the ADT. To the peak hourly volume, a

peak hour factor of 0.50 was applied to determine the maximum flow of traffic on the roadway for the peak 15 minutes of the typical rush hour. The peak hour factor was determined from turning movement and origin-destination counts conducted by CH2M HILL. The volume to capacity ratio was then determined by dividing the peak flow (vph) by the capacity of the roadway segment (vph). This methodology identifies the worst-case congested condition that occurs along Riverside Drive.

Riverside Drive currently experiences recurring congested conditions at several locations along the corridor. These conditions are most pronounced during the peak commute hours that typically occur between 7a.m. and 8a.m. and between 5 p.m. and 6 p.m.. During the a.m. peak period, the primary period of analysis for this study, significant queuing occurs along Riverside Drive due to heavy southbound directional volumes. School drop-off activity and related driver behavior cause disruption in traffic flows that lead to congested conditions at both ends of Riverside Drive, both at the north end in the proximity of Mendenhall River Elementary School as well as in the vicinity of Riverbend Elementary School towards the south end of the corridor. Table 4-4 below summarizes a.m. peak volume to capacity ratios along Riverside Drive under existing and future conditions.

TABLE 4-4
Peak Period Volume to Capacity Ratio Summary

Segment	Peak Hour Volume	Capacity	Peak Flow Volume to Capacity (V/C) Ratio
Egan Drive to Riverwood Drive	1100	1700	1.29
Riverwood Drive to Stephen Richards	1000	1700	1.18
Stephen Richards Memorial Drive to Division Street	650	1500	0.87
Division Street to Tournure Drive	300	1500	0.37

Note: V/C ratio calculated using peak flow volume (Highest volume 15 minutes of the peak hour assumed to extend the full hour). This depicts the most highly congested conditions experienced and not the conditions for the duration of the a.m. peak hour.

Speed Limit Compliance

Preliminary results for an ongoing spot-speed study being performed by CBJ indicate that 85th percentile speeds exceed the posted 35 mph speed limit for at least one location (vicinity of Rotary Park). The generous lane widths and the absence of any traffic control along most of the corridor may encourage speeding. Additional spot speed surveys are needed to better verify compliance or non-compliance.

TABLE 4-5
Spot Speed Summary

Time Period	Location	Northbound	Southbound
a.m. / 9:20 to 10:20	Vicinity of Rotary Park	42	41
a.m. / 11:00 to 12:20 p.m.	Division Street	40	41
p.m. / 3:15 to 3:45 [a]	Riverbend School	37	38
p.m. / 3:45 to 4:15	Vicinity of Rotary Park	40	38
p.m. / 3:50 to 4:30	Division Street	40	39
p.m. / 4:25 to 6:30	Vicinity of Rotary Park	38	39
p.m. / 4:30 to 5:00	Division Street	39	41
p.m. / 4:45 to 5:45	South of Speed Humps	36	34

[a] Survey conducted immediately following completion of p.m. school zone traffic controls

Note: The 85th percentile speed represents a measure by which engineers evaluate roadway operations. This measure should not exceed the design speed of the roadway and be consistent with the posted speed for the roadway. Data collected between 7/13 to 7/18, 2001.

Accident Experience

A ten-year accident history for Riverside Drive was obtained from ADOT&PF. The ten-year summary is included in Appendix E. The accidents observed during that time are coincident with where high traffic volumes occur. As can be expected, accidents occur most frequently at intersections where the number of conflicts points are most numerous. Table 4-6, below summarizes the accident experience at intersections along the corridor for the period between 1997 and 1999. Analysis over the full ten years received from the ADOT&PF indicates that accident rates are increasing in line with traffic volumes. Of the three intersections along Riverside Drive evaluated in the last ADOT&PF Highway Safety Improvement Program statewide screening process, the intersection at Mall Road was found to have the most significant safety issue.

TABLE 4-6
Accident Experience (1997-1999)

	Accidents (1997 – 1999)								
Location	Fatalities	Major Injury	Minor Injury	Property Damage Only	Total	Accident Rate	Statewide Average	Critical Average	Safety Index
Egan Drive	0	0	4	3	7	0.32	1.05	1.36	0.24
Stephen Richards	0	1	3	3	7	0.85	0.85	1.32	0.64
Mall Road	0	1	6	8	15	1.25	1.17	1.61	0.78

Source: ADOT&PF

Pedestrian Safety and Comfort

Of major concern to CBJ and the community is pedestrian safety. There are a number of schools within the Mendenhall Valley that generate walking trips during the school year as well as an active community with bicycle, walking and jogging enthusiasts. Community attractors along the corridor, such as parks and open space also generate demand for pedestrian crossings of Riverside Drive. Some of the locations where these crossing demands exist do not currently have signed, striped or lighted crossings. Pedestrian crossings are needed though not provided at Melvin Park and the north end of the Dimond Park Complex.

Pedestrian Connectivity

Gaps in the sidewalk system exist between Egan Drive and Mall Road at the south end of the Corridor and along the west side of Riverside north of Sharon Street to Tournure in the north end of the corridor. In addition, sidewalks are not provided along either side of Tournure or Mint Way connecting to the Back Loop Road.

Pedestrian connections into neighborhoods could be improved at a number of locations along the corridor. These are evidenced by several "ad-hoc" locations where paths have been established between the corridor and cul-de-sac ends, and along undeveloped easements. These are most prevalent between Stephen Richards Memorial Drive and Division Street.

Cut-through Traffic

Installation of speed humps intended to calm traffic near the school crossing location at the north end of the corridor have generally slowed traffic and somewhat improved student crossing safety at that location. However, these humps have also resulted in trips being diverting to other local streets cutting through neighborhoods at the north end of the corridor. Field observation confirmed that Rosedale and Pinedale Streets have received traffic that is more appropriately served on Riverside Drive.

Inadequate Sight Distances

Several intersections along the corridor have sight distance issues due to skew-angle intersections, inadequate setback distances and overgrown foliage. The AASHTO criteria for a roadway with a design speed of 35 m.p.h. (the speed limit on Riverside) is 300 feet. The criteria is 400 ft for a roadway with a 40 m.p.h. design speed. Field estimates indicate that AASHTO criteria are not being met at Stephen Richards, Fireweed Drive, Taku Boulevard, Rosedale, Lupine Drive and the north driveway of the Melvin Park parking lot.

Inadequate Lighting

Lighting along the corridor is generally provided from the west side of the corridor via cobra-head style luminaires mounted to existing utility poles. The lighting installed as part of the last Riverside Drive construction projects appears to have been dependent upon the location of existing utility poles rather than specific roadway lighting criteria. Some additional lighting has been added as part of projects constructed since Riverside was built to its current dimensions. Luminaire poles with cobra-head lighting fixtures provide additional intersection lighting at James Boulevard and Stephen Richards Memorial Drive.

Two locations along the roadway appear to have inadequate lighting levels. These are just north of James Boulevard and north of Division Street. The former condition appears to be due to the removal of one or more fixtures as part of the Riverbend School frontage construction. The latter condition appears to be due to the large distance between the roadway and utility pole location to which the luminaires are attached.

Findings and Recommendations for Dimond Complex Access

The Dimond Complex access analysis and evaluation considered the needs of all users in the corridor, considering both trip purpose and mode. The extent of analysis included internal site circulation, driveway operations along Riverside Drive, level of severity and location of conflict areas, and traffic operations along the adjacent street system. Data used included a number of sources including the CBJ Engineering Department, Parks Department, and School District, Alaska Department of Transportation and Public Facilities, and Minch Ritter Voelckers Architects. Information was also collected during a public meeting held at Riverbend Elementary School on March 13, 2001. Traffic volume estimates were forecast for a future year of analysis that assumed the full-buildout of the Dimond Complex (Community Center, High School and park facilities expansion) plus assumed future background traffic. The a.m. peak hour period was used as the worst case traffic condition.

Each of the individual alternatives developed for access to the Dimond Complex was evaluated against a common set of criteria representing six categories: Vehicle Conflicts, Pedestrian and Bicycle Conflicts, Access Proximity, Conflict of Uses, Compatibility with Future Widening, and Impacts to Travel Along Riverside. The resulting recommendation was comprised of the following items:

1. Minimize the number of driveways into and out of the Dimond Complex along Riverside Drive to reduce vehicle conflict points and potential impacts to safety and traffic operations.

2. Designate the intersection of Riverside Drive and Riverwood as the main access to the High School/Community Center/Ball field Area. Install a traffic signal and dedicated left turn lane into the Complex for northbound traffic and a free right turn lane into the Complex for southbound traffic. This intersection will include adequate bicycle and pedestrian pathways at this main entrance point.

3. Work with bus company / transit authorities to ensure adequate area and layout for the bus staging functions

4. Include special facilities to accommodate passenger drop-off activities.

The *Dimond Complex Access - Alternatives Evaluation and Recommendation Memorandum* and backup documentation is included in Appendix C of this report.

SECTION 5

Potential Solutions

The solutions considered for Riverside Drive were collected from a number of sources including the City and Borough of Juneau's prior transportation planning efforts, prior Riverside Drive Corridor Project meetings, and research into appropriate applications for this specific transportation corridor.

Solution Categories

The lists of possible solutions considered for Riverside Driver Corridor deficiencies are widely applied and accepted across the country. These optional solutions are grouped into several categories: traffic control/calming measures, pedestrian safety and access improvements, network modifications, administrative changes. They represent a range of project costs and scopes and are also classified as either short- or long-term based on the ease and speed by which they may be implemented. It is assumed that short-term solutions would require low capital outlay and be straightforward to design and implement, while long-term solutions would require more capital and would be more complicated to design and construct. A summary presenting the solutions considered during this study are shown in a graphic "toolkit" format with pros/cons and cost ranges in Appendix B

Traffic Control / Traffic Calming

Traffic control is used to manage traffic for safe and efficient operations. Examples of traffic control devices that allocate right of way are traffic signals and stop signs. Other traffic control devices that are intended to affect some change in driver behavior are commonly referred to as traffic calming measures. Examples of these are chicanes or speed humps. Another set of traffic control devices prohibits certain movements from being made. These include raised medians and diverter islands. Solutions that are applicable to Riverside Drive are provided in Table 5-1.

TABLE 5-1
Short and Long-term Traffic Control/Calming Solutions

Short-term	Long-term
Chicanes	Traffic Signals
Raised, landscaped medians	Roundabouts
Speed humps/traffic tables (fixed & temporary)	
Traffic circles	
Neck downs	
Driver information system	

Pedestrian Safety, Comfort and Access

In order for a roadway facility to serve multimodal transportation, it must possess the features that make it safe, comfortable and accessible to pedestrians. There are a number of solutions available that address this aspect of the corridor. Those which are deemed appropriate for the Riverside Drive Corridor are presented in Table 5-2. They range from lighting and signing, to signals that would provide exclusive right of way (stop traffic) for pedestrians crossing the roadway.

TABLE 5-2
Short and Long-term Pedestrian Safety Comfort and Access Solutions

Short-term	Long-term
Improved signing and marking of pedestrian facilities	Signalized crosswalks (pedestrian actuated)
Pedestrian-scale lighting	Curb extensions Crosswalk flashers
Crosswalk flashers	Widened sidewalks
Street furniture	Refuge medians at crosswalks Curb extensions
Neighborhood connections	Widened sidewalks Refuge medians at crosswalks

Network Modifications

Network modifications represent a change made in the roadway or roadway network that would influence traffic patterns. These include the addition of new links, closure of existing links as well as the addition of roadway capacity through the addition of lanes. Network modification possibilities for the Riverside Drive Corridor are listed in Table 5-3 below.

TABLE 5-3
Short and Long-term Network Modification Solutions

Short-term	Long-term
Peak-period or temporary closure of Rosedale	New bridge connection to Back Loop from Riverside in vicinity of Melvin Park
Closure of Mint Way and Back Loop Road	Widen Riverside Drive South of Stephen Richards
	Permanent closure of Mint Way
	New connection to Back Loop from Riverside at Tournure Street

Administrative Changes

Administrative changes are solutions that affect the operation and management of the roadway or factors affecting traffic on the roadway. Table 5-4 lists a number of solutions that could be considered for the Riverside Drive Corridor ranging from changes in speed limit to altering the time when trips are made along the corridor through changing school start times. Administrative changes amount to changing the "rules of the road".

TABLE 5-4
Short and Long-term Administrative Solutions

Short-term	Long Term
Increase transit service along Riverside Drive	
Stagger school start times	
Close campus to eliminate mid-day student trips	
Reduce speed limit along Riverside Drive (signing and enforcement)	
Pedestrian and driver education program	
Improved Vegetation Control	
Encourage High School students and staff to carpool	

SECTION 6

Recommendations/Conclusions

The short-, mid- and long-term recommended packages for consideration by CBJ are described below. Each of these packages assumes the construction of the Riverwood Drive Signal as part of the Dimond Park Complex access package. It is assumed that the cost to design and install the signal and all associated improvements to the frontage of Dimond Park along Riverside Drive will be developed as part of the Dimond Park project. As stated above, the overriding assumption made during development of these recommendations is that the Riverside Drive Corridor will remain as it is today, a residential neighborhood north of Melvin Park and an urban collector south. Also assumed is that the CBJ-approved AWTP that calls for the improvement of Back Loop and Mendenhall Loop roads will be implemented. These improvements, over time, will aid in the collection of traffic from the north end of the Valley and minimize the unnecessary use of Riverside Drive as a through-way to Egan Drive.

Short-Term Solution Options

The short-term package of potential solutions addresses some of the most critical needs in the corridor, with low-cost, fast to implement solutions that are both consistent with the traffic and safety analysis performed as part of the study and with the concerns raised by many of the citizens that provided input. These improvements are mapped, where possible on Figure 6-1.

In the short term, the CBJ could consider a number of actions including:

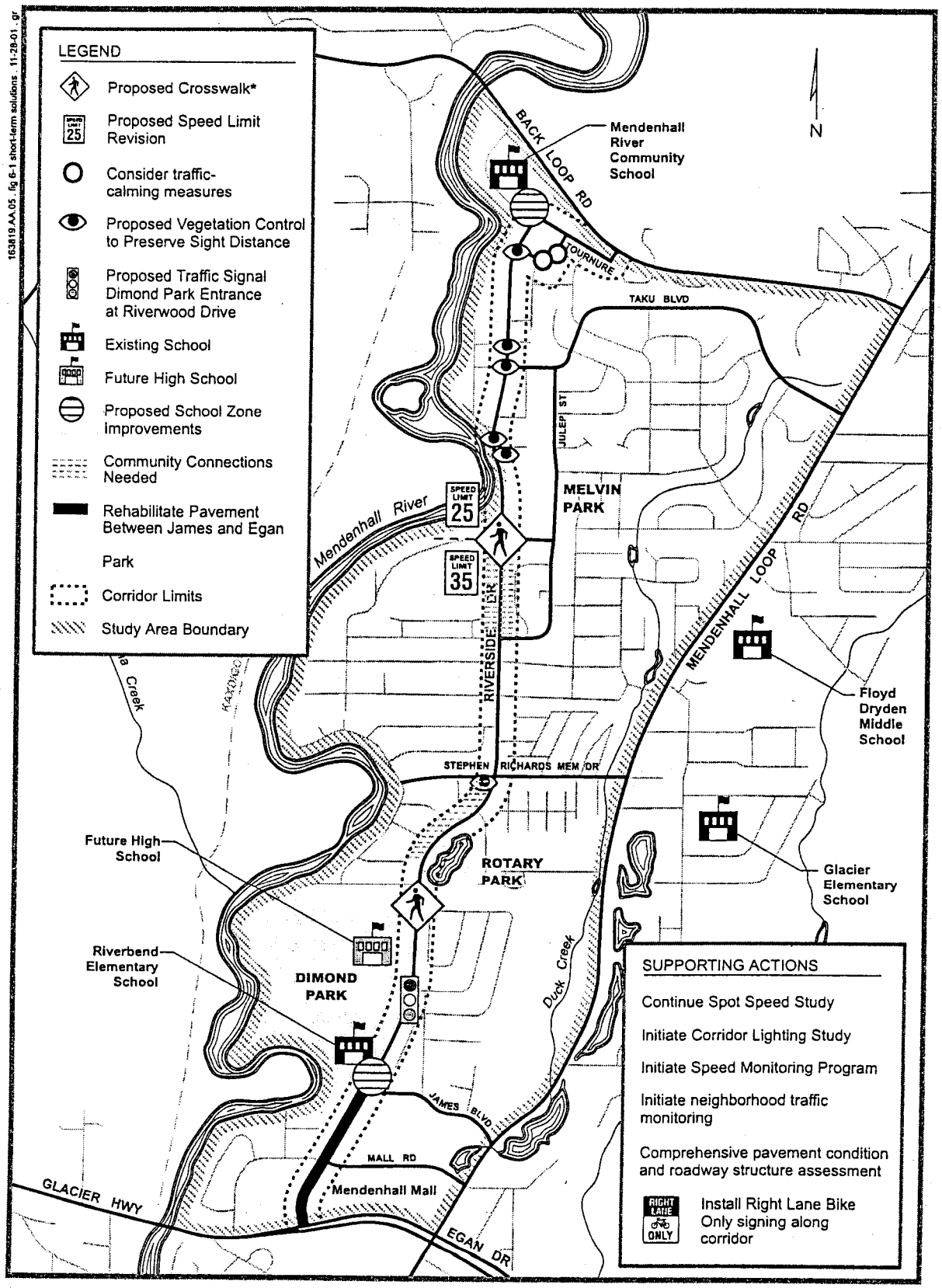
- Develop well-lit and well-marked pedestrian crosswalks at the Riverwood Drive (when the Dimond Complex signal is developed), the north end of the Dimond Complex (Parkwood Drive), and the south end of Melvin Park (Killewich Drive/Division Street). The Parkwood Drive and Killewich Drive crosswalks are needed now.
- Repave road between James Blvd. and Egan Drive
- Quantify road-specific cut-through traffic in the northern corridor neighborhood (e.g., Rosedale, Pinedale, and Taku Blvd.) and, if warranted, consider appropriate traffic slowing mechanisms.
- Establish school zone improvements in the vicinity of Mendenhall River Community and Riverbend Elementary schools to improve pedestrian safety and comfort. Enlist School District representatives and a pedestrian safety expert to work with the community to define what these improvements may include.
- Install "Right Lane Bike Only" signing along corridor.
- Develop neighborhood connections for pedestrians and bicycles along both sides of Riverside Drive between Parkwood Drive and Division Street.

- Establish a vegetation control program for all appropriate intersections beginning with the overgrown foliage north of Division Street and the vegetation limiting the sight distance for eastbound movements on Stephen Richards Memorial Drive.
- Reduce the speed limit along Riverside Drive to 25 miles per hour (m.p.h.) north of Division Street (existing 20 m.p.h. section to remain in the speed hump controlled portion of Riverside and Tournure).
- Deploy a random speed monitoring system that detects the speed of oncoming vehicles and displays the recorded speed on a display visible to the driver of the vehicle.
- Increase the number of Public Service Announcements and information spots in community newspapers to highlight school zone driving rules, bicycle rules of the road, adverse weather driving guidance and other timely releases to improve road safety throughout CBJ.
- Increased enforcement of motor and non-motor vehicle rules of the road.
- In addition, the CBJ should consider supporting actions such as:
  - Continuing the spot speed study to address school year and other seasonal variations in spot speeds,
  - Continuing conducting origin-destination studies to better quantify traffic using side streets as through-fares;
  - Initiating a corridor illumination study to define the precise lighting levels needed and design a system that will meet corridor lighting requirements.
  - Supporting an increase in transit service along Riverside Drive that would include regular daily bus service along the entire length of Riverside Drive.

Mid-Term Solution Options

Mid-term solutions are expected to be implementable within four to nine years following a moderate amount of planning and design. This package of mid-term solutions has been assembled to complement or upgrade the near-term solutions listed above. These improvements are mapped, where possible on Figure ES-3. Mid-term actions proposed include:

- Completion of the sidewalk system from Sharon to Back Loop Road, including Tournure Street. In some sections this would require curb, gutter, and sidewalk. In other sections, curb and gutter are already in place.
- Initiate additional actions to improve pedestrian crossing safety progressing from installing median refuge islands to consideration of signal flashers and rumble strips in advance of intersections. The most immediate needs and appropriate locations for these actions are (1) at the NW corner of Killewich Drive to the NE corner of Division Street, (2) from the NW corner to the NE corner of Stevens Richards, and (3) at the school crossing at James Blvd.
- Improve roadway illumination through installation of new lighting systems and upgrades to existing systems. Improvements to be made at specific intersections identified during a specific lighting deficiency analysis.

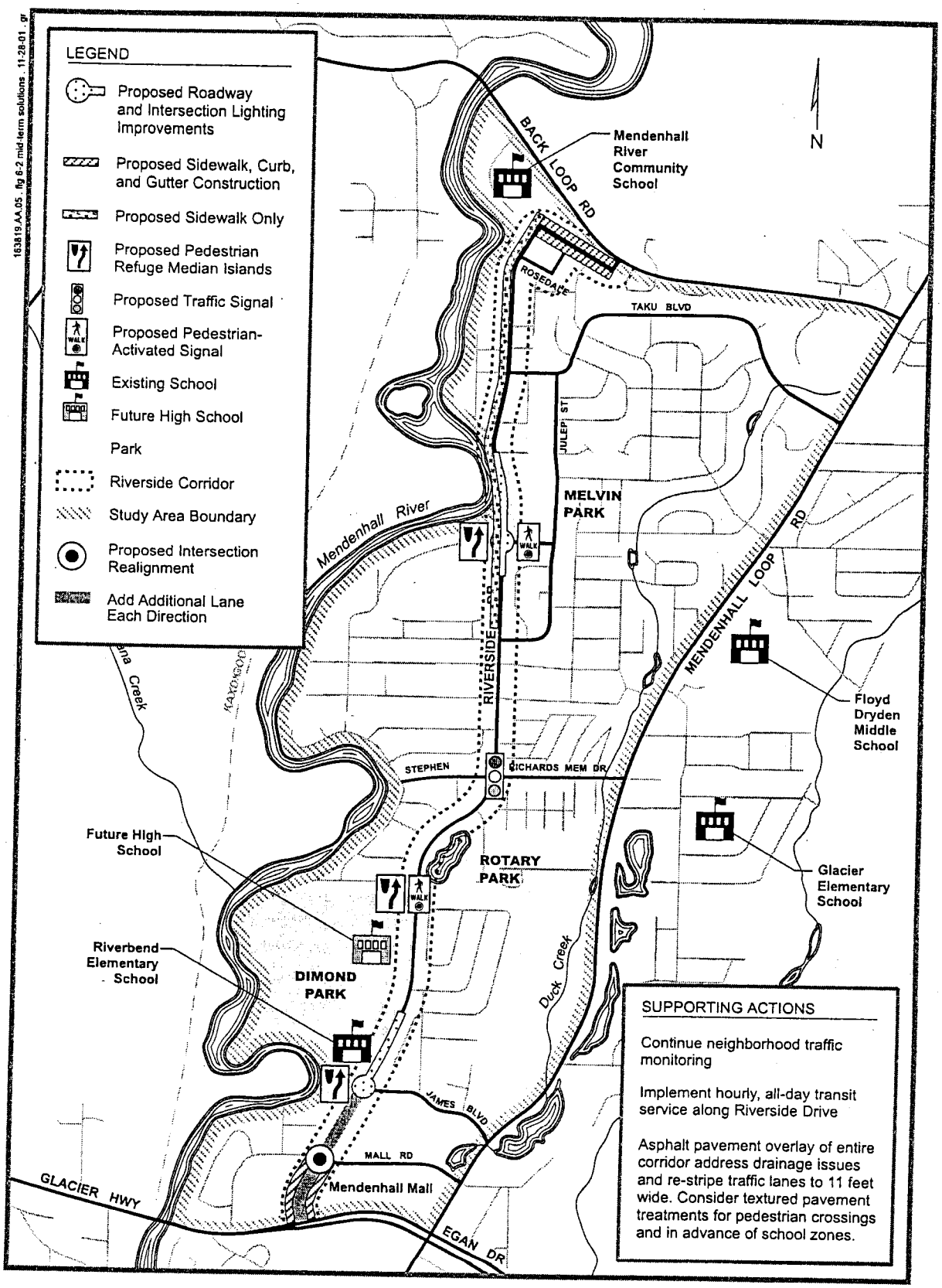


* To include advance signing and overhead flasher.

Riverside Drive Corridor

Figure 6-1

Short-Term Solution Options



Riverside Drive Corridor

Figure 6-2

Mid-Term Solution Options

- Rehabilitate the southern section of Riverside Drive between Egan and James. That project could include:
  - Completion of the sidewalk system from Egan to the Vintage/Mall intersection.
  - Expansion of Riverside Drive to 2 lanes in the southbound direction between James Boulevard and Egan Drive.
  - Realignment of the Mall Road / Vintage Drive intersection to improve roadway geometrics and provide a more safe and operationally efficient intersection.
  - Add a new one-way entrance to the Post Office directly off the southbound, right-hand lane of Riverside Drive.
- Install a traffic signal at Stephen Richards Memorial Drive.
- Asphalt pavement overlay of the corridor from James to Back Loop Road to rehabilitate roadway surface, address drainage issues and re-stripe traffic lanes to 11-feet wide. Consider adding textured pavement treatments for pedestrian crossings and rumble strips in advance of school zones.

Long-Term Solution Options

Long-term options are those that require significant planning, design, and funds. These could be implemented in 10 to 20 years. The long-term package of potential solutions addresses some of the anticipated future transportation needs in the corridor. A solution could include (Figure ES-4):

- Construction of a bridge crossing of the Mendenhall River in the vicinity of Melvin Park.

or

- Extending CBJ's ROW at the northern end of Riverside Drive and completion of a direct roadway connection to Back Loop Road and development of a controlled intersection.

To minimize unwanted traffic in the northern residential neighborhoods of the Riverside Drive Corridor following implementation one of these major projects, closure of Mint Way at the Back Loop Road could be considered.

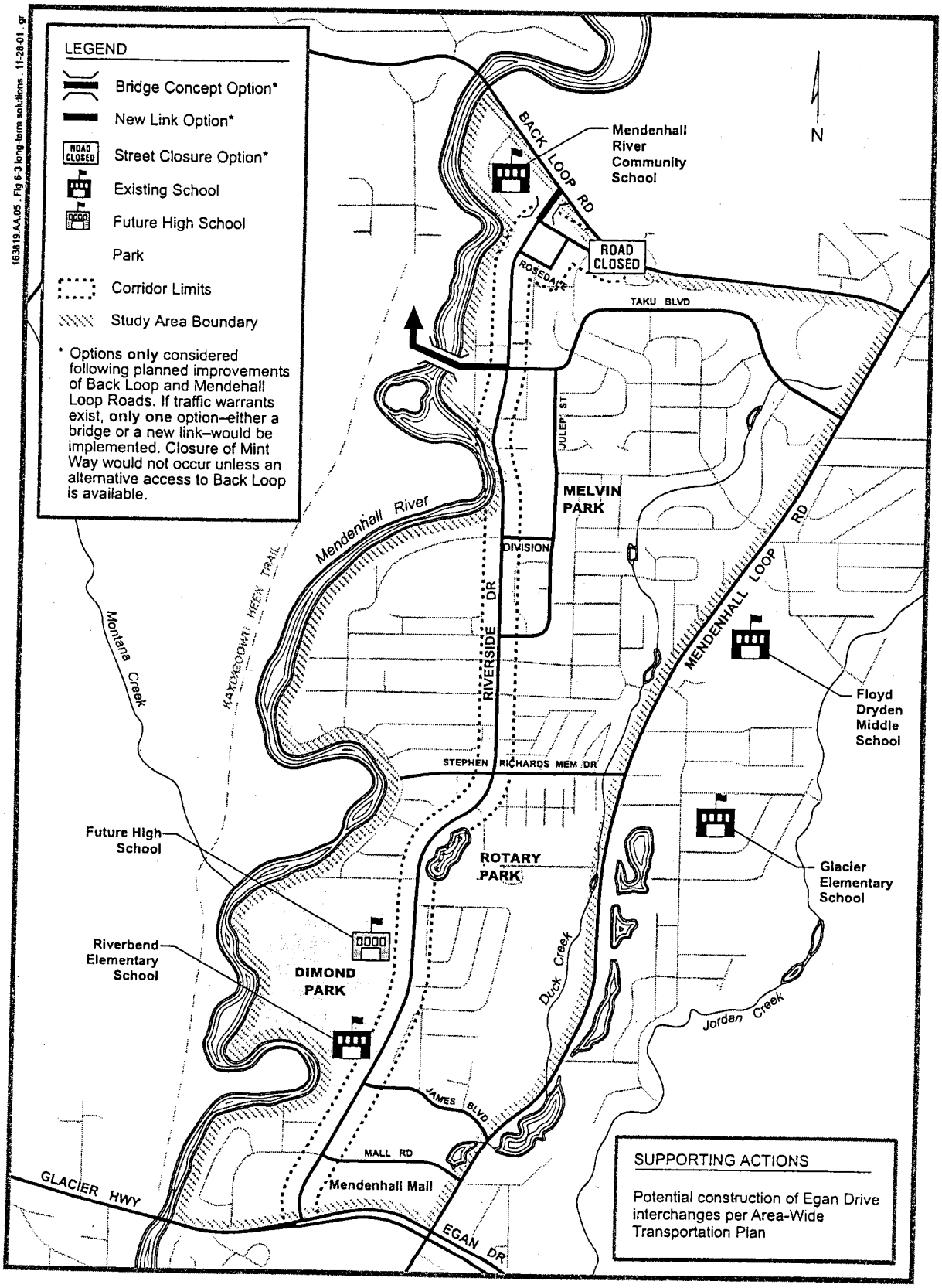
- During public meetings additional east-west connectivity issues were raised as potential long-term needs. We recommend that any evaluation of future connections between the east side and the west side of Mendenhall River include non-motorized connections and transit-supportive treatments. One such concept would be to add a pedestrian bridge across the river near the Killewich Drive neighborhood linking to the existing trail (Kaxdigoowu Heen Dei or Brotherhood Park trail).

As indicated above, these long-term options are independent options that could be considered as the transportation needs grow and change in the Valley over time. The bridge and completion of Riverside Drive are both listed in the approved Area Wide Transportation Plan (April 2001) as are improvements to the Back Loop and Mendenhall Loop Roads. We recommend that the bridge or the Riverside Drive completion projects be considered only after the planned improvements of Back Loop and Mendenhall Loop Roads are made. If additional traffic improvements are still warranted, an assessment of the engineering costs and constraints and the environmental impacts of a bridge or road completion project compared to no action would be mandatory.

The option to construct a new bridge assumes that there is a reasonable ROW to link bridge traffic to the Back Loop Road and existing neighborhoods on both sides of the river are avoided as much as possible. The option to complete Riverside Drive to Back Loop would require additional ROW and a land use change for the park area between Back Loop Road and the existing terminus of Riverside Drive. To implement this option, the northern portion of Riverside Drive would change from a local residential street to an arterial. Provisions would be necessary to allow for safe use of driveways fronting onto Riverside Drive

A preliminary engineering feasibility study conducted for CBJ found more engineering difficulties with the road completion plan compared to a new bridge across the Mendenhall River[2]. During the environmental documentation of any major project such as the bridge or Riverside Drive connection, the engineering feasibility, effectiveness, costs, and environmental impacts of these options can be more thoroughly compared both to each other and to a No Action alternative.

[2] Riverside Drive Extension Feasibility Report, R&M Engineering, 1996.



Riverside Drive Corridor

Figure 6-3

Long-Term Solution Options

Recommendations for Additional Investigation

There are a number of additional actions and investigations that could be pursued by CBJ in order to address existing deficiencies and issues within the corridor as well as citizen concerns. Some of these have already been initiated. Figures 6-1 through 6-3 note these studies as part of the short-, mid-, and long-term recommended solutions.

Continued Speed Study

The CBJ should continue to study spot speeds along the Riverside Drive Corridor to get a more accurate and comprehensive assessment of the speeding issues along the corridor. This includes taking measurements during the school year and across a number of time periods throughout the day.

School Zone Safety Improvement Study

The CBJ could support the development of specific school zone safety improvements for the Mendenhall River Community and Riverbend Elementary Schools. A working group should consist of School District Officials, School Staff, Crossing Guards, and area residents. This working group should be facilitated by a school zone safety expert whom can bring experience and expertise to assist in defining appropriate solutions.

Neighborhood Traffic Monitoring

At the same time the CBJ chooses to implement any additional traffic calming measures or street closures, it should institute a program of traffic monitoring to ensure that traffic impacts are mitigated to areas surrounding the traffic revisions. This can be done by mechanical means using tube counters.

Corridor Illumination Study

The CBJ could initiate an illumination study to determine the existing roadway lighting levels and identify additional lighting that will bring the roadway up to the desired levels. The illumination study should consider both general roadway corridor lighting as well as pedestrian scale lighting in school zones and near crossing locations.

Evaluation of Traffic Control for Stephen Richards Memorial Drive

A detailed evaluation of four-way traffic control for Stephen Richards Memorial Drive should be performed as part of Dimond Complex Environmental Review. The additional trips generated by the proposed High School are expected to necessitate the development of either a traffic signal or a roundabout. Once the opening year for the Dimond Park High School has been set, a detailed analysis of the traffic conditions at opening can be performed and the timing for construction of the traffic improvement set.

SECTION 7

Design Guidelines for Pedestrian and Bicycle Facilities in the Riverside Drive Corridor

Source: Juneau Non-Motorized Transportation Plan

Several viable alternatives exist for providing bicycle access depending on the roadway's cross section. The following design guidelines will proceed from the least expensive and attractive to bicyclists to safer, more costly, and desirable to bicycle riders, excluding separated multi-use pathways.

Wide Lanes

A wide lane may be provided where there is inadequate right-of-way to provide the required bike lanes or shoulder lanes. To be effective, a wide lane must be at least 14-ft wide, but less than 15-ft. Usable width does not include curb and gutter. Widths greater than 15-ft encourage the undesirable operation of two motor vehicles in one lane. In this situation, a bike lane or shoulder bikeway should be striped (see below).

Shoulder Lanes

When providing shoulders for bicycle use, a width of 6-ft is recommended. If there are physical width limitations, a minimum 4-ft shoulder may be used. Shoulders against a curb face, guardrail or other roadside barriers must have a 5-ft minimum width or 4-ft from the longitudinal joint between a curb and gutter and the edge of the travel lane. On steep grades, it is desirable to maintain a 6-ft, (min. 5-ft) shoulder, as cyclists need the additional space for maneuvering. Shoulder lanes should be striped with a 4-inch fog line. Paved shoulders should have the same pavement structural design as that of the roadway. Shoulder lanes should be regularly swept and kept free of debris. Unpaved parking lots and access roads should be paved 15-ft away from the shoulder to reduce encroachment of debris onto the shoulder.

Bike Lanes

Bike lanes are provided along roads where there is high potential bicycle use and should always be provided on both sides of a two-way street. A bike lane must always be marked with pavement stencils and an 8-inch wide stripe. The standard width of a bike lane is 6-ft, as measured from the center of stripe to the curb or edge of pavement. The minimum bike lane width is 4-ft on open shoulders and 5-ft from the face of a curb, guardrail, or parked cars. Bike lanes wider than 6-ft may be desirable in areas of very high use, on high-speed facilities where wider shoulders are warranted or where they are shared with pedestrians. Adequate signing must be in place so lanes are not mistaken for a motor vehicle lane or

parking area. If parking is permitted, the bike lane must be placed between parking and the travel lane and have a minimum width of 5-ft.

Source: Pedestrian Facilities Guidebook; Sponsored by OTAK, WSDOT, PSRC, AWC, CRAB

Basic pedestrian access can be provided by following the Americans with Disabilities Act (ADA) guidelines, but, because of the presence of school zones, recommendations for these areas are provided in this memorandum.

ADA Pedestrian Access Requirements

A clear width of passage, without obstacles such as signs, newspaper stands, and trash receptacles needs to be provided for accessible routes of travel. The ADA requires that pedestrian travel ways have a minimum 3-ft wide travel space to accommodate wheelchairs and a clear height of no less than 80-inches. All of the travel space needs to be a usable and unobstructed clear space for wheelchair passage. The minimum desirable width for sidewalks is 5-ft on local neighborhood streets and 6-ft elsewhere. When a walkway of less than 5-ft must be installed, passing areas are required. Passing areas measuring 5-ft by 5-ft every 200-ft are necessary. Accessible routes of travel should not exceed a maximum longitudinal grade of 5 percent. Steeper grades up to 8.33 percent can be provided with ramps. Level landing areas, 5-ft in length for every 30-inches of elevation change are required for these steeper slopes. Although, sidewalks and walkways located along roadways within the right-of-way may follow the natural grade of the land, which may exceed these maximum gradients. Cross-slopes on sidewalks and walkways should not exceed 2 percent, but should be of sufficient grade to facilitate positive drainage and avoid water accumulating on the surface. Slopes across intersections and crossings should also not exceed 2 percent, to facilitate crossing by wheelchair users and others.

Pedestrian Friendly School Zones

Sidewalks and walkways that clearly define the routes of access to and from schools should be provided in all areas surrounding the school and on the school site. Vertical separation (using curbs) and horizontal separation (using planting buffers, ditches, or swales) from motor vehicle traffic are strongly encourage to improve the safety of pedestrians walking along streets. On roads without sidewalks, widened roadway shoulders accommodate pedestrians. Shoulders may be paved or unpaved, but if unpaved, a well-compacted stable surface of crushed rock or other material is highly recommended. Shoulders that are a part of a designated school walk route should be 5-ft wide and be provided on both sides. If a shoulder can only be provided on one side, provide a minimum of 8-ft in width to allow students to walk off the roadway in either direction. It is recommended that shoulder use be a temporary solution until separated sidewalks or walkways can be implemented along roadways leading to the school.

SECTION 8

References

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