

# MEMORANDUM

CITY/BOROUGH OF JUNEAU  
155 South Seward Street, Juneau, Alaska 99801

**DATE:** January 3, 2014

**TO:** Planning Commission

**FROM:** Beth McKibben, Planner *BMC*  
Community Development Department

**FILE NO.:** USE2013 0034 and CSP2013 0028

**PROPOSAL:** Conditional Use and City State Project Review for Construction of a new 20,600 SF library and associated site improvements (parking, landscaping, etc.) in Dimond Park.

## GENERAL INFORMATION

**Applicant:** City and Borough of Juneau

**Property Owner:** City and Borough of Juneau

**Property Address:** Riverside Drive

**Legal Description:** USS 1284 TR 1 & 4598 Lakeside

**Parcel Code Number:** 5-B21-0-108-002-3

**Site Size:** 1.84 Acres

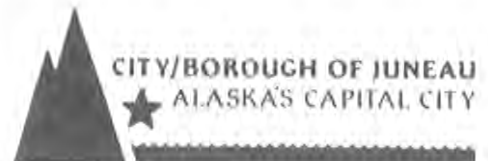
**Comprehensive Plan Future Land Use Designation:** MDR (Map G)

**Zoning:** D5

**Utilities:** City Water & Sewer

**Access:** Riverside Drive

**Existing Land Use:** Riverbend Elementary School, Thunder Mountain High School, softball and soccer fields, Wells Fargo Field House, Dimond Park Aquatic Center, greenhouse and related facilities, bridge/trail across Mendenhall River, etc.



Surrounding Land Use: North - Single-family Dwellings, D5  
South - Riverbend Elementary School, D18  
East - Riverside Drive ROW, Single-family Dwellings, D5  
West - Mendenhall River, CBJ-Owned Park, D1(T)D5

**VICINITY MAP**



## **ATTACHMENTS**

Attachment A – Traffic Impact Analysis of the Mendenhall Valley Public Library – An Update to the 2015 Riverside Drive Traffic and Pedestrian Study, TENW Project No. 3320. December 2013.

## **PROJECT DESCRIPTION**

The applicant requests a Conditional Use permit and City/State Project Review for the development of the Mendenhall Valley Library. The proposed library will be approximately 20,600 square feet in area.

Access will be via the signalized intersection at Riverside Drive, the same intersection and access road used to access Thunder Mountain High School. A total of 34 parking spaces are proposed. Parking lot lighting will continue the existing design used at the High School and Dimond Park Aquatic Center.

Landscaping will be provided along all sides of the building, with the majority being on the north side between the library and pool, some landscaping will be provided in the parking areas. Site lighting for the entrance and pedestrian access will be combination of building mounted and pathway lights. A government facility does not require a sign permit.

## **BACKGROUND**

Both the 1989 Dimond Community Complex Master Plan and the Juneau Parks and Recreation Plan, updated 2007, call for a library to be included in the Dimond Park Complex. According to the application materials a 1982 library development plan, which resulted in the construction of the downtown library in 1988 and the Douglas Library in 1986, called for a third public library in the Mendenhall Valley. The Valley Library was housed in the Mendenhall Mall in 1983 until the Dimond Park site could be developed.

## **ANALYSIS**

**Project Site** – Mendenhall Library site is located within the Dimond Community Complex in the East Mendenhall Valley. The master plan for the complex designates this site for a mix of recreational and educational facilities to meet the needs of the community. Although the overall Dimond Community Complex is approximately 70 acres, the actual acreage available for the library use will be approximately 1.8 acres.

**Project Design** – The proposed library facility will be 20,600 square feet in a single story building with a mechanical mezzanine, replacing the much smaller library currently operating in the

Mendenhall Mall. The library will be constructed to be a USGBC LEED certified facility and will include a geothermal heat pump system supplemented with an electric boiler. The plans call for 6,420 square feet for adult selections and seating, 1,000 square feet for young adult collections/seating, 2,740 square feet of children's collections/seating, 2,030 square feet of meeting/study space, 2,250 square feet of administration space (circulation desk, offices, break room, etc.), 2,790 square feet of public/support area.

**Traffic** – Thunder Mountain High School was permitted by Conditional Use permit USE2003-00055. During the review of this permit the applicant commissioned Transportation Engineering NorthWest, LLC (TENW) to conduct a transportation impact study (TIS), which was completed on January 26, 2004. The TIS analyzed traffic to be generated from a full build-out of the Dimond Park campus, including a high school with 1,500 students and a 95,000 square foot community center including an aquatic center, multi-use recreation center, and a public library.

On June 17, 2005 a TIS Addendum was issued by Transportation Engineering NorthWest, LLC revising their original recommendations based on changes made to the size of the high school. The TIS Addendum assumed a high school with a reduced capacity from 1,500 to 1,080 students and a community complex still at 95,000 square feet. The community complex used in conducting the analysis (alternative 2-full build out) contained an aquatic center, gymnasium, climbing wall, aerobic fitness area, teen room, meeting room, small commercial kitchen, offices, support facilities and a 17,500 square foot library.

The CBJ Engineering Department commissioned transportation specialist Richard Purves to summarize the key points of the TIS Addendum and offer conclusions to the Engineering Department. In a memo dated July 11, 2008 Engineering Department Director, Rorie Watt, stated that subsequent to the TIS Addendum, the size of the school was further reduced from 1,080 students to 850 students and the size of the community complex has been reduced from a 95,000 square foot complex with aquatic center, recreation center, and library to a 33,000 square foot aquatic center.

In July 2008 the Planning Commission approved USE2008-00037 which modified two conditions of USE2003-00055: installation of a traffic signal or roundabout at Riverside Drive and Stephen Richards Drive; and installation of bus shelters at Riverside Drive. The other conditions of USE2003-00055 remain in effect.

In the summer of 2009 CBJ Engineering commissioned another transportation and planning analysis (TIA) along Riverside Drive between James Boulevard and Division Street. This analysis was completed by TENW. This analysis considered the current conditions of the Dimond Park complex and a future (2015) build out as follows: Thunder Mountain High School with a maximum 750 students, 33,000 square foot aquatic center, and the existing Dimond Park Field House. All of the existing site access points would remain. The updated analysis also took into consideration the change in school hours. The analysis forecasted pedestrian and bicycle traffic for the 2015 build out scenario.

The study found that all the evaluated intersections function at or above LOS D, which is the minimum standard allowed by CBJ 49.40.310. Most of the studied intersections function at LOS A and B and were projected to continue to do so in 2015. This 2009 study found the four-way stop at Riverside and Steven Richards functioned at LOS D and projected that it would continue to function at LOS D in 2015.

A signal warrant analysis was also conducted for Riverside Drive and Steven Richards Drive intersection for full build out in 2015. Eight warrants were evaluated. Only warrants 3 and 8 were met during peak hours in 2015. TENW concludes that because not enough warrants were met per the requirements of the Alaska Traffic Manual, a traffic signal is not warranted or necessary at the Riverside and Steven Richards intersection in 2015.

Because the library was not included in the 2009 TIA, and the library is projected to generate 880 daily weekday trips, the CBJ Engineering Department commissioned another TIA by TENW (attachment A). This TIA was done as an update to the 2009 study discussed above and also uses 2015 as the horizon year. Page 4 of the TIA explains that even with the completion of the various facilities at the Dimond Park complex daily traffic on Riverside Drive has decreased an average of -1.6% between 2009 and 2012. Because of this change the growth rates used in past studies were not used in evaluating the cumulative impacts with the addition of the Mendenhall Valley Library.

The study found that all the evaluated intersections function at or above LOS C. Most of the studied intersections function at LOS A and B and were projected to continue to do so in 2015. This 2009 study found the four-way stop at Riverside and Steven Richards functioned at LOS D and projected that it would continue to function at LOS D in 2015. With the actual decrease in daily traffic on Riverside Drive this 2013 study found the four-way stop at Riverside and Steven Richards currently functions at LOS C at both AM and PM peak hour, but is projected to function at LOS D during the PM peak hour in 2015; which is the minimum standard allowed by CBJ 49.40.310. The study concludes that no additional traffic mitigation is warranted to support the addition of the library.

Traffic during construction.

Construction traffic is of some concern, Staff recommends that the contractor be required to use flaggers when construction vehicles use any of the internal access routes in the Dimond Park Complex. Staff also recommends that the contractor be required to wash down the trucks and dampen excavated material off-site prior to exiting the site as an effort to reduce dust. Additionally, staff recommends that sweeping and cleaning Riverside Drive be required to control dust and remove unwanted material from the street surface.

**Circulation** – Primary access will be via the signalized intersection at Riverside Drive with an internal road that provides public access to the proposed library, the swimming pool and TMHS. Thirty-four parking spaces are located across the internal road from the Mendenhall Valley Library. Pedestrian ways are shown on the site plan, providing a route from the parking area to the entrance of the library and tying in with the pedestrian way that parallels the high school visitor access road, which then intersects with Riverside Drive. Commercial service vehicles (such as deliveries) will

utilize drop-off areas. CBJ maintenance vehicles will use the service drive located on the north side of mechanical room.

**Parking** – CBJ 49.40.200(4)(D) requires that off-site parking be within 500 feet of the use from the nearest point of the parking facility. The parking lot across the access road from the library is less than 110 feet from the building at the nearest point and about 200 feet at its farthest point.

CBJ 49.40.210 (a) Table of minimum parking standards requires 1 parking space per 600 square feet of gross floor area for libraries. For this 20,600 square foot facility 34 parking spaces are required and are shown on the site plan, two of which will be van accessible.

**Noise** – Noise is not expected to be of concern with the Mendenhall Valley Library. Activity takes place inside the fully enclosed structure. There may be some external noise generated by the mechanical equipment, but given the distance from the neighboring residences it will not be loud enough to be considered a disturbance. Impacts to the neighborhood from vehicular noise are minimized due to using the “visitor access” road to the high school, located near the center of the Dimond Park Complex.

With regard to noise during construction, the CBJ Disturbing the Peace code, 42.20.095, restricts certain activities. A contractor will not be allowed to operate any heavy construction equipment before 7:00 am or after 10:00 PM Monday through Friday, or before 9:00 am or after 10:00 PM Saturday and Sunday, unless a permit is obtained from the CBJ Building Official. This permit will be issued only upon the determination that construction operations outside of these hours are necessary and will not result in unreasonable disturbance to surrounding residents.

**Lighting** – Exterior lighting will be provided in parking areas, along pedestrian pathways, and immediately adjacent to the building. All exterior lighting will have appropriate cut-off optics and house-side shields to efficiently focus light in the desired areas and to minimize the impacts to adjacent neighbors. The application materials indicate that exterior lighting will be the similar to what has been used at TMHS and the pool. As a condition of approval, staff recommends that a lighting plan be reviewed and approved prior to the issuance of any building permits.

**Landscaping** – D5 zoning requires 20% of the lot be maintained with live vegetation. If the Mendenhall Valley Library site is considered to be 1.8 acres then 15,682 square feet must be maintained with live vegetation. The application materials indicate that 25% of the site (19,602 sq. ft.) will be maintained with live vegetative cover. This is required to obtain the USGBC LEED Sustainable Site credit for maximum open space. Staff recommends a condition of approval that Prior to issuance of a Certificate of Occupancy, 20% of the lot must be planted with vegetation or the installation of vegetation must be bonded for and the required vegetative cover/landscaped shall be maintained with live vegetative cover. It is understood that the required 20% coverage will not be obtained in the first year of planting but when plants are mature.

**Drainage** – A drainage plan is required with the submittal of the building permit. The proposed Mendenhall Valley Library will create a large expanse of impervious coverage with the 20,600 square foot building footprint, plus the 34 parking spaces and pedestrian ways. Drainage will tie into the existing storm water system of the Dimond Park complex.

**Public Health or Safety** – Public Health and Safety concerns come primarily from the traffic generated by the library and the Dimond Park complex. These impacts have been considered and evaluated through a series of Traffic Impact Studies. Mitigation has been either installed or is required to be installed as a condition of another Conditional Use permit, therefore addressing the effect on public health and safety. The structure meets all zoning requirements for height and setbacks and will meet all applicable building code requirements for fire safety. No public health or safety concerns have been raised by this proposal.

**Habitat** – Approximately 0.18 acres of the library site is wetland. The CBJ Engineering Department is working with the US Army Corps of Engineers to obtain the required permits. No other sensitive habitats have been identified in this project area.

**Property Value or Neighborhood Harmony** – Numerous articles have been published documenting the positive impacts of libraries on communities. Libraries provide many essential services to the public and provide a common place for people to gather. Available evidence indicates that property values will not be affected and the proposed use, a library in Dimond Park Community Complex, is in harmony with the surrounding neighborhood.

**Conformity with Adopted Plans** – The 1989 Dimond Community Complex Plan called for a library but the 1999 plan does not. The Juneau Parks and Recreation Plan, updated 2007 also calls for a library to be included in the Dimond Park Complex. The newly adopted 2013 Comprehensive Plan addresses the Mendenhall Valley Library in Chapter 14, Community Education and Services, with Policy 14.2 and implementing action IA1:

*Policy 14.2 To foster literacy and to provide free access to library facilities and services.*

*IA1. Provide a city-owned library and community center at a convenient location in the Mendenhall Valley.*

Granting a Conditional Use permit for 20,600 square foot public library in the D5 zoning district, with appropriate conditions, is consistent with the Juneau Parks and Recreation Plan, updated 2007 and the 2013 CBJ Comprehensive Plan.

## **FINDINGS**

CBJ §49.15.330 (e)(1), Review of Director's Determinations, states that the Planning Commission shall review the Director's report to consider:

1. Whether the application is complete;
2. Whether the proposed use is appropriate according to the Table of Permissible Uses;  
and,
3. Whether the development as proposed will comply with the other requirements of this chapter.

The Commission shall adopt the Director's determination on the three items above unless it finds, by a preponderance of the evidence, that the Director's determination was in error, and states its reasoning for each finding with particularity.

CBJ §49.15.330 (f), Commission Determinations, states that even if the Commission adopts the Director's determination, it may nonetheless deny or condition the permit if it concludes, based upon its own independent review of the information submitted at the public hearing, that the development will more probably than not:

1. Materially endanger the public health or safety;
2. Substantially decrease the value of or be out of harmony with property in the neighboring area;  
or,
3. Not be in general conformity with the comprehensive plan, thoroughfare plan, or other officially adopted plans.

Per CBJ §49.15.330 (e) & (f), Review of Director's & Commission's Determinations, the Director makes the following findings on the proposed development:

### ***1. Is the application for the requested conditional use permit complete?***

**Yes.** We find the application contains the information necessary to conduct full review of the proposed operations. The application submittal by the applicant, including the appropriate fees, substantially conforms to the requirements of CBJ Chapter 49.15.

### ***2. Is the proposed use appropriate according to the Table of Permissible Uses?***

**Yes.** The requested permit is appropriate according to the Table of Permissible Uses. The permit is listed at CBJ §49.25.300, Section 5.300 for the D5 zoning district.

### ***3. Will the proposed development comply with the other requirements of this chapter?***

**Yes.** The proposed development complies with the other requirements of this chapter. Public notice of this project was provided in the January 3, 2014 and January 13, 2014 issues of the Juneau Empire's "Your Municipality" section, and a Notice of Public Hearing was mailed to all property



owners within 500 feet of the subject parcel. Moreover, a Public Notice Sign was posted on the subject parcel, visible from the public Right of Way.

**4. *Will the proposed development materially endanger the public health or safety?***

**No.** Based on the above analysis the proposed development, with conditions, will not endanger the public health and safety. Traffic mitigation that has been previously required will address the needs of the Dimond Community Park at full build out.

**5. *Will the proposed development substantially decrease the value of or be out of harmony with property in the neighboring area?***

**No.** Based on the above analysis the use, with conditions, will maintain values and will be in harmony with the neighboring area.

**6. *Will the proposed development be in general conformity with the land use plan, thoroughfare plan, or other officially adopted plans?***

**Yes.** As discussed above, the proposed development is in general conformity with the land use plan, particularly Policy 14.1 and IA1.

**Per CBJ §49.70.900 (b)(3), General Provisions, the Director makes the following Juneau Coastal Management Program consistency determination:**

**7. *Will the proposed development comply with the Juneau Coastal Management Program?***

**N/A.** This proposal will not impact habitat regulated by the Alaska Coastal Management Program.

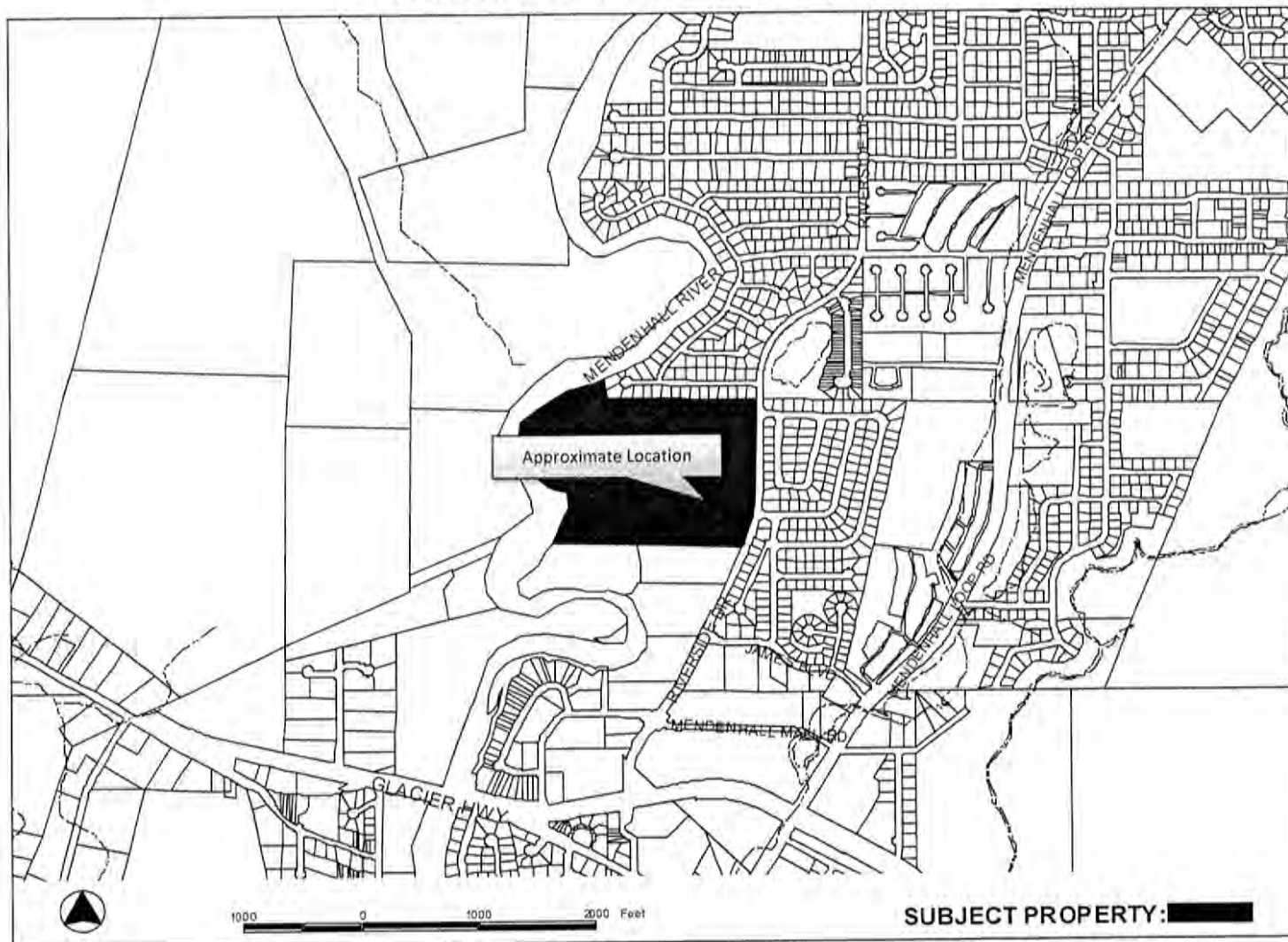
**RECOMMENDATION**

It is recommended that the Planning Commission adopt the Director's analysis and findings and grant the requested Conditional Use permit. Further, it is recommended the Planning Commission recommend approval of the City/State Project Review. The permits will allow the development of a new 20,600 SF library and associated site improvements (parking, landscaping, etc.) in Dimond Park. The approval is subject to the following conditions:

1. The contractor is required to use flaggers when construction vehicles use any of the internal access routes in the Dimond Park Complex.

2. The contractor is required to wash down the trucks and dampen excavated material off-site prior to exiting the site as an effort to reduce dust.
3. The contractor is required to control dust and remove unwanted material from the street surface of Riverside Drive and the internal circulation routes of Dimond Park.
4. Per CBJ Disturbing The Peace code, §42.20. 095, the contractor will not be allowed to operate any heavy construction equipment before 7:00 am or after 10:00 PM Monday through Friday, or before 9:00 am or after 10:00 PM Saturday and Sunday, unless a permit is obtained from the CBJ Building Official.
5. Prior to issuance of a building permit, the applicant shall submit a lighting plan illustrating the location and type of exterior lighting proposed for the development. Exterior lighting shall be designed and located to minimize offsite glare. Approval of the plan shall at the discretion of the Community Development Department, according to the requirements at CBJ 49.40.230(d).
6. Prior to issuance of a Certificate of Occupancy or a Temporary Certificate of Occupancy, 20% of the lot must be planted with vegetation or the installation of vegetation must be bonded for.
7. Vegetative cover/landscaped areas shown on the plans submitted shall be maintained with live vegetative cover as shown in the approved plans.
8. The site drainage ties in with the existing storm water system for the Dimond Park Community Complex.

# NOTICE OF PUBLIC HEARING



**PROPOSAL:** Conditional Use and City State Project review for construction of a new 20,600 SF library and associated site improvements (parking, landscaping, etc.) in Dimond Park.

<b>File No:</b>	CSP2013 0028; USE2013 0034	<b>Applicant:</b>	City and Borough of Juneau
<b>To:</b>	<b>Adjacent Property Owners</b>	<b>Property PCN:</b>	5-B21-0-108-002-3
<b>Hearing Date:</b>	January 14, 2014	<b>Owner:</b>	City and Borough of Juneau
<b>Hearing Time:</b>	7:00 PM	<b>Size:</b>	1.84 Acres
<b>Place:</b>	Assembly Chambers Municipal Building 155 South Seward Street Juneau, Alaska 99801	<b>Zoned:</b>	D-5
		<b>Site Address:</b>	Riverside Drive
		<b>Accessed Via:</b>	Riverside Drive

## PROPERTY OWNERS PLEASE NOTE:

You are invited to attend this Public Hearing and present oral testimony. The Planning Commission will also consider written testimony. You are encouraged to submit written material to the Community Development Department no later than 8:30 A.M. on the Wednesday preceding the Public Hearing. Materials received by this deadline are included in the information packet given to the Planning Commission a few days before the Public Hearing. Written material received after the deadline will be provided to the Planning Commission at the Public Hearing.

If you have questions, please contact Beth McKibben at [beth\\_mckibben@ci.juneau.ak.us](mailto:beth_mckibben@ci.juneau.ak.us) or at 586-0465.

Planning Commission Agendas, Staff Reports and Meeting Results can be viewed at [www.juneau.org/plancomm](http://www.juneau.org/plancomm).

Date notice was printed: December 24, 2013

# CITY/STATE PROJECT AND LAND ACTION REVIEW APPLICATION

Project Number	Project Name (15 characters)	Case Number CSP 20130028	Date Received 10/28/13
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**TYPE OF PROJECT REVIEW:**

City Project Review     
  City Land Acquisition /Disposal     
  State Project Review

**DESCRIPTION OF PROJECT**

CONSTRUCT A 20,600 SF PUBLIC LIBRARY AND ASSOCIATED SITE AMENITIES.

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Please attach a cover letter to fully explain the project if there is not adequate space on this form.

**CURRENT USE OF LAND OR BUILDING(S):**

VACANT UNDEVELOPED PARK LAND

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**PROPOSED USE OF LAND OR BUILDING(S):**

PUBLIC LIBRARY

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**PROJECT NUMBERS ASSOCIATED WITH PROPOSAL:**

Is this project associated with any other Land Use Permits?     No     Yes    Case No.: 2013.0034

Capital Improvement Program # (CIP)    CBJ CONTRACT NO. E14.051

Local Improvement District # (LID)    \_\_\_\_\_

State Project #    \_\_\_\_\_

**ESTIMATED PROJECT COST:**    \$ 10,500,000 CONSTRUCTION COST

For more information regarding the permitting process and the submittals required for a complete application, please see the reverse side.  If you need any assistance filling out this form, please contact the Permit Center at 586-0770.	<b>CITY/STATE PROJECT FEES</b>				
		Fees	Check No.	Receipt	Date
	Application Fees	\$ <u>1600.00</u>	_____	_____	_____
Total Fee	\$ <u>1600.00</u>	<u>PAID BY PAC</u>	_____	<u>10/28/13</u>	

**NOTE: MUST BE ACCOMPANIED BY DEVELOPMENT PERMIT APPLICATION FORM & EVEN IF THE PROPOSED PROJECT IS ASSOCIATE WITH OTHER LAND USE PERMITS, THIS APPLICATION MUST BE FILLED OUT**

TO BE COMPLETED BY THE APPLICANT

# DEVELOPMENT PERMIT APPLICATION

Project Number <b>CSP20130028</b>	CITY and BOROUGH of JUNEAU	Date Received: <b>10/28/13</b>
Project Name (City Staff to Assign Name)		

**INFORMATION**

**Project Description**  
Construction of a new ~20,600 SF library and associated site improvements (parking, landscaping, etc.) in Dimond Park.

PROPERTY LOCATION	
Street Address 73001? Riverside Drive	City/Zip Juneau, AK
Legal Description(s) of Parcel(s) (Subdivision, Survey, Block, Tract, Lot) USS 1284 TR 1 & 4598 Lakeside	
Assessor's Parcel Number(s) 5B2101080023	

LANDOWNER/ LESSEE		
Property Owner's Name City & Borough of Juneau	Contact Person: Nathan Coffee	Work Phone: 586-0895
Mailing Address 155 South Seward St, Juneau AK 99801	Home Phone: 321-0528	Fax Number:
E-mail Address nathan.coffee@ci.juneau.ak.us	Other Contact Phone Number(s):	

**LANDOWNER/ LESSEE CONSENT** \*\*\*\*Required for Planning Permits, not needed on Building/ Engineering Permits\*\*\*\*

I am (we are) the owner(s) or lessee(s) of the property subject to this application and I (we) consent as follows:  
 A. This application for a land use or activity review for development on my (our) property is made with my complete understanding and permission.  
 B. I (we) grant permission for officials and employees of the City and Borough of Juneau to inspect my property as needed for purposes of this application.

\_\_\_\_\_  
Landowner/Lessee Signature Date \_\_\_\_\_

\_\_\_\_\_  
Landowner/Lessee Signature Date \_\_\_\_\_

NOTICE: The City and Borough of Juneau staff may need access to the subject property during regular business hours and will attempt to contact the landowner in addition to the formal consent given above. Further, members of the Planning Commission may visit the property before the scheduled public hearing date.

**APPLICANT** If the same as OWNER, write "SAME" and sign and date at X below

Applicant's Name same as above	Contact Person:	Work Phone:
Mailing Address	Home Phone:	Fax Number:
E-mail Address	Other Contact Phone Number(s):	

\_\_\_\_\_  
Applicant's Signature Date of Application \_\_\_\_\_

-----OFFICE USE ONLY BELOW THIS LINE-----

**STAFF APPROVALS**

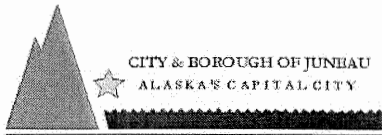
	Permit Type	**SIGN	Date Received	Application Number(s)
<input checked="" type="checkbox"/>	Building/Grading Permit			
<input checked="" type="checkbox"/>	City/State Project Review and City Land Action		10/28/13	CSP 20130028
	Inquiry Case (Fee In Lieu, Letter of ZC, Use Not Listed)			
	Mining Case (Small, Large, Rural, Extraction, Exploration)			
	Sign Approval (If more than one, fill in all applicable permit #'s)			
	Subdivision (Minor, Major, PUD, St. Vacation, St. Name Change)			
<input checked="" type="checkbox"/>	Use Approval (Allowable, Conditional, Cottage Housing, Mobile Home Parks, Accessory Apartment)		9/30/13	USE20130034
	Variance Case (De Minimis and all other Variance case types)			
	Wetlands Permits			
	Zone Change Application			
	Other (Describe)			

\*\*\*Public Notice Sign Form filled out and in the file.

Comments:  
\_\_\_\_\_  
\_\_\_\_\_

Permit Intake Initials

*ADW*



**ENGINEERING DEPARTMENT**  
CIP Engineering, Third Floor  
230 So. Franklin Street, Marine View Center

## transmittal letter

**Date:** Monday, September 30, 2013  
**To:** CBJ, Community Development  
**From:** Nathan Coffee, CBJ Project Manager, 586-0895  
**Subject:** Mendenhall Valley Public Library

### WE ARE SENDING YOU:

Copies	Description
1	Schematic Design Drawings & Narrative
1	Cover Letter
1	Conditional Use Application

### THESE ARE TRANSMITTED AS CHECKED BELOW:

For Your Use       For Approval       Approved As Submitted  
 For Review       Approved As Noted       Returned For Corrections

### COMMENTS:

Please bill review and permitting for this project to the following:

404900101 23 058 01 40 5690 Construction Permits

The project's construction budget is ~\$10,000,000. If you have any questions, don't hesitate to call me directly.

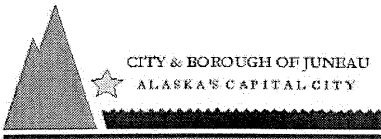
Thanks

Nathan Coffee, CBJ Project Manager, 586-0895 (cell 321-0528)

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Copies to: Owner, Project File

**MAILING ADDRESS: 155 SOUTH SEWARD STREET, JUNEAU, ALASKA 99801**



**ENGINEERING DEPARTMENT**  
CIP Engineering, Third Floor  
230 So. Franklin Street, Marine View Center

## memorandum

**Date:** Monday, September 30, 2013  
**To:** Beth McKibben  
**From:** Nathan Coffee, CBJ Project Manager, 586-0895  
**Subject:** Mendenhall Valley Public Library Conditional Use Permit Application

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Beth:

Below is a narrative description of the proposed Mendenhall Valley Library project to supplement schematic design drawings and narrative submitted 8/28/2013.

### **APPLICANT**

The applicant is the City and Borough of Juneau, Engineering Department. Primary contact for the project is Nathan Coffee, Project Manager.

### **PROJECT LOCATION**

The proposed project is located in Dimond Park on a parcel due north of the park's main entry and south of the Dimond Park Aquatic Center (DPAC) in the Mendenhall Valley of Juneau, Alaska. The latitude and longitude coordinates of the project site are 58.377756,-134.588592.

### **PROJECT HISTORY, PURPOSE AND NEED**

The project will construct a new 20,600 SF library facility on a city-owned site in Dimond Park to replace the current Valley Library located in leased space within the Mendenhall Mall. The project includes design, construction, and furnishing of the new library facility and appropriate development of the site. The existing Valley Library within the Mendenhall Mall will be closed upon completion of the new valley library at Dimond Park.

The City and Borough of Juneau has three public library facilities: the main Juneau Public Library downtown and branches in the city of Douglas and the Mendenhall Valley. The Juneau Public Library was completed in 1988 and opened to the public in the winter of 1989. It is a facility of 17,350 square feet, which houses the majority of the library collection, administrative offices, as well as computer and server support for all three libraries. It directly serves an area with a population of 8,302. The Douglas Public Library branch was completed in 1986. The library shares the Douglas Community Building and a public meeting room with the Douglas fire hall. The square footage of this library, including the shared meeting room is 7,973 square feet. The Douglas library serves a population of approximately 5,500.

The Mendenhall Valley Public Library is presently located in 9,391 square feet of leased commercial space in the Mendenhall Mall, 10 miles from the main library downtown. The Mendenhall Valley library serves the area of largest population in the Juneau borough: 17,500 in

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Copies to: Owner, Project File

**MAILING ADDRESS: 155 SOUTH SEWARD STREET, JUNEAU, ALASKA 99801**

the 2010 census.

The construction of the Douglas Public Library in 1986 and of the Juneau Public Library in 1988 were two parts of a three-part plan for library development published in 1982 following a two-year long process that involved library staff, various community groups and a library consultant hired by the city.

The third element of the plan called for the construction of a city-owned library branch in the Mendenhall Valley, near to the three schools then located in the area. A sales tax measure was passed by the voters in 1982. The measure was dedicated, in part, to the acquisition of property in the heart of the Mendenhall Valley for construction of schools, recreation facilities, and a branch library to serve the Mendenhall Valley. In 1983, the Mendenhall Valley Library moved to the Mendenhall Mall as a temporary measure until the newly acquired Dimond Park site could be developed. A new Mendenhall Valley library facility has been envisioned as part of the long term development of Dimond Park since its purchase in 1986 and was included as a component in a comprehensive master plan that was developed for the park in 1988.

A new planning process for a community recreation center, including the library, began in early 2004. In addition to the library, the facility was planned to include an aquatics center and gyms. Community meeting rooms and public spaces were to be shared and jointly administered by Parks and Recreation and the library. An architectural firm from Portland, Boora, was hired to manage planning for the overall facility. Boora contracted with Drew Harrington, a library consultant from Eugene, Oregon, to work with the library to develop a detailed space needs assessment. It included interviewing of staff and convening focus groups with varied groups of potential Mendenhall Valley library users. She applied recognized library standards to her recommendations for seating and collections, based on population estimates for the Mendenhall Valley at that time.

As the community recreation center plans developed, the space needs of the library were subordinated to those of the recreation components. As concerns regarding the overall project cost grew, the project became a phased project with the first phase addressing recreational components, primarily a swimming pool, and the second phase was to address construction of a new library. In October, 2005 as part of a multi-part, multi-year sales tax initiative the recreation facility was placed on the ballot. The pool and other projects failed to win voter approval. However, shortly after the project's defeat, a small group of concerned citizens working with JYL Architects developed a scaled back swimming pool plan that better met the needs of the community and the voter's budget conscious decision making. The revised aquatic facility initiative was placed on the ballot in October 2007 and was passed by voters. The aquatic center opened to the public in 2011 and another piece of the comprehensive development plan for the Dimond Park site was completed.

The proposed library project is but another piece of the master plan for Dimond Park. Based on the public support during the initial project planning from the Juneau community, who have long since tired of the substandard library space provided in the Mendenhall Mall location, the time is ripe for the construction of a new library facility at Dimond Park to come to fruition.



## PROJECT TIMELINE

The following project schedule identifies the anticipated project timeline:

Work Item	Date
Design	
- Complete Concept/Schematic Design	9/1/2013
- Complete 50% Design	11/1/2013
- Complete 95% Design	2/1/2013
- Complete 100% Design	3/1/2014
- Advertise for Construction Bids	3/1/2014
Construction	
- Open Construction Bids	4/1/2014
- Issue Notice to Proceed	4/15/2014
- Begin Construction	5/1/2014
- Midpoint Construction	12/1/2014
- Complete Construction	7/1/2015
Furnishings and Equipment	
- Procure FFE	1/1/2015
- Complete FFE Install	8/1/2015
- Occupy Building	8/1/2015
Grand Opening to Public	9/1/2015

## PROJECT DESCRIPTION

The project will construct an approximately 20,600 SF library facility in Dimond Park. The library will replace the current valley library located in rental space in the Mendenhall mall. The project will also construct 34 parking spaces on adjacent property west of the main access road to Thunder Mountain High School (TMHS); similar to the relationship between facility and parking area at both DPAC and TMHS. Other site development of lighting, utilities, paved plaza spaces, and landscaped garden spaces will also be included in the project. The project is to be a USGBC LEED certified facility. The library will be divided into the following building areas:

<b>Adult Collections &amp; Seating</b>	
Fiction & Non-Fiction	3400
Reference Collection	200
Media Collections	500
Periodicals	100
Alaska Collection	300
Distributed Tables and Seating	1000
Public Computer Area	420
Display	100
New Materials & Oversize	400
<b>Subtotal Adult</b>	<b>6,420</b>
<b>Young Adult Collections &amp; Seating</b>	
Young Adult Collections	200
Tables and Lounge Seating	800
<b>Subtotal Young Adult</b>	<b>1000</b>

<b>Children's Collection &amp; Seating</b>	
Children's Collections	1800
Table and Lounge Seating	400
Children's Computer	100
Children's Story Area	320
Staff support area	120
<b><i>Subtotal Children's</i></b>	<b><i>2,740</i></b>
<b>Meeting</b>	
Multi-Purpose / Program Room	900
Multi-Purpose Storage	250
Small Meeting Room (Conference)	300
Craft / Flex Room	100
Study Rooms	200
AV Lab	200
Business Center	80
<b><i>Subtotal Meeting</i></b>	<b><i>2,030</i></b>
<b>Administration</b>	
Circulation Desk, Reference Desk	450
Director's Office	0
Administrative Support Offices	900
Administrative Storage	400
Children's Program Storage	50
Shipping / Receiving	200
Staff Break Room	200
Staff Restroom	50
<b><i>Subtotal Administration</i></b>	<b><i>2,250</i></b>
<b>Public / Support</b>	
Vestibule, Entry	150
Central Foyer / Lobby	400
Coffee Kiosk & Seating	300
Display / Paperback Exchange	50
Public Restrooms	400
Family Restroom	50
Mechanical, Electrical Rooms	1200
Janitor	120
Misc. / Outdoor Storage	120
<b><i>Subtotal Support</i></b>	<b><i>2,790</i></b>
<b><i>Net Area Subtotal</i></b>	<b><i>17,230</i></b>
<b>Gross Multipliers</b>	
Circulation (17%)	2,929
Shafts / Walls (3%)	517
<b>TOTAL</b>	<b>20,676</b>

## **CONSTRUCTION**

The new Mendenhall Valley Library will be a single-story structure with a small mechanical mezzanine. The site soils will be removed and replaced with suitable non-frost susceptible structural fill to create a building pad for the standard concrete foundation and concrete floor slab on grade. A structural steel building frame will be clad with a brick and glass exterior closure system over an ~R30 metal stud wall assembly. Low roof areas will utilize a fully adhered membrane roof system over rigid insulation and sloped roof will utilize a metal roof system over rigid insulation. Both roofs will have an ~R40 insulation value. The facility will be heated using a geothermal heat pump system (GSHP) with the facility's well field being located under the parking area. An electric boiler will be provided for back-up of the GSHP and to supplement provision of heat to the facility during extreme cold periods. Construction of the well field will occur concurrent with the project. A 600 amp electric service will be provided to the facility.

The project construction will be bid as a single construction contract in spring of 2014 and be awarded to the lowest qualified bidder as required by CBJ procurement code.

## **SITE LIGHTING**

Site lighting will utilize cut-off fixtures similar to those used in development of THMS and DPAC. Project will be designed to meet USGBC LEED Sustainable Site credit 8 – Light Pollution Reduction, which stipulates that no more than 2% of total fixture lumens are emitted at an angle of 90 degrees or higher from nadir and that not greater than .01 horizontal footcandles will occur 10' beyond the site boundary.

## **ZONING AND PERMISSIBLE USE**

Dimond Park is zoned D-5. A library facility is a permissible use that must be approved by the CBJ Planning Commission. D-5 zoning development is required to have a 20' front setback and can not exceed 35' in height. The current facility design complies with the 20' front setback. The current facility design complies with the 35' maximum height with the exception of the building chimney, which is being reduced in size to comply with the height restrictions and as a value engineering measure.

## **PARKING**

CBJ Ordinance 49.40.201 requires 1 space per 600 square feet gross floor area for libraries and museums.  $20,600 \text{ SF} \div 600 \text{ SF} = 34.33$  parking spaces. The project intends to provide 34 parking spaces, two of which will be accessible.

## **VEGETATIVE COVER**

CBJ Ordinance 49.50.300 requires live vegetative cover over a minimum of 20% of the lot on D-5 zoned sites. The project intends to provide a minimum of 25% live vegetative cover in pursuit of USGBC LEED Sustainable Site credit 5.2 – Maximize Open Space.

## **WETLANDS**

Approximately .18 acres of the proposed site was determined to be a wetland per United States Army Corps of Engineers (USACOE). CBJ is working with USACOE to procure required permits for the project excavation and fill that will eliminate the wetland area. Due to the wetland habitat being separated from other wetlands and a remnant from wetland permitted construction that occurred during the TMHS construction, it is unlikely that the USACOE will require mitigation of the wetland area.

## **NOISE & NEIGHBORHOOD HARMONY**

Construction of a public library facility will most likely be viewed as an asset to local properties and should not detrimentally impact property values. Building operations will have little to no impact on noise levels to adjacent neighborhood with the exception of additional vehicular traffic to and from the site.

## **TRAFFIC**

Additional traffic to the site is anticipated with the construction of the library facility. However, traffic levels still should be well below those estimated and planned for with the construction of TMHS where a signaled intersection was installed at Riverside Drive and Riverwood Drive and a four-way stop was installed at the intersection of Riverside Drive and Stephen Richards Memorial Drive.

Please contact me directly with any questions regarding the project.

Thanks

Nathan Coffee, CBJ Project Manager, 586-0895

# MENDENHALL VALLEY PUBLIC LIBRARY

CBJ CONTRACT E14-041



AUGUST 9, 2012

## SCHEMATIC DESIGN NARRATIVE



**THA**  
ARCHITECTURE

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**1010 PROJECT SUMMARY**

The project consists of a New 20,756 single story public library to be constructed on an unprepared site located at the entrance to Dimond Park in Juneau's Mendenhall Valley. It will be adjacent to other City of Juneau facilities including the Mendenhall Valley Aquatic Center, and nearby, the Juneau Thunder Mountain High School.

**1015 STRUCTURAL CRITERIA**

The structural system will be designed in accordance with the following criteria:

Code: 2009 International Building Code as amended by the State of Alaska and the City and Borough of Juneau

Structural Occupancy Category: III , *"Buildings and other structures that represent a substantial hazard to human life in the event of a failure, specifically buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300."*

Loads:Snow:

Ground Snow: 70 psf  
Exposure Coefficient, Ce: 1.0  
Thermal Coefficient, Ct 1.0 at main roof, 1.2 at unheated eaves and entry  
Importance, Is: 1.1  
Flat Roof Snow Load: pf= 54 psf at main roof  
pf = 65 psf at unheated eaves and entry

Wind:

Wind Speed (3 second gust) 105 mph  
Exposure: C  
Importance, Iw: 1.15

Seismic:

Site Class D  
Importance, Ie = 1.25  
Sd = 0.635g; Fa = 1.29; Sds = 0.55g  
S1 = 0.299g; Fv = 1.80; Sd1 = 0.36g  
R = 2.5 for cantilevered column, special steel moment frames  
Cs = 0.64 g

Foundation Criteria:

The foundation will be designed in accordance with the recommendations included in the R&M Engineering report: "Juneau Valley Library, Geotechnical Investigation", March 19, 2013. Footings will be designed to not exceed an allowable vertical bearing pressure of 2,500 psf on the material prepared per the geotechnical report.

Structural Materials

Materials will be as follows:

Concrete: 28-day strength  $f_c' = 4,000$  psi

Concrete Reinforcing: Conform to ASTM A615, grade 60.

Steel will conform to the following:

W Sections: ASTM A992 (Fy = 50,000 psi)

Tube Steel HSS sections: ASTM A500, Grade B, (Fy = 46,000 psi)

Plates, Angles and Channels: ASTM A36 (Fy = 36,000 psi)

Bolts: ASTM A325

Steel will be fabricated and erected in accordance with the American Institute of Steel Construction, Code of Standard Practice. Welding will be in accordance with the American Welding Society, Structural Welding Code D1.1 and the Seismic Supplement D1.1

**1020 PROJECT PROGRAM**

Reference Schematic Design Narrative Appendix, "Valley Library Program".

**1030 EXISTING CONDITIONS**

The site is currently undeveloped.

**1040 OWNER'S WORK**

Includes the provisions for all non fixed items including all tables, platforms, shelving, equipment and furnishings in the Library. These items are not to be included in this contract.

**20 PROPOSAL, BIDDING, AND CONTRACTING**

**2010 DELIVERY METHOD – Lump Sum Bid**

**2020 QUALIFICATION REQUIREMENTS – "Qualified Bidder " provision, CBJ Engineering Department, General Contracts**

**2040 BID REQUIREMENTS – None specified**

**2050 CONTRACTING REQUIREMENTS – None Specified**

**30 COST SUMMARY**

**3010 ELEMENTAL COST ESTIMATE – As outlined**

**3020 ASSUMPTIONS AND QUALIFICATIONS – None Specified**

**3030 ALLOWANCES – Non Specified**

**3040 ALTERNATES for individual cost analysis:**

**Alternate #1 - Heating System- Water to Water Heat Pump - Reference section Services, Section "D-30" (Mechanical)**

**Alternate #2 - Heating System- Air to Water Heat Pump, ASHP, , reference section Services, Section "D-30", (Mechanical), Reference Architectural Site Plan A0.2 for location and description of pump enclosure.**

**Alternate #3 - Library Raised Floor system - Reference structural narrative section "A1030 SLAB ON GRADE SECTION", following as well as Architectural Schematic Design Documents, sheet A10.1, "Alternate – Raised Floor Diagram - Basis of design for the raised floor system is Haworth Smart Floor 1500 SL.**

**Alternate #4: Granite Pavers at Pedestrian Street Crossing:** Area of granite pavers to be 24' long by 28' wide. Granite pavers to be 12"x12" by 3-1/2" deep. Granite pavers to be set on 1" depth bedding sand and have polymeric jointing sand placed. A 4" thick concrete raft slab will be placed below the granite paver area to provide structural stability for the granite pavers.

**3050 UNIT PRICES** – Used for earthwork with quantities provided.

## **A. SUBSTRUCTURE**

### **A10 FOUNDATIONS**

#### **A1010 STANDARD FOUNDATIONS**

The foundation system will consist of a conventional reinforced concrete, spread footing foundation. The column footings will likely be larger than typical due to the fact that columns are to be fixed at their bases by the foundation. A slab on grade will serve as the floor.

#### **A1020 SPECIAL FOUNDATIONS**

The column footings will likely be larger than typical due to the fact that columns are to be fixed at their bases by the foundation.

#### **A1030 SLAB ON GRADE**

A slab on grade will serve as the floor. The slab will be over a 15 mil vapor barrier over a 4 inch base course. The slab will be 5.5 inches deep to accommodate the in-floor heat piping, the relatively large concentrated loads from shelving and the moderately soft soils on site. Alternate No. 3, Raised Floor Included in the alternate that includes the raised floor, there will be a recessed 5.5 inch slab on grade over a 15 mil vapor barrier over base course under the access floor. The access floor will be specified using a performance specification and be pre-engineered by the supplier. The system will be 18 (or what ever height you want to specify) inches high and consist of heavy but removable structural tiles supported on a galvanized steel grid with small pipe support columns at periodic intervals. The columns will have a small base plate which will bear on the recessed slab-on-grade. At the edges of the access floor system there will be vertical concrete walls, 6 inches thick and reinforced with no 4 at 12 inches on center each way.

## **B. SHELL**

### **B10 SUPERSTRUCTURE**

#### **B1010 FLOOR CONSTRUCTION**

See slab on grade foundation above.

#### **B1015 COLUMNS**

The foundation will support tube steel columns that will resist lateral forces from earthquakes and wind by being fixed at their bases. The columns will be relatively large and thick with 14 x 14 inch size and 7/8 inch thick wall thickness so that they will satisfy the requirements of the seismic provisions of the building code for special steel moment frames, cantilevered column systems. The columns will be 12 feet on center along the perimeter glass curtain wall and at the edge of the building where a 12 foot high low roof is over offices and meeting rooms.

#### **B1017 FIREPLACE STRUCTURE**

The fireplace will be a free-standing concrete structure with masonry veneer isolated from the roof, steel deck diaphragm. The veneer will be either brick or stone veneer.

#### **B1020 ROOF CONSTRUCTION**

The steel columns will support 24-inch deep wide flange beams that will clear span the main areas of the building. At the roof overhangs 12-inch deep wide flange beams will be bolted to the ends of the 24-inch deep wide flange beams with end plates on each, separated by a dense material that provides a thermal break. Beams will be field bolted to columns.

The main beams will have pre-fabricated holes through the web to provide a path for sprinklers, conduit and cabling. Depending on the opening location, the openings may be reinforced or they may be a simple oval opening.

At the low roof, 12-inch deep wide flange beams will span over the perimeter rooms. The beams will be on 12 foot spacings

The roof beams, both at the upper roof and lower roof will support a 3-inch deep steel deck. The deck will support the roofing insulation and membrane system as well as the suspended ceiling system.

Tube steel members will be at the top of curtain walls to provide lateral support to resist out of plane wind and seismic loads. The tube steel members will be bolted to the beams or the columns.

### **B. SHELL**

#### **B20 EXTERIOR ENCLOSURE**

##### **B2010 EXTERIOR WALLS**

The exterior solid walls will consist of steel, cold formed studs. Depending on the clear height they will be 6 or 8 inches in depth. The studs will not be load bearing and will need to have a deflection track at the top of the wall. The studs will need to be sized to resist the lateral wind loads as prescribed by the building code.

##### **B2010 EXTERIOR WALL**

There is one exterior wall type:

BRK VNR SYS - walls to be composed of:

Brick Veneer – Endicott- Manganese iron spot- Norman brick 3 5/8" x 2 1/4" x 12"  
3" of rigid insulation = R 30  
1 " Air Space  
Waterproof membrane; Henry Blueskin  
Exterior Gyp Sheathing  
6" Mtl stud framing  
Vapor Barrier  
One layer painted gyp bd.,

**B2020 EXTERIOR WINDOWS WDW WALL 1:** Basis of design is Kawneer 1600.

##### **B2030 EXTERIOR DOORS**

Exterior Doors (Main Entry): Aluminum with glass relite

Exterior Doors (North Side - Meeting room): Aluminum with glass relite

Exterior Doors (North Side – Open Library): Painted steel door

Exterior Doors (North Side – Service): Painted steel door

Exterior Door (West Side- Administration): Aluminum with glass relite

### **B30 ROOFING**

#### **B3010 ROOF COVERINGS**

SHT MTL RFG 1 – AE Span Span Loc 12” Standing seam Low slope metal roofing  
2x4 PT Sleepers spaced 24” O.C.

7” insulation thickness over the entire roof R-40 fully adhered.

Continuous ice and water shield over the entire roof.

¾ Exterior plywood.

Metal decking Ref: Structural.

SINGLE PLY RFG SYS :

White 60 mill white single ply.

5/8” Cover board.

Tapered insulation Min R-40 fully adhered.

Vapor barrier

Metal decking Ref: Structural

METAL FLASHING AND TRIM:

MTL PNL COPING - .125” Prefinished exterior aluminum plate.

MTL PNL SILL - .125” Prefinished exterior aluminum plate.

MTL PNL FACIA - .125” Prefinished exterior aluminum plate.

SHT MTL GUTTER- 18 ga. Prefinished sht metal

#### **B3020 ROOF OPENINGS**

SHT MTL DS – Prefinished metal downspout

## **C. INTERIORS**

### **C10 INTERIOR CONSTRUCTION**

#### **C1010 PARTITIONS**

General wall type recommendations are given below by room use. Where two different room types are adjacent to each other, use the higher numbered wall type.

Break room / walls between Administration and other Library Areas

Wall Type 1: STC 45 : 1 layers of 5/8" GWB II 25 ga, 3 5/8" mtl stud w/ R-11 insulation in cavity II 1 layers of 5/8" GWB

Bathrooms:

Wall Type 3: STC 55 : 2 layers of 5/8" GWB || 25 ga, 3 5/8" mtl stud w/ R-11 insulation in cavity || 2 layer of 5/8" GWB

Wall between Large meeting room and Teen / Foyer / Service

Wall Type 3: STC 55 : 2 layers of 5/8" GWB || 25 ga, 3 5/8" mtl stud w/ R-11 insulation in cavity || 2 layer of 5/8" GWB

Wall between Foyer and Main Library

Wall Type 3: STC 55 : 2 layers of 5/8" GWB || 25 ga, 3 5/8" mtl stud w/ R-11 insulation in cavity || 2 layer of 5/8" GWB

Walls @ small / medium meeting rooms

Wall Type 2: STC 50 : 2 layers of 5/8" GWB || 25 ga, 3 5/8" mtl stud w/ R-11 insulation in cavity || 1 layer of 5/8" GWB

**C1020 INTERIOR DOORS**

- Typical interior doors shall be solid core doors with wood veneer.
- Doors at main entry lobby vestibule: Same as the exterior Aluminum door system
- Meeting Room Doors: Modernfold 932 gypsum face.
- All interior glazing to be custom frameless glass with aluminum top and bottom support channel.

C1030 FITTINGS - None

**C20 STAIRS**

**C2010 STAIR CONSTRUCTION** - None

**C30 INTERIOR**

**C3010 WALL FINISHES**

- Typical: painted, smooth finish (Level 4) gypsum wallboard. Latex eggshell paint. 4" painted wood base.
- Bathrooms to be Ceramic tile thinset on water resistant gypsum board
- Large Meeting Room: painted, smooth finish (Level 4) gypsum wallboard. Latex eggshell paint. 4" painted wood base. Fabric wrapped acoustical panel with fiberglass tackable liner to 8'-0" AFF on all wall surfaces.

**C3020 FLOOR FINISHES**

- Ceramic tile at all bathrooms..
- Carpet tile at all open library areas, Community meeting room and office areas
- Linoleum @ Break Room and all electrical, water, janitor, storage and tel/data rooms.

- Walk-off mat at Vestibule.
- Ground and polished concrete at Foyer
- Additive Alternate Floor Sytem

#### **C3030 CEILING FINISHES**

- Painted gypsum wallboard ceilings in all toilet rooms, storage rooms, janitor room.
- 
- Service area to be open to structure.
- WD SLAT CEILING SYS – Basis of design is: 9 Wood 2200 Lay in Linear.
- ACT – 1 – Basis of design is Decoustics "Claro".

### **D. SERVICES**

#### **D10 MECHANICAL**

##### **DESIGN CRITERIA:**

The mechanical systems will be designed and constructed in accordance with the 2009 International Building, 2009 Uniform Plumbing Code, 2009 International Fire Code, 2009 International Mechanical Code, most recent National Fire Protection Association (NFPA), and City and Borough of Juneau Title 19 and State of Alaska requirements.

##### **DESIGN PARAMETERS**

- Inside Air Temperature: 70F.
- Outside Air Temperature: -4F.
- Outside air per ASHRAE 62.1-2010 Ventilation Rate Procedure, Chapter 6.2.
- Total ventilation rate no less than 3 air changes per hour with displacement ventilation.
- Toilet Rooms will be provided with minimum 10 air changes per hour mechanical exhaust.

##### **GENERAL SCOPE OF WORK**

- The scope of mechanical work includes installation of a radiant floor heating system, variable volume ventilation for all occupied areas utilizing displacement air ventilation, low temperature water heating coil, domestic water plumbing, exhaust air systems, low voltage DDC automatic controls, and building sprinkler system. A base bid heating system with electric boiler and alternate geothermal or air-to-water heating system are to be provided.
- Contractor shall provide submittal data, O&M data, as-built drawings, adjustment of ventilation systems with report log, and training of the mechanical systems.
- The Mechanical system design and installation will be an integral part of the building LEED requirements. LEEDS Commissioning of Mechanical Systems shall be provided.



### **PIPE AND EQUIPMENT INSULATION**

Vent piping within 10 feet of roof penetration, all domestic cold and hot water piping shall be insulated with sectional pipe covering, mineral fiber, 1 inch IPS thick. Heating piping will be mineral fiber, 1-1/2 inch thick. Outside air duct from louver to fan and exhaust ducts from exterior wall to backdraft damper or automatic damper will be insulated with faced 1-1/2 inch thick glass-fiber blanket having a minimum density of 1 pound per cubic foot and vapor barrier.

### **VALVES**

Domestic and heating water valves shall be provided rated for 400 psig working pressure. Valves 3-inches and smaller are to be bronze body, two piece, quarter turn full port ball valves. Valves over 3-inches shall be gate valves and shall have flanged end connections. Valves will be installed accessibly to individually shut off domestic/heating water piping to each room. A main cold water and hot water shutoff valve will be located accessibly behind an access door in each of the public toilet rooms or immediately outside the toilet room in order to quickly shutoff water service to the entire toilet room. Domestic water drain valves shall have vacuum breakers and caps. Heating water drain valves shall have caps.

## **D20 PLUMBING**

### **D2010 PLUMBING FIXTURES**

Handicapped accessible ADA fixtures will be used where required. All fixtures will be the water saving type. Sinks in Break Room, in Administration work area, and in Meeting Room will be ADA stainless steel with undercoating and single lever gooseneck faucet. Water closets will be vitreous china wall mounted, elongated bowl, with dual type manual flush valves. Urinals will be vitreous china wall mounted with low flow manual flush valves. Lavatories will be wall mounted fixtures with auto sensing faucets. Service sink SS-1, located in Janitor, will be floor mounted enamel cast-iron with mixing faucet. Floor drains with trap primers will be located in Toilet Rooms, Janitors Room, and Mechanical Room. A stainless steel dual drinking fountain near toilet rooms is anticipated.

### **D2020 DOMESTIC WATER DISTRIBUTION**

Domestic cold and hot water piping interior to the facility will be Type L copper. A 2-inch cold water service is anticipated to serve the domestic water requirements from a branch off of the ductile iron 6-inch water service.

Domestic hot water will be supplied to toilet room lavatories, a service sink, and work area/meeting/break room sinks from a 50 gallon, 9 KW electric hot water tank. A tempering valve will be installed at the hot water tank and will temper the water for a maximum of 115F water temperature. Hot water recirculating system is anticipated with hot water recirculating pump located in the Mechanical room.

An exterior non-freeze type wall hydrant will be located at the Mechanical Room, at the Team/Meeting common wall, and at the Break room wall to serve exterior water needs.

### **D2030 SANITARY WASTE**

Sanitary waste and vent piping will be cast-iron hub-and-spigot below grade and no-hub cast-iron with heavy duty couplings above the floor. 4-inch sanitary waste piping will exit the building and a 6-inch sanitary sewer service will be routed to city

service main. A 4-inch vent-through-roof shall serve the plumbing vent requirements.

**D2040 RAIN WATER DRAINAGE –  
ROOF DRAINAGE SYSTEM**

Roof drainage collection will occur outside of the building envelope. See architectural for further definition.

**D2050 OTHER PLUMBING SYSTEMS - None**

**D30 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

**D3010 ENERGY SUPPLY  
HEATING SYSTEMS**

The heating plant will consist of an electric boiler, primary/secondary pumping system, radiant floor heating, air handling unit heating coil, and convectors/cabinet unit heaters located at entries if needed. The heating system will be designed for low temperature heating water of 110-120F so that energy efficient water-water or air-water heat pumps can be utilized, either now or in the future. The majority of the building heating would be provided through a hydronic radiant floor heating system with 12 zones anticipated, each controlled by its own respective wall mounted DDC room thermostat.

**Electric Boiler, EB:** A single electric boiler with PID controls and demand limiting capability, sized for 100% of building load with preliminary boiler size of 385,000 BTU/hr (115 Kilowatts), would supply the heating water for the radiant floor heating and air handling unit heating coil. A lead/back-up in-line pump would inject heating water from the boiler into the building heating water circulation loop when heating is required. Two building heating circulation pumps, operating in lead/back-up, would provide heating water to the radiant floor heating loop and to the air handling unit coil and entry convectors.

**Alternate Heating System- Water to Water Heat Pump, GSHP:** Alternate heating system would consist of ground source heating system with 20 vertical boreholes manifolded in the loopfield into three separate circuits and routed to two small heat pumps located in the Mechanical Room. The heating water generated by the water-water heat pumps would provide heating water for the radiant floor heating, entry convectors, and the AHU heating coil. A reversing valve at the water-water heat pumps could allow for use of cooling water to serve the main AHU and its cooling coil. Recent innovations to water-water heat pumps have provided for heating and cooling options. If the GSHP option is selected, a smaller electric boiler (sized at 50% load) would provide back-up heating if one GSHP unit fails and could also operate as lag heating if needed during coldest winter days. Two loopfield circulation pumps (Lead and Back-up), a buffer tank, and a GSHP condenser-side in-line circulation pump would be required for each GSHP unit in addition to that described for the electric boiler only system.

Preliminary estimate is as follows:

- 20 boreholes at an average depth of 350 feet with 1-inch diameter U-tube assembly.
- Two water-to-water heat pumps, McQuay scroll compressor, each sized at 185,000 Btu/hr capacity for a total of 370,000 Btu/hr (96% of design load).

- Loopfield area approximately 80 feet by 60 feet required with boreholes 20 feet on center.

**Alternate Heating System- Air to Water Heat Pump, ASHP:** Alternate heating system would consist of air source heating system with exterior air source heat pumps and interior water storage tanks providing heating water for the building.

Air source heat pumps operate down to outdoor air temperatures of approximately -4F, thus during extreme cold temperatures experienced in the Mendenhall Valley, a back-up electric boiler sized at 100% load, would be required.

Preliminary estimate is as follows:

- Six air-to-water heat pumps, each sized at 60,000 Btu/hr heating capacity for a total capacity of 360,000 Btu/hr (94% of design load).

Air source heat pump outdoor units should be located near service area to minimize noise disturbances to library/meeting/office areas. The outdoor units should also be located on a concrete pad and under exterior covered building overhangs or in louvered enclosure to reduce defrost cycles, provide easier maintenance, and to maintain higher energy efficiencies. An additional 160 SF overhang would be required to cover these heat pumps outside of the building on the North side of the Service Room.

A cartridge style heating water circulation pump would be required for each indoor heat pump unit in addition to that described for the electric boiler only system.

#### **HEATING PIPING**

**Heating Water Piping:** Aboveground heating piping mains and branch piping shall be hard-drawn copper tubing, ASTM B 88, Type L with press-fit joints, 95-5 solder fittings or equivalent. Press fit joints would be acceptable upon approval.

**Geothermal Loopfield Piping:** If the ground source heating option is selected, underground vertical u-bend piping and horizontal loopfield piping mains and branch piping would be high density polyethylene (HDPE) piping with fittings joined by a heat fusion process. Loopfield piping would be insulated with closed cell elastomeric foam pipe insulation, 1-inch thick. Extruded polystyrene rigid insulation would be installed above the piping in the loopfield trenches. Aboveground geothermal piping located inside the building will be Copper Type L or Schedule 40, black steel. Methanol/Water or Propylene Glycol/Water solution would be used as geothermal heat transfer fluid.

**Radiant Heating Piping:** High density cross-linked polyethylene tubing with oxygen barrier (Pex-a), 5/8-inch diameter, would be used for in-slab radiant heating piping material. Aboveground piping would be copper, Type L. A minimum of 4-5 enclosed accessible manifolds would be required for heating supply to 12 radiant heating zones.

**D3020 HEAT GENERATION** – See above

**D3030 REFRIGERATION:** None

**D3040 HVAC DISTRIBUTION**

### **VENTILATION AND EXHAUST AIR SYSTEM**

Ventilation will be provided to all occupied areas of the facility by an air-handling unit, AHU, with variable speed supply and return fans in an internally isolated insulated cabinet, located in the Mechanical Room above the toilet rooms. Preliminary size of the AHU unit is 10,000 cfm. The AHU would include a return fan RF section with airfoil plenum fan and exhaust air dampers, mixing box section with outside and return air dampers, MERV 13 high efficiency filter section, low temperature water heating coil, and airfoil plenum supply fan section. AHU outside air will be taken in through an intake louver and the AHU will exhaust/relieve air out a separate exhaust louver on opposite side of the Mechanical Room. Building wide air conditioning cooling systems are not anticipated for the facility unless the GSHP water-water heat pump alternate or other alternative heating system is chosen. A cooling coil would be provided in the AHU to provide air cooling in this case. If cooling is not used in current installation a blank space for future cooling would be included for future installation. A heat recovery wrap-around preheat coil is anticipated for installation in the outdoor air duct and heat recovery coil in the exhaust duct to transfer heat from exhaust air to the incoming outdoor air.

A displacement type ventilation system is recommended that would deliver supply air low to the occupied space, within 6-24 inches above the floor. The return air system would be installed high. Displacement diffusers are anticipated to be installed within the bottom 8-inches of permanent bookshelves in main library areas and larger spaces; with wall type or corner type displacement diffusers installed for smaller rooms. Displacement air is delivered at low velocity (20-30 fpm) at the face of the diffuser so that the cool air will not create drafts. The displacement air would be provided at temperatures of between 60-66F depending on building cooling/heating requirements. Supplying air at temperatures lower than room temperature allows the displacement air to distribute evenly throughout the occupied spaces. Displacement air systems provide ventilation to occupants and breathing zones in an efficient manner, requiring less outdoor air and thus less heating energy than standard overhead distribution systems in providing proper indoor air quality. Displacement ventilation is a good choice for applications with higher ceilings. The displacement air system can also provide natural cooling, when outdoor air conditions allow, (or mechanical cooling with alternate heating system option) when needed.

Return air grilles would be located high in soffits and along high library ceiling edges. Exhaust air will be provided for toilet rooms, janitors room, copy room, and mechanical/storage rooms where needed. Heat recovery will be provided for the exhaust air system through heat recovery coil system to preheat incoming outdoor air. Duct silencers would be installed on the return air ducts and supply air ducts to limit transfer of sound to library areas.

Displacement supply air ducting would be routed underground in round HDPE ductwork, similar to Blue-Duct, to the displacement diffusers throughout the building. Return air and exhaust air ducting would be routed above the ceiling. All aboveground ductwork would be galvanized steel sheet metal.

MERV 13 filters will be provided for ventilation systems meeting LEEDS requirements.

The copy room will utilize an exhaust system with a high air exchange rate for proper air quality meeting LEEDS requirements.

**D3050 TERMINAL AND PACKAGED UNITS – None**

**D3060 HVAC INSTRUMENTATION AND CONTROLS**

A stand-alone direct digital control DDC system is anticipated to control the AHU air handling unit ventilation system, heat recovery system, exhaust system, heating plant and pumps, and radiant floor heating systems. Computer station with graphics of the building mechanical systems will be provided for ease in monitoring, trending, and scheduling operation of mechanical systems. Control system will be capable of remote monitoring and control from CBJ maintenance office.

Individual room temperature control will be provided for each heating zone.

The Building Automation System BAS will monitor the outdoor air supply volume and indoor air quality (carbon dioxide levels) to ensure that ventilation systems maintain design minimums per LEEDS requirements.

Feedback to the building automation system from heating plant(s), room temperature sensors, outdoor air monitoring devices, ventilation controls, and other heating/ventilation systems provide the maintenance crew with the ability to monitor the operation and energy use of the HVAC system on-site or remotely. Estimate a total of 50 input-output control points.

**D3070 TESTING, ADJUSTING, AND BALANCING**

**D3090 OTHER SPECIAL HVAC SYSTEMS AND EQUIPMENT - None**

**D40 FIRE PROTECTION**

**D4010 SPRINKLERS SYSTEMS**

A wet sprinkler system shall serve the warm spaces of the building, with the sprinkler header located in the Mechanical room. Sprinkler heads to be recessed where ceilings are present or standard pendant heads otherwise. Sprinkler piping within the ceiling space may need to penetrate structural beams. Combustible exterior canopies and entries over 4 feet wide will be sprinkled by a dry sprinkler system. Sprinkler system shall be designed and installed per NFPA 13. A 6-inch water service with double check backflow preventer is anticipated.

**D50 ELECTRICAL**

**D5010 ELECTRICAL SERVICE AND DISTRIBUTION**

**Incoming Service:** A single utility service will provide power to the building. This utility service will provide power to the building at 208Y/120 volt, three-phase, four-wire, from the new pad-mounted transformer. The transformer will feed bus-type current transformers located within the Main Switchboard (MSB).

**Main Distribution:** The service ampacity will be sized to include a minimum of 25 percent spare capacity. Preliminary calculations indicate that a 208Y/120 volt service rated for 600 amperes will be required for the building. The service will feed a Main Switchboard, equipped with a main circuit breaker, located in the main electrical/mechanical room of the building. The main circuit breaker will be equipped with a shunt trip operator and a pushbutton actuator will be located on the exterior of the building adjacent to the main entrance to serve as the main service disconnect. The main switchboard will distribute 208Y/120 volt power to major mechanical loads,

primary building loads and branch circuit panelboards located throughout the facility. Spare circuit breakers will be provided in the main switchboard to supply future loads.

Electrical distribution equipment and panels will be located in proximity to the area they serve to minimize branch circuit homerun lengths.

Depending on the final mechanical design and the potential additive bid alternate, a ground source heat pump system may be installed for the heating loads. If an electric boiler is provided as a back-up heat source for this facility, it will cause the electrical service size to increase to 1,200 amperes.

Branch Circuit Distribution: Depending on the floor system utilized for the building a distribution system for power and data connections will be developed to future-proof the facility and allow for relocation of equipment and furniture as needs evolve. If the floor system chosen is a computer floor or raised floor system then sufficient raceways will be provided from the distribution panel(s) and server racks to provide access under the floor system. These will be utilized for the identified circuits and drops and spares will be provided for future additional ones. Should the floor be a slab-on-grade type then a system of underfloor ducts or a similar underfloor trench system will be installed to again provide future access to most points in the main open portion of the Library. These systems will provide a grid of accessible boxes throughout the open floor plan area for use of the present connections as well as those in the future.

## D5020 LIGHTING AND BRANCH WIRING

### LIGHTING SYSTEMS

**General Criteria:** High efficiency solid state lighting (SSL) utilizing LED technology will be employed in most interior spaces and for the exterior as well. A variety of luminaire types will be incorporated to distribute light in a controlled way that will be efficient, flexible and will compliment the architecture in the respective spaces. LED lamps will have a color-rendering index (CRI) greater than 80 and a color temperature between 3500°K and 4000°K. Luminaires will be selected to utilize standard electronic drivers with dimming capability as appropriate.

The latest edition (10th) of the Illuminating Engineering Society of North America (IESNA) Lighting Handbook has reduced the recommended horizontal illuminance levels from previous editions. Greater emphasis is placed on vertical illuminance and controlling glare and luminance ratios for reader comfort in a paper and computer environment. We will be using the latest edition of the IESNA Lighting Handbook, the American National Standard (ANSI) IES RP-4-13 for Library Lighting and the American National Standard (ANSI) IES RP-1-12 for Office Lighting.

Lighting concepts will be fully developed with the architect and interior designer during the Design Development phase. Preliminary concepts are described below based on area types. These are ideas for consideration in lieu of specific layouts, which are pending the more developed floor plans and reflected ceiling plans.

**General Lighting Concepts:** Where practical, indirect lighting will be utilized to soften and warm the appearance of the space while providing sufficient illuminance levels. It will also provide more effective vertical lighting with less shadow obscuration. Further, this enhances the implementation of the daylighting schemes by minimizing the differences between the light sources.

Luminaire types and geometric layout patterns will be selected to complement room shapes and features, including the light shelves and daylight harvesting controls. Task and display lighting will utilize LED type luminaires installed to handle specific lighting tasks. Explicit applications and control schemes will be developed with the architect and interior designer during the Design Development phase.

Recessed cove or surface wall-mounted perimeter-type LED lighting will be developed for internal corridors and low ceiling, high traffic areas. The luminaires will be placed strategically and intermittently to lend contrast and relief where desired.

Lighting in large, high ceiling spaces will typically utilize similar recessed cove or surface wall-mounted perimeter-type LED semi-concealed luminaires. A combination of luminaires with direct and indirect lighting components is anticipated.

Typically, lighting in small office areas will be indirect type suspended LED luminaires with a minimal cross section and a small, diffuse downlight component.

Emergency egress lighting will be provided with integral emergency batteries installed in the room luminaires or with unit type emergency luminaires.

Exit signs will be LED type for long life and will be equipped with integral emergency batteries.

**Specific Lighting Concepts:** Recommended illumination levels and concepts for specific areas are:

**Lobby/Foyer:** 10-30 footcandles (fc) horizontal. These areas are the center points of access to the facility and the lighting will be designed to provide an atmosphere that is inviting, safe and efficient. We envision indirect LED luminaires to accentuate high ceiling spaces and LED pendants or downlights for general ambient lighting. Linear LED direct/indirect perimeter lighting can present a visually appealing edge-lit appearance in the lower levels of this space, which puts light where it is needed without flooding the space. In addition, well placed recessed LED luminaires may be utilized to light the lower level perimeter areas of the space. During Design Development several approaches will be explored in close coordination with the architect and interior designer to create a lighting design that will highlight the architecture of this space.

**Display Areas:** 10-50 footcandles (fc). These areas can vary considerably and lighting concepts will be further developed during the next design phase. Wall washing techniques can be used to provide background lighting levels. Spot lights and/or high performance downlights and wall wash luminaires will highlight display areas. Where sensitive material or artwork is to be displayed, LED lighting with proper infrared and ultra-violet protection will be utilized.

**Meeting Room:** 10-50 fc horizontal. This is a multi-use area and the lighting design will support this function. We envision that the majority of the lighting will consist of pendant direct/indirect LED luminaires or recessed LED downlights. A limited number of track or theatre-type lighting will be provided to support a presentation/lecture position at the front of the room as well as potential art displays on the walls. In addition, wall mounted decorative sconces may be utilized to add visual interest to the space. Control is the key to effective and attractive lighting in this variable use space and the lighting control will be coordinated closely with the architect and Owner during the future design phases.

**Library (Seating/Reading Areas):** 30-40 fc horizontal. Consideration will be given to glare and luminance ratios. We will be designing using either recessed LED downlights or linear LED direct/indirect luminaires. Since many of these areas are adjacent to stack areas the lighting layout should endeavor to provide a seamless appearance and permit future rearranging the floor layouts without changing luminaire layouts. Perimeter or cove mounted luminaires may be utilized to accentuate the sloped ceiling in these areas.

**Library (Stack Areas):** 30 fc vertical. Depending on the type of stack specified the illumination may be provided with LED luminaires mounted within the stacks or attached to the stacks. Otherwise semi-indirect luminaires work well for providing the vertical illumination required for stack areas. If not stack mounted we intend to utilize pendant mounted linear LED luminaires similar to those used in the seating/reading areas but with revised distribution.

**Administrative Offices:** 30-40 fc horizontal. Small offices will be illuminated with high efficiency primarily indirect type suspended LED luminaires with a small, diffuse downlight component. Larger offices will be illuminated with similar direct/indirect linear pendant mount luminaires where feasible. Recessed luminaires may be required if adequate ceiling height cannot be achieved.

**Conference Rooms:** 40 fc horizontal, 5 fc vertical design level. Typically, these rooms require a wide variety of illumination: low levels for presentations, indirect lighting for eye comfort, and the design levels mentioned above for presentation of critical reading material. We will endeavor to provide a palette of options and controls for the multiple uses these spaces involve.

**Restrooms:** 30 fc horizontal. For luminaires subject to vandalism, illumination will be provided by recessed LED luminaires with vandal resistant lenses. Those luminaires not subject to vandalism will utilize wall mounted luminaires with both direct and indirect lighting.

**Corridors:** 20 fc horizontal. Recessed cove or surface wall-mounted linear perimeter-type LED lighting will be utilized in corridors and low ceiling traffic areas.

**Computer Areas:** 30 fc horizontal. These areas will require a lighting system that minimizes direct and reflected glare due to the high usage of visual display terminals (VDTs). If ceiling heights allow, a pendant mounted direct/indirect luminaire will be utilized to achieve the RP-1 recommendations.

**Lighting Control:** General lighting control in the public and office areas will be accomplished with manual and automatic control. Automatic control will be actuated via network lighting controls and control panels with individual relays located either in the electrical room or near the luminaires controlled. Manual control will be via switches located within the spaces to be controlled. Switches for public spaces will be key switches or will be located in areas accessible only to facility staff.

Multi-level switching or full dimming will be provided to allow uniform multi-level lighting in the library, offices and other areas as determined during design.

Occupancy sensors will be provided in the toilet rooms, office areas and normally unoccupied spaces such as storage rooms, etc.



An emphasis on individual occupant control of lighting will be provided for both perimeter and non-perimeter occupied spaces to achieve LEED credit for controllability of systems and to support optimum health, productivity and comfort conditions.

Daylight activated control of the direct/indirect LED luminaires will be utilized in all areas with significant daylight contributions. Further daylight analysis will occur during the next design phases to prove a minimum daylight factor (ratio of exterior illumination to interior illumination) of 2% in 75% of occupied spaces per LEED criteria.

Selected luminaires in the corridors and public spaces will be non-switched as night lights. These night lights can be turned off by the DDC system during times that the building is unoccupied.

### D5030 COMMUNICATIONS AND SECURITY

**TELECOMMUNICATIONS SYSTEM:** The building will be pre-wired to a Category 6 TIA/EIA standard for telecommunications using unshielded, twisted pair products.

**Main Distribution Frame Room (MDF):** The MDF will serve as the main hub for the telecommunications systems for the facility and will contain the following equipment:

- Telephone service entrance.
- Cable TV service entrance.
- Head-end equipment for the TV system.
- Data and Voice modular patch panels.
- Fiber Optic Data Network distribution panel(s).
- Owner provided telephone switch.
- Owner provided data network equipment.

The MDF will be located adjacent to the main mechanical/electrical room and will serve as the homerun location for telecommunication and television cabling in the building.

**Media:** The following media will be used for distribution of telecommunications information.

**Network Backbone:** 62.5/125 micron multi-mode optical fiber. Capable of providing gigabit speeds. Multiple gigabit bandwidth is available with channeling technology.  
**Horizontal Cabling:** Category 6 (CAT 6) UTP, capable of supporting all common network systems specified in the ANSI/TIA/EIA 568-A standards, as well as analog and digital telephones, fax, modem, CATV, CCTV, RS-232 and other protocols.

**Cable Tray:** A cable tray system will be provided in the accessible ceiling space for routing the low voltage special systems cabling including telecommunications and television cabling. The low voltage cabling will run from the devices, in conduit, to the cable tray.

**Telecommunication Outlets:** Telecommunication outlets will be the multi-port type allowing from one to six telecommunications ports per outlet. Telecommunication outlet locations and port quantities will be determined during the design development phase.

**TELEPHONE SYSTEM:** Telephone service will be provided by Alaska Communication Systems. A 2 inch conduit only will be stubbed out from the MDF to

the relocated ACS pedestal at the northwest corner of the site for connection to the outside plant facilities. The conduit will be installed in joint trench with the primary electrical line extension to the facility. Adequate space in the MDF will be provided for a phone switch to be provided by the Owner.

**NETWORK ACTIVE EQUIPMENT:** Selection and design of active components of the data network can be performed by either the Owner, the design team or by a combined effort of both. This equipment includes electronic fiber optic interface equipment, network switches, routers, servers, uninterruptible power supplies and workstations. If the Owner wishes to employ the design team to assist with the active network equipment design, direction and scope definition will be required before design development can commence. It is our recommendation that the Owner provide the network switches and active components out of the Fixtures/Furnishings and Equipment budget for the facility. This will ensure the Owner is getting the equipment they have standardized on at the best price and without Contractor mark-up. It also allows the purchase of equipment to be delayed until just prior to occupancy so the Owner can take advantage of the latest technology offerings.

**SECURITY SYSTEM:** A remotely monitored security system will be provided. The system will be based on the Napco 3000 system to allow U.L. listed fire reporting that includes the sprinkler system.

Detection: Door contacts will be provided on all exterior doors. Passive infrared motion detectors will be provided in corridors and other areas as determined during design to detect entry into the building. In addition, door contacts will be provided on doors to spaces such as the Meeting Room, Staff Offices and Storage. Glass breakage detectors will be provided in accessible areas with exterior glass.

The security system will be inter-tied with lighting via the building control system to turn on building night lights and/or site lighting whenever an alarm is received.

The system will be zoned to allow separate zones to remain armed when the building is occupied.

#### **D5040 OTHER ELECTRICAL SYSTEMS**

**FIRE ALARM SYSTEM:** An electrically operated, electrically supervised addressable fire alarm system will be provided. The system will comply with the applicable provisions of the current NFPA Standard 72 National Fire Alarm Code, local building codes, and meet all requirements by Underwriters Laboratories Inc. and/or the Factory Mutual System. The system will operate as a low voltage, general evacuation fire alarm system. In addition to Code required actions, alarms will signal the building control system and energize building night lights and site lighting (unless prohibited by photocell).

Alarms will be annunciated at a graphic annunciator panel located in the main entry.

Manual pull stations will be provided within five feet of each exit and additional pull stations will be provided as required to ensure the travel distance to the nearest pull station does not exceed 200 feet.

Both audible and visual alarms will be provided throughout the facility to meet Code requirements. Audio-visual horn/strobe units with combination horn and flashing alarm strobe will be used.

Smoke and heat detection will be provided throughout the facility and in addition as noted below:

- Smoke detectors will be installed in mechanical return air ducts in accordance with International Mechanical Code (IMC) requirements.
- Smoke detectors will be provided at locations specifically requested by the Owner.
- Smoke/Fire dampers will be provided at each point a duct or air transfer opening penetrates a smoke barrier wall or a corridor wall required to have smoke and draft control doors in accordance with the IBC. Smoke detectors will be installed at Fire/Smoke dampers and will be controlled by the Fire Alarm System in coordination with the HVAC system.
- Electromagnetic door holders and smoke detectors for door release service will be provided at fire doors in horizontal exits.

**CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM:** Limited digital CCTV monitoring will be provided. The system will consist of the following features:

- A limited number of Internet Protocol (IP) based high-resolution cameras in key indoor and outdoor locations such as the Entry, Foyer, Meeting, Teen, Adult and Children areas. These cameras will be connected to the library network to provide decentralized monitoring and storage. All security access keypads will be in sight of a camera to observe persons accessing and securing the building (or failing to do so properly).
- Each camera will include individual alarm management, two-way audio, microphone, notification and recording capabilities.
- Cameras will be connected to the network via individual Power over Ethernet (PoE) cables.
- A computer to digitally record all cameras is not required as all the data will be maintained on the individual cameras as well as on the network storage equipment.
- This system will be based on devices and equipment by Mobotix Corporation or an approved equal.

**PUBLIC ADDRESS / SOUND SYSTEM:** A public address system will be provided for the Meeting Room. The system will include an amplifier, speakers, mixer, microphones, rack enclosure, equalizer, cables and accessories. The system will amplify and distribute sound from a number of microphone locations. Wireless microphones will be provided to allow wireless microphone operation.

The meeting room will also be equipped with an interface to a ceiling mounted multi-media projector. This interface box will allow various audio/video signals to be input to the ceiling mounted projector. These signals will include unbalanced audio, composite video, computer audio input, computer video RGB and S-video.

This will allow video signal to be displayed via the ceiling mounted multi-media projector. In addition, the audio signal will be connected to the room sound system to provide effective sound distribution.

**TELEVISION DISTRIBUTION SYSTEM:** Overview: The system will provide for television distribution to the facility as determined during the next design phase.

General: An electrically powered television distribution system will be provided. Distribution will be via broadband distribution. The system will include amplifiers, processors, mixers, splitters, outlets, conduit, cable, couplers, filters, directional tap-offs, wall outlets, fittings and all accessories required to provide a complete operating system. The system will provide for the reception and distribution of selectable cable-furnished channels. Channel processors will be used to translate the output from the cable TV boxes to appropriate channels for distribution. The number of cable boxes to be provided will be coordinated with the Owner during the design development phase.

Equipment: Headend equipment will be located in the main distribution frame (MDF) room. The equipment will be located in equipment racks to centralize TV distribution and for ease of maintenance.

Outlets will be provided as determined during the design development phase.

## **E. EQUIPMENT AND FURNISHINGS**

### **E10 EQUIPMENT**

**E1010 COMMERCIAL EQUIPMENT** – None

**E1020 INSTITUTIONAL EQUIPMENT** – None

**E1030 VEHICULAR EQUIPMENT** – None

**E1090 OTHER EQUIPMENT** - None

### **E20 FURNISHINGS**

**E2010 FIXED FURNISHINGS** – As shown on plans

**E2020 MOVABLE FURNISHINGS** - NIC

## **F. SPECIAL CONSTRUCTION AND DEMOLITION**

### **F10 SPECIAL CONSTRUCTION**

**F1010 SPECIAL STRUCTURES** – None

**F1020 INTEGRATED CONSTRUCTION** – None

**F1030 SPECIAL CONSTRUCTION SYSTEMS** – None

**F1040 SPECIAL FACILITIES** – None

**F1050 SPECIAL CONTROLS AND INSTRUMENTATION** - None

### **F20 SELECTIVE DEMOLITION**

**F2010 BUILDING ELEMENTS DEMOLITION** – None

**F2020 HAZARDOUS COMPONENTS ABATEMENT** - None

**G. BUILDING SITEWORK**  
**G10 SITE PREPARATION**

**INTRODUCTION**

Per NorthWind Architects, LLC notice to proceed, R & M Engineering, Inc. (R&M) has prepared schematic civil specifications and site plan for the proposed Mendenhall Valley Public Library. This property is owned by the City and Borough of Juneau. NorthWind provided R&M with a pdf of the concept site plan on July 8, 2013 to assist in preparing the schematic site development narrative.

The proposed Mendenhall Valley Public Library is located within property currently zoned D-5 City and Borough of Juneau zoning maps in the Mendenhall Valley. The legal description is a Fraction of Tract 1, U.S. Survey No. 1284 and is otherwise known to be located in "Dimond Park". The site is situated at the corner of Riverside Drive and the main entrance into Dimond Park.

The planned site facilities for the Mendenhall Valley Public Library indicated in the concept site plan include the new library building, a new drop-off zone, vehicle parking lot across the access roadway, outdoor area and pedestrian sidewalk connections to the new building.

**G1010 SITE CLEARING**

Site clearing and grubbing will be required on the library site as Alder, Hemlock, Cotton Wood and Spruce trees exist as well as low lying vegetation. The parking lot site will require minimal site clearing operations as it has been graded previously during the Dimond Park Aquatic Center project.

**G1020 SITE DEMOLITION AND RELOCATIONS**

Site demolition work will include removal and off site disposal of existing asphalt pavement and concrete curb and gutter for construction of the drop off zone and curb cuts for the parking lot. Relocation of existing site light poles and foundation bases is also required.

**G1030 SITE EARTHWORK**

**Site Geology and Soils**

Under contract to MRV Architects, R&M preformed a geotechnical investigation on this site from January 24 through January 28, 2013. The sub-surface exploration methods utilized machine dug test pits and drill test holes located throughout the proposed Mendenhall Valley Public Library site. Four test holes were drilled with the R&M CME-55 drill rig using hollow stem auger drill methods to 25-feet. Standard penetration blow counts ranged from 9 to 29 blows per foot. Water table depths below ground surface varied from 5' to 14'. Eight machine dug test pits were dug from 10' to 15' in depth.

The surface geology observed in the investigation area is may be categorized into three (3) distinct soil layers as described below.

Organic Mat: This is a thin layer of overburden soil covering the entire project site. It composed of small root mats in brown to brownish gray silty Sand or sandy Silt soil. Thickness varies from 6" to 12".

Loose Silty Sand / Sandy Silt with Buried Logs/Stumps: This soil layer is located immediately below the organic mat and is generally loose in its in-situ condition as indicated by SPT N-values ranging from 4 to 12. Thickness varies from 6' up to 12'. During excavation of test pits, this layer tended to immediately cave-in and was difficult to excavate when the water table was reached due to rapid inflow of water that in turn caused the excavation limits to cave and form a large crater. The typical composition of this loose silty Sand to sandy Silt layer is the small to large size logs, small twigs/roots and tree stumps buried at different depths from previous organic waste filling operations.

Medium dense Gravel with Sand: This is the last layer encountered in the four drill test holes that persisted down to at least 30.5 feet depth. All test pits were also terminated on this medium dense sandy Gravel layer. This layer consists mainly of medium dense, gray, poorly-graded Gravel in sand matrix (GP). The gravel is clean and rounded to sub-rounded in shape, indicating the gravel layer was deposited through water action. Recorded SPT N-values ranged from 12 to 29 with occasional low N-values from 5 to 9. The surface of this layer was encountered on or below the water level. In the test pits, soil samples from this layer were difficult to obtain due to continuous caving and sloughing of the upper loose silty Sand layer. Environmentally hazardous materials were not observed in any of the test pits or drill test holes.

The medium dense Gravel layer underlying the project site would dictate that a shallow foundation is feasible in supporting the proposed one-story Mendenhall Valley Public Library. Shallow foundation scheme will require excavation and removal of the thick unsuitable loose silty Sand and/or sandy Silt layer intermixed with buried logs, stumps, and organic waste fill in some areas (i.e., TP-5). Large logs and stumps buried with organics to a depth of 15' below the surface would preclude construction of a deep foundation system (pile driving) as large logs and stumps could potentially hinder driving of piles. Based on R & M's sub-surface investigation of January 2013 and our knowledge of the project area, we offer the following recommendations regarding the structural foundations design and construction for the library and associated vehicle parking lot:

#### **Library Building Foundation**

It is recommended that all frost susceptible soils, organics, tree limbs/stumps, be removed to reduce frost penetration and possible foundation settlement from freeze/thaw cycles. The following site preparation methods are recommended for this site:

1. Install erosion and sediment control devices prior to beginning construction.
2. Clear and grub trees and vegetation designated for removal within the project site.
3. Install dewatering devices to lower the ground water level at least 1-foot below the bottom of the planned excavation level. This will involves installing a slotted vertical pipe with submersible pumps and discharge piping.

4. Over-excavate the area beneath the building foundation (10' outside each side of building foundation) down to the medium dense Gravel layer (approximately 11' to 15' depth below ground surface).
5. Static proof roll the bottom of the excavation using a 10-ton self propelled compactor. Should areas be observed to "pump" or "settle" further, excavate and replace with 12" shot rock borrow.
6. Place a geotextile separation fabric (woven polypropylene geotextile fabric) with a minimum bursting strength of 500 psi at the bottom of the excavation.
7. Place 12" minus well graded, non-frost susceptible (NFS) shot rock borrow, and compact with a vibratory grid roller (minimum centrifugal force shall be 50,000 lb) with minimum 5 passes (1 pass = 1 down and back) prior to placement of subsequent lifts. Loose lift thickness shall be a maximum of 18" in depth. 6" screened shot rock may be substituted for the 12" minus shot rock. Shot rock borrow shall consist of clean fractured rock containing no muck, frozen materials, roots or other deleterious materials. The material shall have a plasticity index not greater than 6 as determined by AASHTO T90 and shall contain no more than 6% passing the #200 sieve based on material that passes a 3-inch screen
8. The top 6" lift below the building slab on grade shall be base course grading D-1 compacted to at least 95% of the maximum dry density unit weight as determined by modified proctor (ASTM D1557).

#### Library Parking Lot

We recommend the following typical section of improvements for the asphalt pavement parking lot construction:

1. Remove and dispose of the existing surficial vegetation, organics and native silty sand soil to at least 5 feet below the planned pavement finish elevation. The 5 foot depth over-excavation should be enough to remove the frost susceptible silty Sand/sandy Silt. Remove any logs, stumps and wood debris observed at the bottom of the excavation. Backfill over-excavation with compacted shot rock borrow.
2. Static proof roll the bottom of the sub-cut using a 10-ton self-propelled compactor or bucket compact. Should areas be observed to "pump" or "settle" further, excavate and replace with N.F.S. shot rock borrow and compact to 95%.
3. Place 12" minus well graded shot rock borrow and compact with vibratory grid roller similar to the library building foundation site preparation methods.
4. Place 6" depth of select borrow or 2" minus shot rock over the top of the shot rock borrow, compact to 95% of maximum dry density unit weight per ASTM D 1557.
5. The selected borrow or finer shot rock material should be topped with a minimum 6" depth of base course, grading D-1 compacted to 95% of maximum dry density unit weight.

6. Place a 2½" depth of hot asphalt concrete pavement per CBJ, Class B, Type II asphalt mix over the structural base course section.

**G1040 HAZARDOUS WASTE REMEDIATION - None**

**G2010 ROADWAYS**

**G2020 PARKING LOTS**

A library specific parking lot will be added to the west of the main entry. This will include 31 spaces and 2 ADA spaces.

**G2030 PEDESTRIAN PAVING**

Plazas and sidewalks will use 6"x24" linear pavers by Wausau Tile, set in a 2" sand bed over a 1'6" layer of course aggregate.

**G2040 SITE DEVELOPMENT**

Granite block benches will be roughly 2 1/2'x8' from Coldspring Granite. These will be set over a bed of course aggregate.

Rock berms will be 24" high and be made of rounded rock (min. 4") with larger boulders (max 72").

Bike rack will be custom design by landscape architect and manufactured by Dero.

Gravel path will be 6' wide with 6" compacted ¾" minus crushed rock aggregate over 3'8" classified fill.

**G2050 LANDSCAPING**

Plantings will be a mix of native and ornamental trees, shrubs, and grasses.

Edging will be aluminum, 3/16" wide x 5 ½" deep.

Drip Strip will use 3" diameter rounded river rock over a weed-barrier fabric.

Seed will include a lawn mix and a native, no-mow mix to be hydroseeded.

Rock mulch will be in all planting beds and be rounded riverbed gravel ¾" max, ¼" min.

Planting soil will 18" deep in all planting beds and 6" deep in all turf and native grass areas.

**G20 SITE IMPROVEMENTS**

**G2010 Public Roadways:**

No public roadway improvements for this project. Project will be accessed via existing public roadways.



**G2020 Parking Lots:**

Access to the Mendenhall Valley Public Library will be through the signalized intersection at Riverside Drive and Riverwood Drive and then onto the Dimond Park access roads. A drop off zone would be constructed in front of the main plaza area in front of the Mendenhall Valley Public Library. Reconstruction of the existing 8' wide asphalt sidewalk and concrete curb and gutter would be necessary. Existing site lights located on the back side of the sidewalk may also have to be relocated. A concrete table top traffic calming structure is recommended at the crossing zone of from the vehicle parking lot to the Mendenhall Valley Public Library. The table top will be have 6' long concrete ramps on each side and be raised 6" to be flush with the sidewalk. The width of the raised table top would be approximately 24'.

The 33 stall vehicle parking lot for library users will have a typical pavement section of 2-1/2" asphalt pavement, 6" base course, grading D-1, 6" depth of select borrow and 30" depth of shot rock borrow. Concrete curb and gutter will encompass the parking lot with pedestrian sidewalks as necessary to provide safe access to and from the library entrance. Parking stalls will be striped and signed. Two (2) Americans with Disabilities Act (ADA) parking stalls with aisle will be constructed.

**G2020 Pedestrian Paving:**

Pedestrian paving will include sidewalk construction adjacent the east side of the library parking lot connecting to the raised table top crossing. A gravel surfaced pedestrian link from the Riverside Drive separated path would be constructed on the north side of the building to the front entrance of the library.

**G2040 SITE DEVELOPMENT**

**G30 SITE CIVIL/MECHANICAL UTILITIES**

Sewer and water services for Mendenhall Valley Public Library will connect to existing CBJ public utilities located within the paved access roadway to the west and south of the project site. There is an existing 8" DIP water line stubbed out on the south side of the site and an 8" PVC sewer stub out on the west side of the property.

Power, telephone and television cable exist under ground with above ground transformers located at the northwest intersection of Riverside Drive and Riverwood Drive. Electric transformers, telephone/TV cable pedestals and traffic signal load centers also exist at the intersection of the main access road and the access road to the Mendenhall Valley Public Library. Site lighting exists on the access roadways into Dimond Park and along Riverside Drive.

**G3010 WATER SUPPLY**

The existing 8" DIP water service stub out with DI cap exists on the south side of the site near the existing fire hydrant location. The 8" DI cap will need to be removed and the 8" DIP water line connected to. An 8" to 6" reducer installed and approximately 136 linear feet of new water pipe would be installed to the proposed Mendenhall Valley Public Library mechanical room location. The existing fire hydrant southwest of the proposed building is within the 300 foot radius for required fire protection.

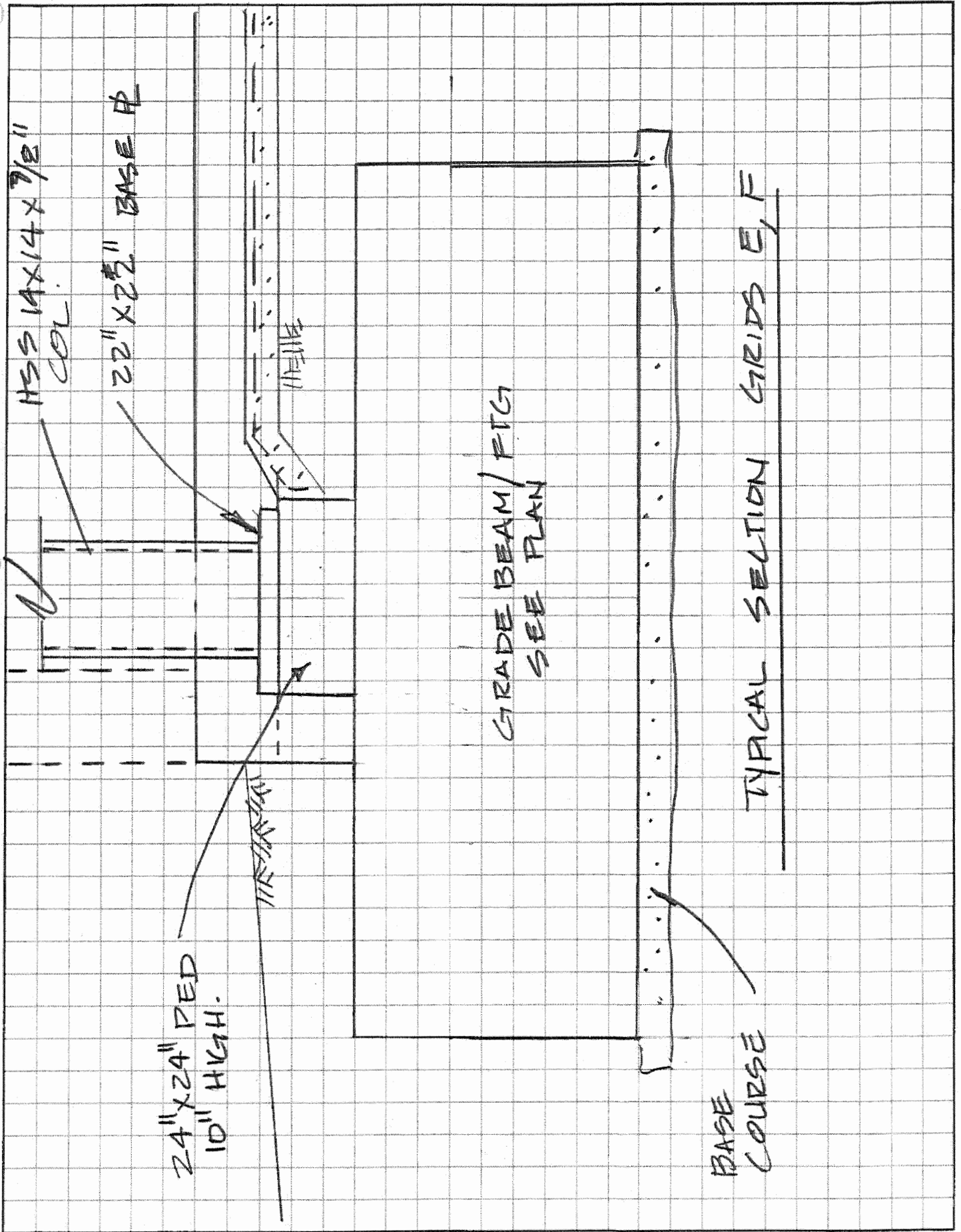
## APPENDICES

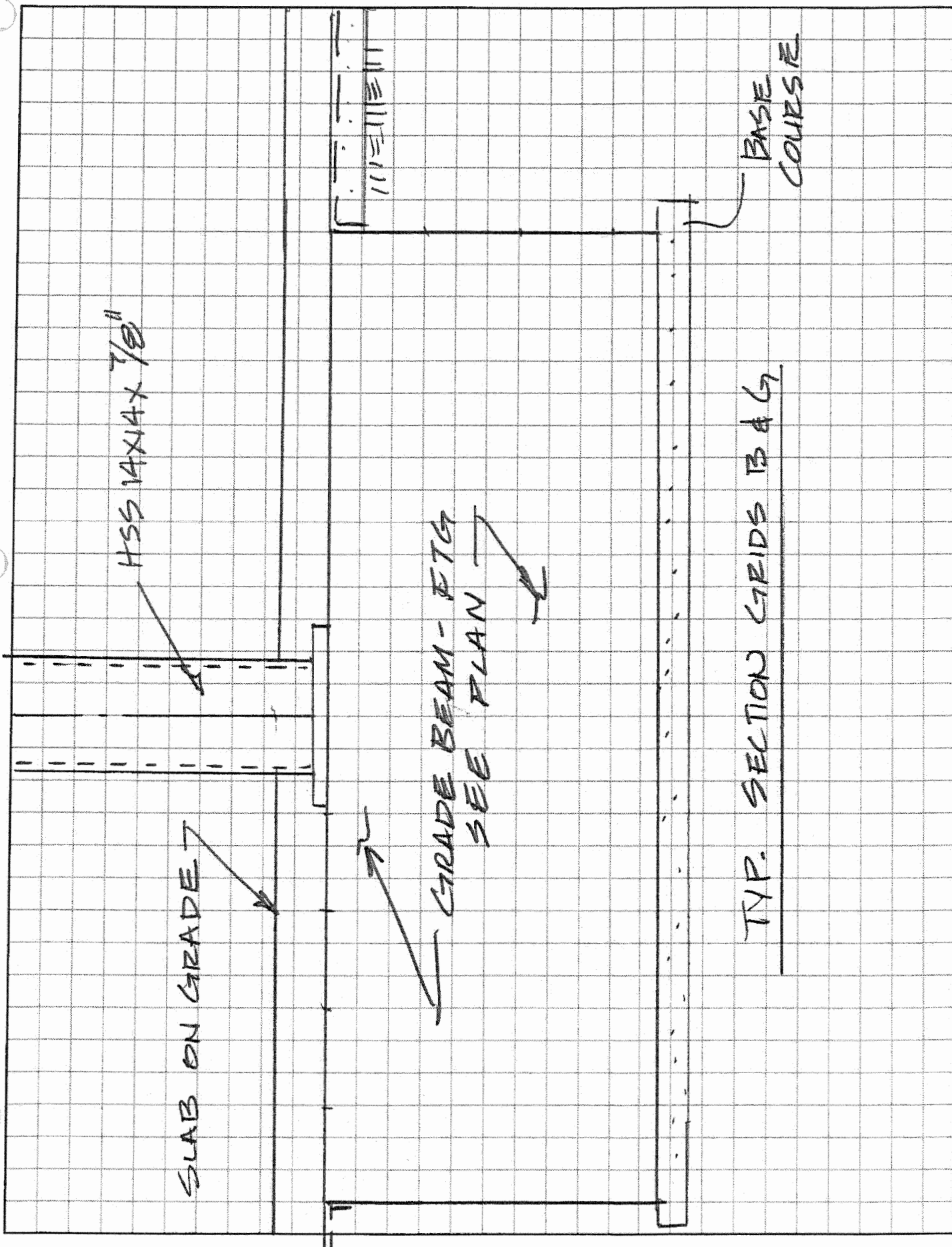
1. Structural Framing Diagrams
2. Valley Library Program
3. LEED Checklist

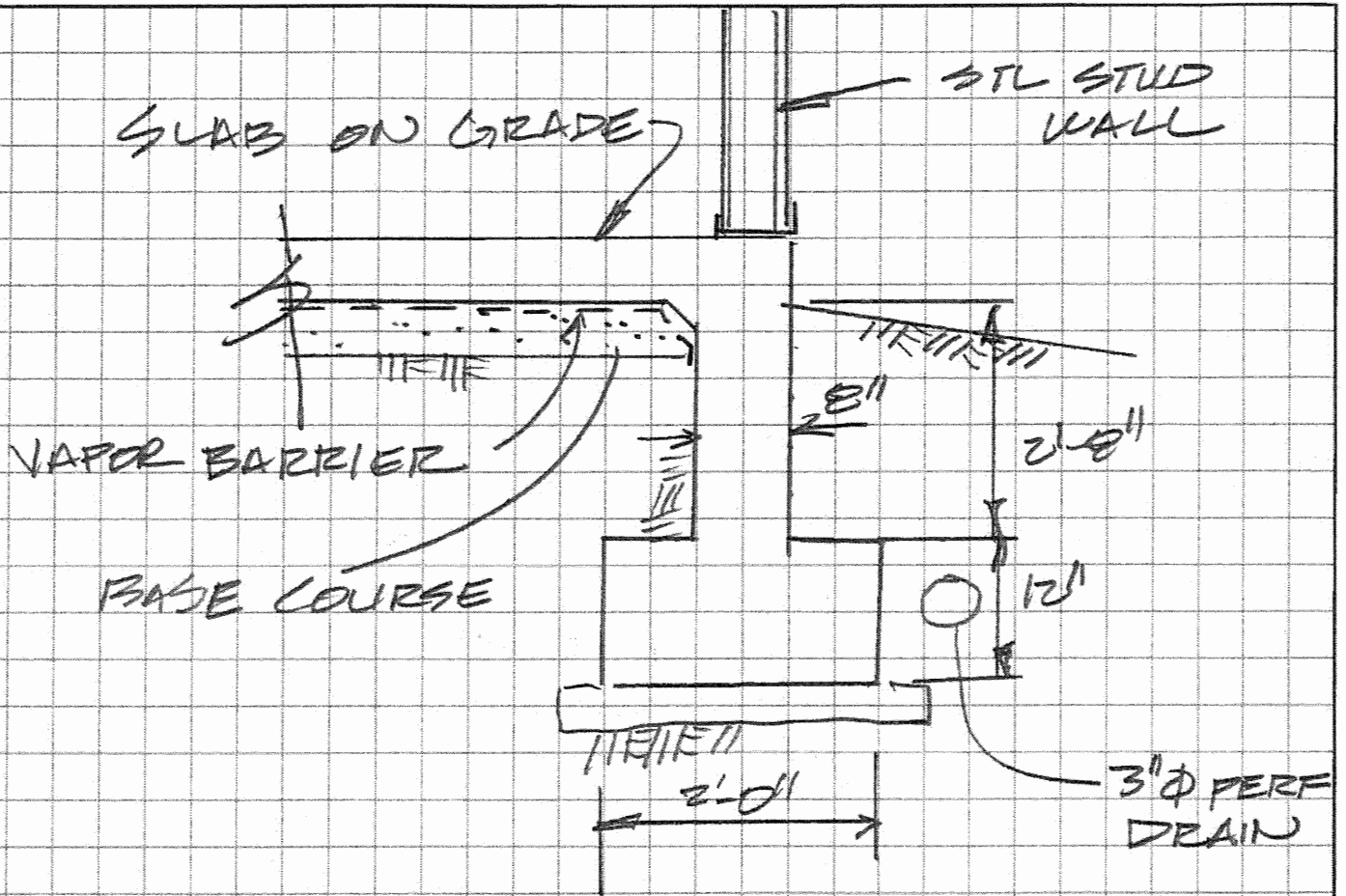
**Mendenhall Valley Library**  
Program Areas

THA Architects

	Existing Proposed		Notes
	Total SF	Total SF	
<b>Adult Collections &amp; Seating</b>			
Fiction & Non-Fiction	1860	3000	
Reference Collection	160	160	
Media Collections	100	500	
Periodicals	85	150	*Per. and Ref. Collections combined, Magazines 85 sf
Alaska Collection	100	250	adjacent quiet reading
Distributed Tables and Seating	1100	1950	divide into several seating areas/type
Public Computer Area	420	420	divide into several groupings, include adjacent seating for people waiting for computers
Display	100	150	rotating display
New Materials & Oversize	250	300	*current area to right of entrance
<b>Subtotal Adult</b>	<b>4,175</b>	<b>6,880</b>	
<b>Young Adult Collections &amp; Seating</b>			
Young Adult Collections	0	200	no door on teen, but some acoustic consideration
Tables and Lounge Seating	0	600	circular tables, cyber bar, possible booth seating
<b>Subtotal Young Adult</b>	<b>0</b>	<b>800</b>	visual connection from circulation desk separated from children's, possibly on more active side of the library
<b>Children's Collection &amp; Seating</b>			
Children's Collections	900	1500	possibly on protected quiet side or south exposure
Table and Lounge Seating	125	450	
Children's Computer	50	150	5 computer stations
Children's Story Area	320	320	internalized, no distracting views
Staff support area	0	120	non-enclosed, flexible space. Could be used for staff desk.
<b>Subtotal Children's</b>	<b>1,395</b>	<b>2,540</b>	
<b>Meeting</b>			
Multi-Purpose / Program Room	715	900	operable wall opens to foyer to enlarge space
Multi-Purpose Storage	100	250	directly off multi-purpose room for furniture, kitchenette and full height cabinets directly off meeting room
Small Meeting Room (Conference)	0	300	adjacent to more active area of library
Study Rooms	50	400	4 rooms at 100 sf each, glass for visibility and control
Business Center	0	80	copy machine & desk (typewriter?). Alcove, non-enclosed.
<b>Subtotal Meeting</b>	<b>865</b>	<b>1,930</b>	
<b>Administration</b>			
Circulation Desk, Reference Desk	400	350	centralized. fluid connection between Ref. and Circ., anchored to administration area
General Work Room		250	locate to support circ desk, staff work stations. 10' x 40" work table, 10' counter with sink
Administrative Support Offices	160	750	6 workstations
Administrative Storage	200	400	mainly shelving
Children's Program Storage	0	50	bins on a shelf, not a separate room
Shipping / Receiving	0	200	need separate staff and delivery entry
Staff Break Room	0	170	kitchenette and seating
Staff Restroom	20	70	
<b>Subtotal Administration</b>	<b>780</b>	<b>2,240</b>	
<b>Public / Support</b>			
Arctic Entry/Vestibule	0	150	integrate with generous exterior canopy area
Central Foyer / Lobby	425	600	clear entry sequence, area for conversation and seating, cell phone area, possible coffee vendor and changing art display. Separated from Library with glass doors.
Display / Paperback Exchange	50	50	used bookstore, off Foyer
Public Restrooms	0	400	2 multi-fixture rooms.
Family Restroom	0	65	possibly located within children's area for supervision
Mechanical, Electrical Rooms	50	1100	in proposed, area equals 5.3% of total building
Janitor	50	120	
Misc. / Outdoor Storage	0	120	
Circulation (17%)	1,324	2,915	in proposed, raises to 18%
Shafts / Walls (3%)	273	708	in proposed, raises to 5%
<b>Subtotal Support</b>	<b>2,173</b>	<b>6,228</b>	
<b>TOTAL</b>	<b>9,388</b>	<b>20,618</b>	







TYP PERIMETER WALL SECTION

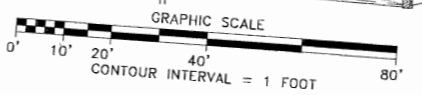
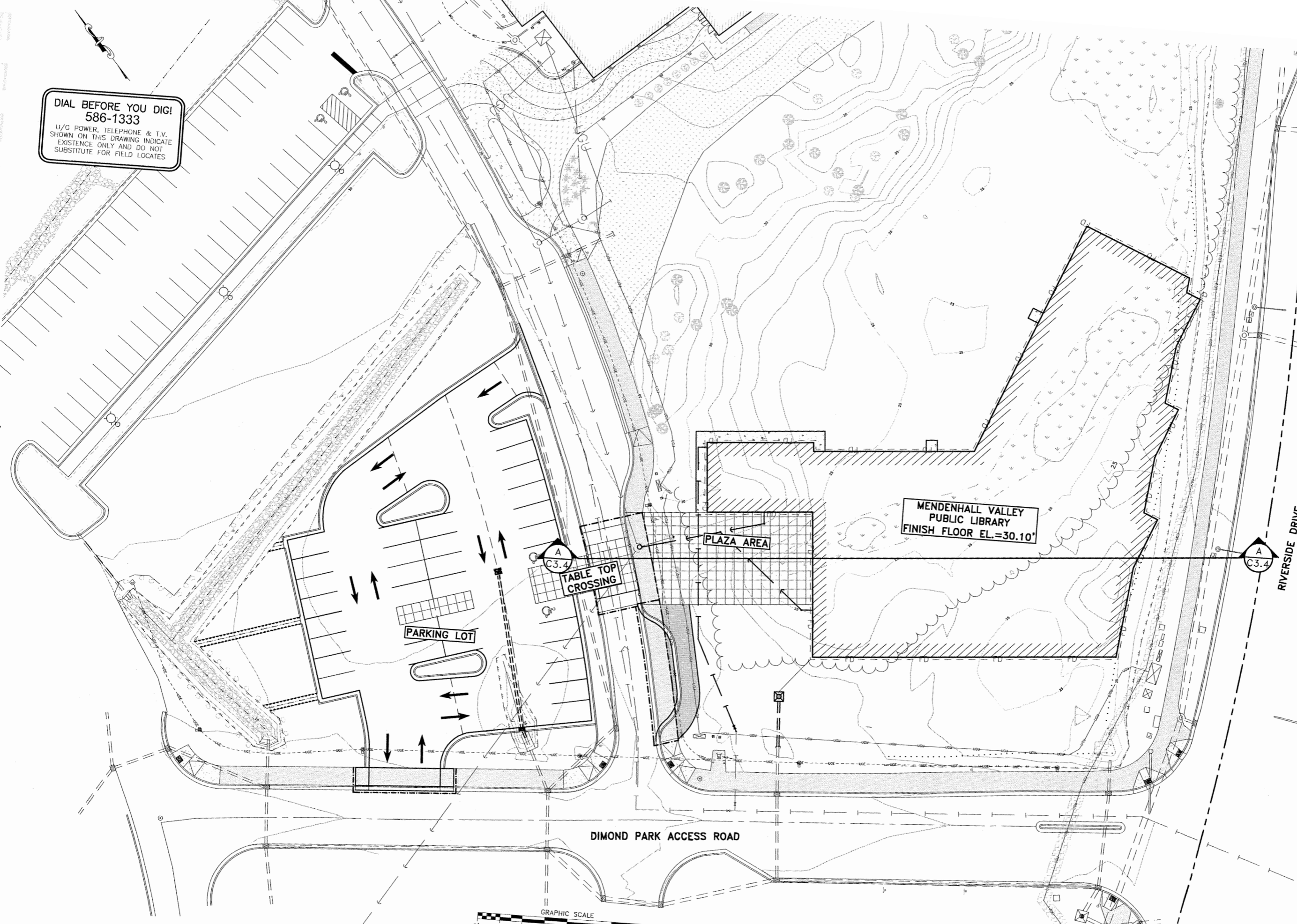
**DIAL BEFORE YOU DIG!**  
**586-1333**  
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SCHEMATIC DESIGN



**R & M ENGINEERING, INC.**  
 ENGINEERS SURVEYORS  
 635 CLACKING WAY JUNEAU, AK 99801  
 Phone 907-780-6600 Fax 907-780-6811  
 rmeengineering@juno.com

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**MENDENHALL VALLEY PUBLIC LIBRARY**

CBJ Contract # E14-051  
 Juneau, Alaska

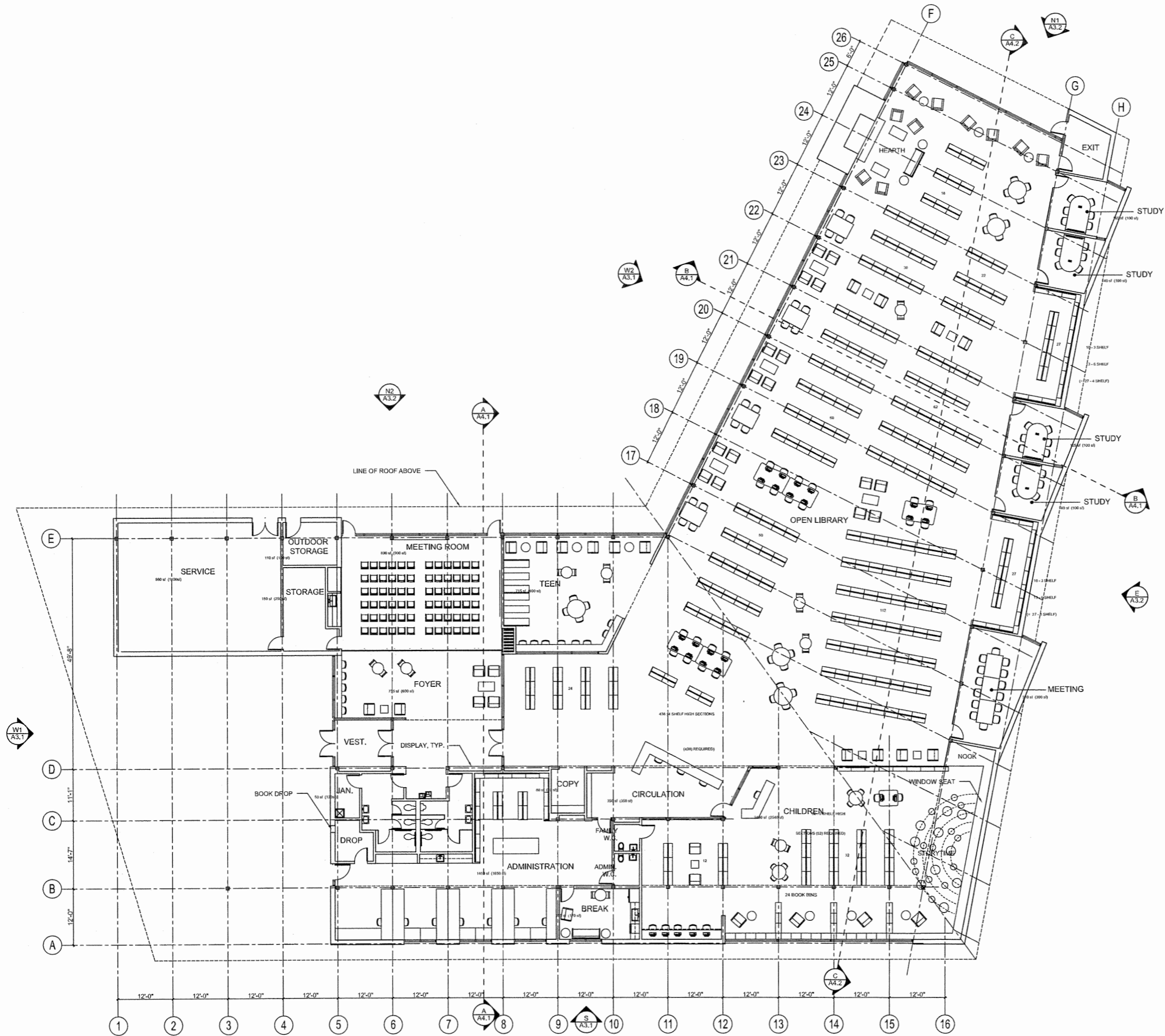
SHEET TITLE:  
**OVERALL SITE PLAN**

DATE: Aug. 9, 2013  
 REVISION:  
 CHECKED BY: J.M.P.  
 DRAWN: M.L.L.

SHEET #

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**MENDENHALL VALLEY PUBLIC LIBRARY**

CBJ Contract # E14-051  
 Juneau, Alaska

SHEET TITLE:  
**FLOOR PLAN**

DATE: **AUGUST 9, 2013**  
 REVISION:  
 CHECKED BY:  
 DRAWN:

SHEET #  
**A2.1**  
 PLOT DATE: **8/9/2013**




## MEMORANDUM

**DATE:** December 5, 2013

**TO:** Sean M. Boily, AIA, Principal, NorthWind Architects, LLC

**CC:** Nathan Coffee, Project Manager, CBJ Engineering  
Mark Pusich, PE, R&M Engineering

**FROM:** Michael J. Read, PE, Principal, TENW 

**SUBJECT:** Traffic Impact Analysis of the Mendenhall Valley Public Library An Update to the 2015 Riverside Drive Traffic and Pedestrian Study – TENW Project No. 3320

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This memorandum summarizes an analysis of 2015 traffic impacts of a proposed 20,600 square-foot *Mendenhall Valley Public Library* at the Dimond Community Complex adjacent to Riverside Drive in Juneau, AK. This study is an update of the *2015 Riverside Drive Traffic and Pedestrian Study*, September 2009, TENW, that includes construction of a public library in addition to the Thunder Mountain High School, Dimond Park Aquatic Center, and Field House. This updated study includes a revised project description of built community facilities and utilization, a methodology used to derive the trip generation estimate, traffic operational analysis of the key site access intersection and key off-site intersections under cumulative impacts, and identification of any transportation mitigation measures to offset traffic impacts.

### Project Description

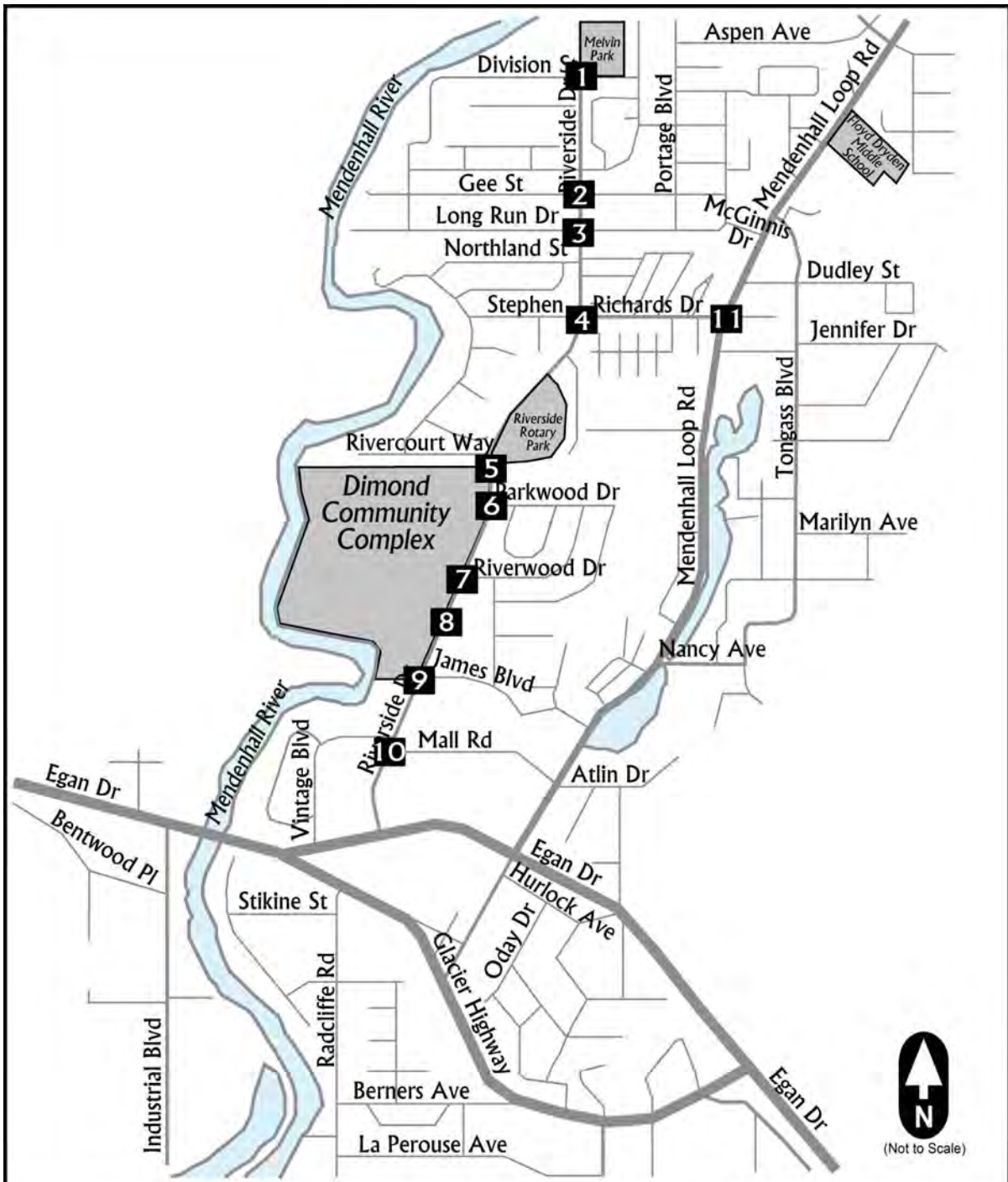
The *Mendenhall Valley Public Library* project proposes a 20,600 square foot public library within the Dimond Community Complex, southeast of the Dimond Park Aquatic Center. A 34-stall parking lot would be constructed west of the library to serve the library specifically, although shared parking opportunities with the adjacent surface parking for the aquatic center and high school would also be available to the library. The study intersections and project site vicinity are shown in **Figure 1**, while a site plan for the proposed public library is shown in **Figure 2**. Consistent with the past traffic analysis in the *2015 Riverside Drive Traffic and Pedestrian Study*, September 2009, and the expected buildout and occupancy of the proposed library, 2015 was the horizon year used to evaluate cumulative traffic impacts.


### Traffic Impact Analysis

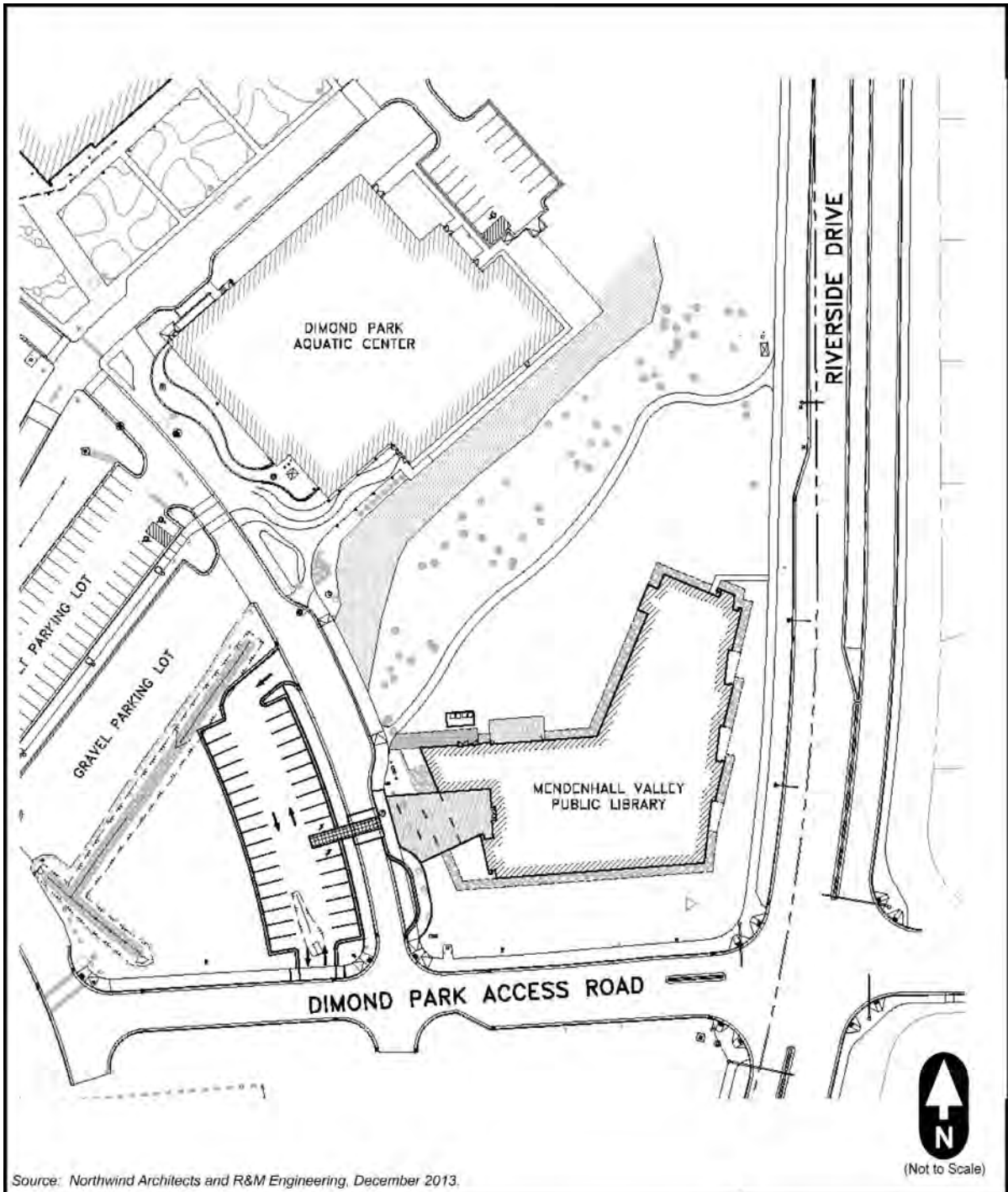
The following section describes projected future baseline traffic growth, new trips generated by the proposed development, distribution and assignment of new project trips, intersection level of service impacts, site access, safety and circulation issues, and identification of transportation mitigation to offset impacts.


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Attachment A



 Transportation Engineering Northwest	<h3>Figure 1</h3> <h2>Study Intersections</h2>	Mendenhall Public Library Juneau, AK
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 <p>Transportation Engineering Northwest</p>	<p>Figure 2 Conceptual Site Plan</p>	<p>Mendenhall Public Library Juneau, AK</p>
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## 2015 Baseline Traffic Volumes

To evaluate project traffic impacts at full buildout, a review was conducted of previous traffic analyses conducted for the Dimond Community Complex as well as the *2015 Riverside Drive Traffic and Pedestrian Study* in comparison to recent historical growth in traffic along the Riverside Drive corridor. Although completion and occupancy of the Thunder Mountain High School and other public facilities at the Dimond Community Complete as occurred along the Riverside Drive corridor, traffic growth along Riverside Drive has decreased on a daily basis an average of -1.6 percent per year between 2009 and 2012. As such, previous growth rates utilized in historical traffic studies were eliminated in evaluating cumulative impacts with the addition of the *Mendenhall Public Library*.

## Project Trip Generation

Consistent with previous studies, vehicle trip generation rates compiled by the Institute of Transportation Engineers (ITE) *Trip Generation, 8<sup>th</sup> Edition, 2008*, were used to estimate daily, a.m. peak hour, and p.m. peak hour traffic that would be generated by the proposed action. Average rate equations for the Library (ITE Land Use Code 590) were used to estimate new trips generated by the proposed development. A 20 percent discount factor was applied to Library trip generation to account for linked trips that would already be generated by existing traffic of adjacent uses (i.e., not all trips generated by the proposed library would be generated as “new” to the site) and relocation of the existing library to this location.

Table 1 summarizes estimated trip generation by the proposed action and Table 2 summarizes trip generation by the *Dimond Community Complex* as a whole. An estimated total of 880 daily, 16 a.m. peak hour trips (12 entering and 4 exiting), and 116 p.m. peak hour vehicular trips (56 entering and 60 exiting) would be generated by the *Mendenhall Valley Public Library*. An estimated total of 2,430 daily, 205 a.m. peak hour trips (140 entering and 65 exiting), and 240 p.m. peak hour vehicular trips (120 entering and 120 exiting) would be generated at full build-out and utilization of the *Dimond Community Complex*. Detailed trip generation estimates are provided in **Attachment A**.

**Table 1 - Mendenhall Public Library Trip Generation Summary**

Time Period	In	Out	Total
Weekday Daily	440	440	880
Weekday AM Peak Hour	12	4	16
Weekday PM Peak Hour	56	60	116

**Table 2 - Dimond Community Complex Trip Generation**

Time Period	In	Out	Total
Weekday Daily	1,215	1,215	2,430
Weekday AM Peak Hour	140	65	205
Weekday PM Peak Hour	120	120	240

Sources: *2015 Riverside Drive Traffic and Pedestrian Study, September 2009* and *Trip Generation Manual, 8<sup>th</sup> Edition, ITE, 2008*.

## Trip Distribution and Assignment

To distribute trips onto the vicinity-street and arterial network, trip distribution patterns were determined based on review of existing travel patterns, and the relative distribution of other schools, employment centers, and residential density in the vicinity. Trip distribution to and from the *Mendenhall Valley Public Library* was assumed to be the same as that of the *Dimond Community Complex*; as shown in the *Dimond Community Complex Traffic Impact Study*, TENW, January 2004.

Figure 3 and Figure 4 summarize traffic volume impacts of the proposed *Mendenhall Valley Public Library* project during the a.m. and p.m. peak hour in 2015, respectively.

## Intersection Levels of Service Impacts

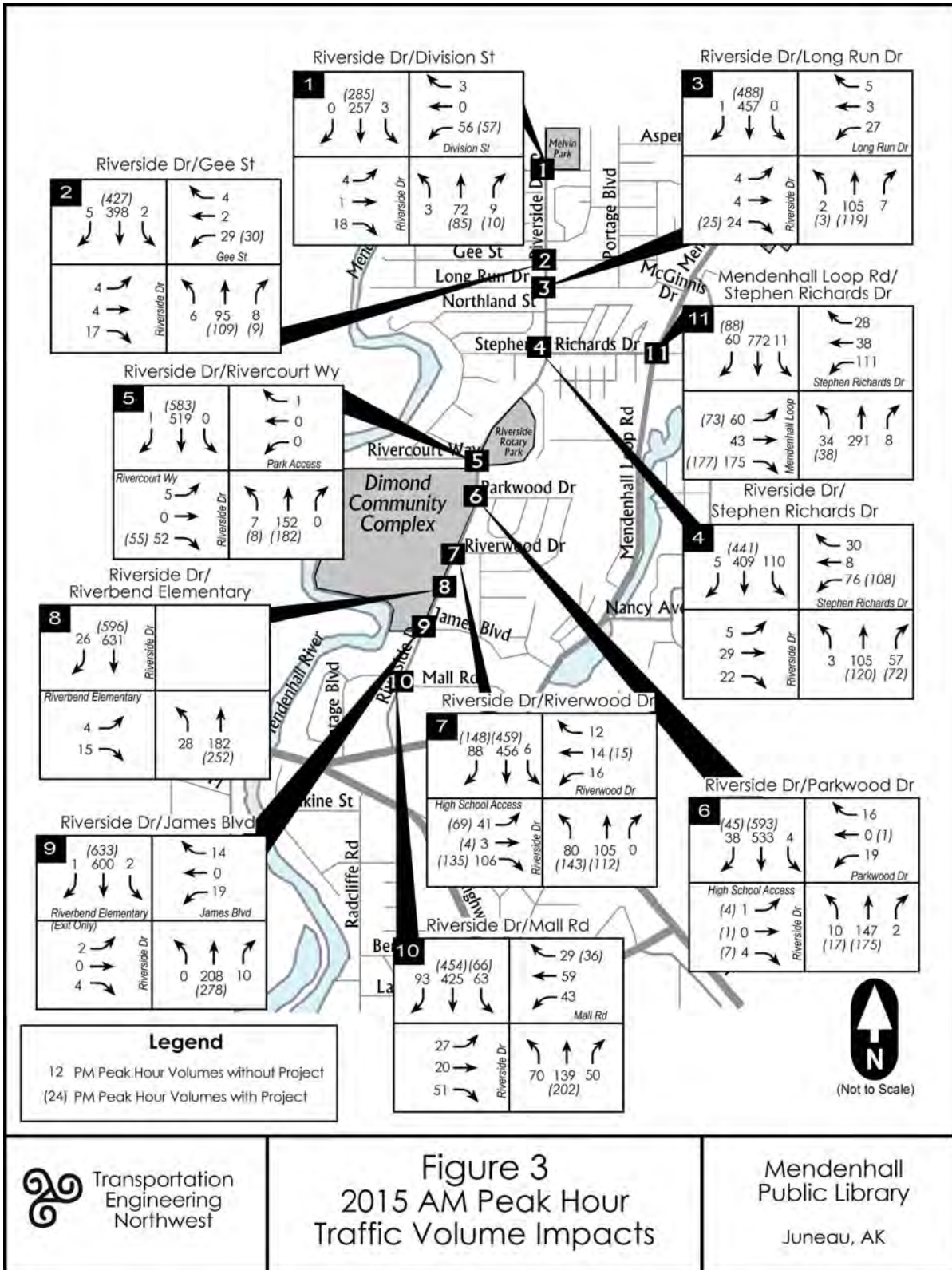
Updated intersection level of service (LOS) analyses were conducted at the study intersections during the weekday PM peak hour of existing conditions and with project traffic generated at full buildout of the *Mendenhall Valley Public Library* project. LOS refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes LOS. At signalized intersections, LOS A represents free-flow conditions-motorists experience little or no delays, and LOS F represents forced-flow conditions-motorists experience an average delay in excess of 80 seconds per vehicle. The LOS reported for signalized intersections represents the average control delay per vehicle entering the intersection. The LOS reported at stop-controlled intersections is also based on the average control delay (sec/veh) and is reported for each movement. Therefore, the reported LOS at unsignalized intersections does not represent a measure of the overall operations of the intersection.

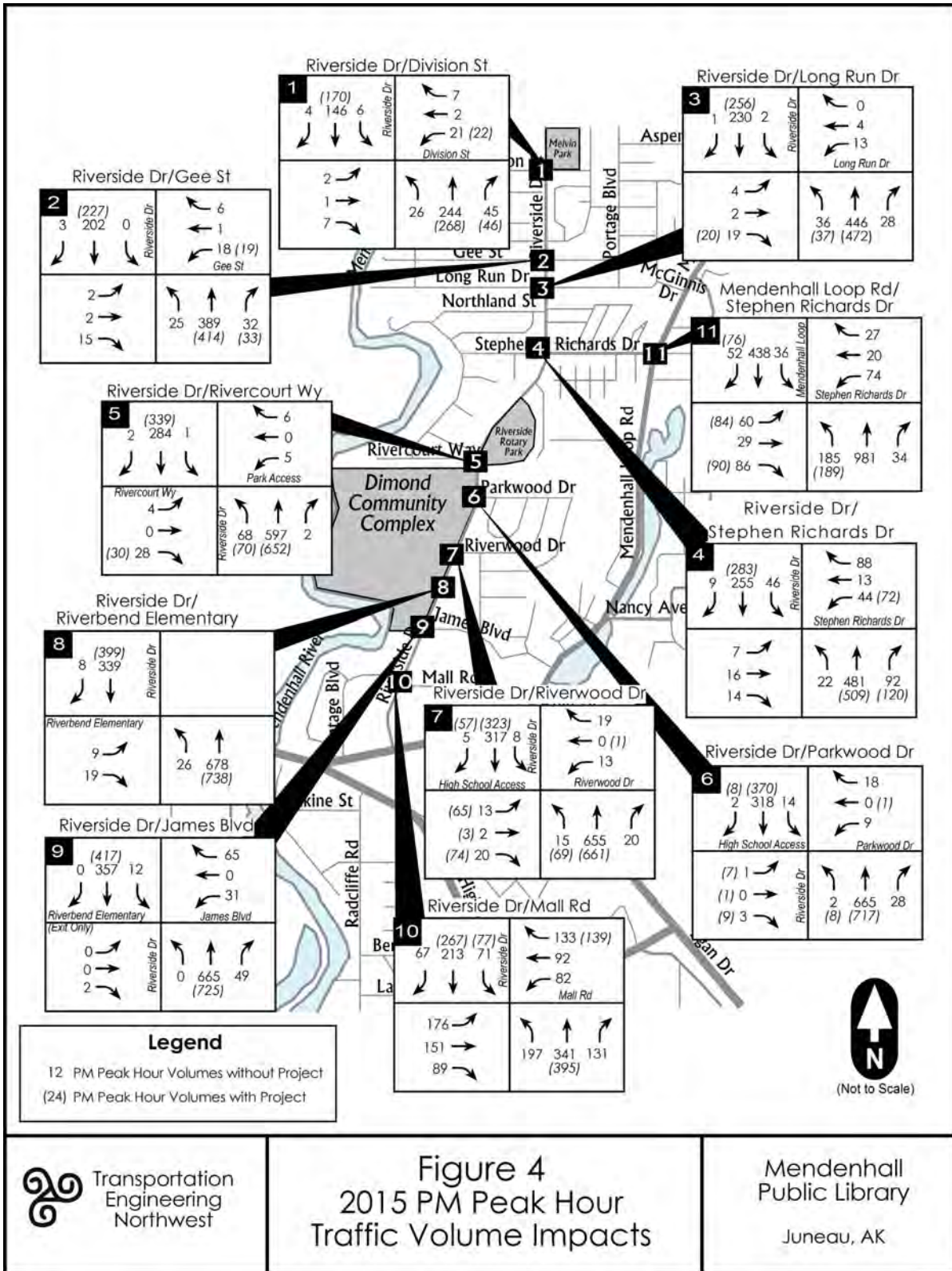
LOS calculations for both signalized and stop-controlled intersections were calculated using the methodologies and procedures outlined in the 2000 *Highway Capacity Manual (HCM)*, Special Report 209, Transportation Research Board (TRB). Table 3 outlines the LOS criteria for signalized and unsignalized intersections based on these methodologies.

**Table 3**  
**Level of Service Criteria for Signalized and Unsignalized Intersections**

Level of Service	Signalized Intersection Average Delay Range (sec)	Unsignalized Intersection Delay Range (sec)
A	≤ 10	≤ 10
B	> 10 to ≤ 20	> 10 to ≤ 15
C	> 20 to ≤ 35	> 15 to ≤ 25
D	> 35 to ≤ 55	> 25 to ≤ 35
E	> 55 to ≤ 80	> 35 to ≤ 50
F	> 80	> 50

Source: "Highway Capacity Manual", Special Report 209, Transportation Research Board, 2000.





Intersection levels of service in 2015 during the typical a.m. and p.m. peak hours are summarized in **Table 4 and 5**. As shown, buildout of the Dimond Community Complex that also includes a public library would increase intersection delay at Intersection #4 – Riverside Drive/Stephan Richards Memorial Drive, reducing operating conditions from LOS C to LOS D conditions during the p.m. peak hour. However, as the City and Borough of Juneau maintains a level of service standard of LOS D for its arterial intersections; all intersections or stop controlled/yield movements within the study area would remain within adopted standards.

Detailed LOS summary worksheets are included in **Attachment B**.

## Project Mitigation

A review of traffic impacts to intersection levels of service, site access, and circulation issues was conducted in association with the *Mendenhall Public Library* project, a 20,600 square foot planned public library at the Dimond Community Complex in Juneau, AK. The following mitigation measures are recommended to reduce or eliminate project impacts:

- The results of the traffic operations analysis show that all the study intersections are expected to operate at acceptable levels with the proposed buildout of the Dimond Community Complex that would also include the *Mendenhall Public Library* project. No additional traffic mitigation is warranted to support this new use.

If you have any questions regarding the information presented in this memo, please call me at (206) 361-7333 x 101 or mikeread@tenw.com.



**Table 4 - 2015 A.M. Intersection Level of Service Impacts**

Study Intersection	AM Peak Hour Without Project		AM Peak Hour With Project	
	LOS	Delay (sec)	LOS	Delay (sec)
<i><u>Signalized Intersections</u></i>				
#7. Riverwood Dr/Riverside Dr	--	--	B	10.5
#10. Mendenhall Mall Rd/Riverside Dr	B	12.4	B	12.2
#11. Stephen Richards Dr/ Mendenhall Loop Rd	C	20.9	C	22.3
<i><u>Stop Controlled Intersections</u></i>				
#1. Division St/Riverside Dr				
Northbound Left	A	7.9	A	8.0
Southbound Left	A	7.4	A	7.4
Westbound Approach	B	12.8	B	13.5
Eastbound Approach	B	10.5	B	10.8
#2. Gee St/Riverside Dr				
Northbound Left	A	8.3	A	8.4
Southbound Left	A	7.4	A	7.5
Westbound Approach	C	14.3	C	15.0
Eastbound Approach	B	12.4	B	12.5
#3. Long Run Dr/Riverside Dr				
Northbound Left	A	8.7	A	8.6
Southbound Left	A	7.5	A	7.5
Westbound Approach	C	15.9	C	16.9
Eastbound Approach	B	12.9	B	13.4
#4. Stephen Richards/Riverside Dr	C	17.5	C	22.6
#5. Rivercourt Wy/Riverside Dr				
Northbound Left	A	8.8	A	9.1
Southbound Left	A	7.6	A	7.7
Westbound Approach	A	9.3	A	9.5
Eastbound Approach	C	14.5	C	16.0
#6. Parkwood Dr/Riverside Dr				
Northbound Left	A	9.1	A	9.5
Southbound Left	A	7.6	A	7.7
Westbound Approach	C	16.1	C	19.1
Eastbound Approach	C	14.6	C	18.0
#8. Riverbend Elem/Riverside Dr				
Northbound Left	A	9.5	A	9.3
Eastbound Approach	B	14.0	B	14.9
#9. James Blvd/Riverside Dr				
Southbound Left	A	7.7	A	7.9
Eastbound Approach	C	15.5	C	18.9
Westbound Approach	C	16.5	C	16.8

Note: Results based on *Synchro 6 Traffic Signal Coordination Software* and *HCS2000* results using HCM 2000 control delays (seconds) and LOS.

**Table 5 - 2015 P.M. Intersection Level of Service Impacts**

Study Intersection	Peak Hour Without Project		Peak Hour With Project	
	LOS	Delay (sec)	LOS	Delay (sec)
<i><u>Signalized Intersections</u></i>				
#7. Riverwood Dr/Riverside Dr	--	--	A	9.5
#10. Mendenhall Mall Rd/Riverside Dr	B	15.1	B	15.5
#11. Stephen Richards Dr/ Mendenhall Loop Rd	B	17.0	B	19.1
<i><u>Stop Controlled Intersections</u></i>				
#1. Division St/Riverside Dr				
Northbound Left	A	7.6	A	7.7
Southbound Left	A	8.0	A	8.0
Westbound Approach	B	13.2	B	14.0
Eastbound Approach	B	10.7	B	10.8
#2. Gee St/Riverside Dr				
Northbound Left	A	7.7	A	7.8
Southbound Left	A	8.2	A	8.3
Westbound Approach	C	14.9	C	15.8
Eastbound Approach	B	10.8	B	11.1
#3. Long Run Dr/Riverside Dr				
Northbound Left	A	7.8	A	7.9
Southbound Left	A	8.4	A	8.5
Westbound Approach	C	18.9	C	20.4
Eastbound Approach	B	11.8	B	12.2
#4. Stephen Richards/Riverside Dr	C	22.2	D	34.0
#5. Rivercourt Wy/Riverside Dr				
Northbound Left	A	8.1	A	8.3
Southbound Left	A	8.9	A	9.1
Westbound Approach	C	21.0	C	24.4
Eastbound Approach	B	12.9	B	14.0
#6. Parkwood Dr/Riverside Dr				
Northbound Left	A	8.0	A	8.1
Southbound Left	A	9.2	A	9.4
Westbound Approach	C	18.4	C	21.2
Eastbound Approach	C	14.3	C	20.9
#8. Riverbend Elem/Riverside Dr				
Northbound Left	A	8.1	A	8.3
Eastbound Approach	C	14.6	C	16.2
#9. James Blvd/Riverside Dr				
Southbound Left	A	9.6	A	9.9
Eastbound Approach	B	10.5	B	11.0
Westbound Approach	D	27.2	D	34.8

Note: Results based on *Synchro 6 Traffic Signal Coordination Software* and *HCS2000* results using HCM 2000 control delays (seconds) and LOS.

# ATTACHMENT A

## Detailed Trip Generation Estimates

## Mendenhall Library/Dimond Complex Trip Generation Estimate

ITE Trip Generation, 8th Edition, 2008

### Adjacent Street Traffic (4-6 p.m.)

		LU	AM Peak			PM Peak			Daily	Daily Rate	AM Rate	PM Rate
New	X	Code	Enter	Exit	Trips	Enter	Exit	Trips	Trips			
High School (net increase in students since counts)	310	530	90	40	130	20	20	40	500	1.71	0.41	0.14
Recreation Center (Swimming Pool)	37.8	495	35	20	55	20	35	55	800	22.9	1.62	1.45
Field House	-	-	5	0	5	25	5	30	250			
Library	20.6	590	15	5	20	70	75	145	1,100	54.00	1.06	7.09
<i>Discounted Library Trips</i>	-	-	-3	-1	-4	-14	-15	-29	-220			
			140	65	205	120	120	240	2,430			
										Library Discount Factor		20%

## ATTACHMENT B

### Intersection Level of Service Summary Sheets

**AM Peak Hour Unsignalized Intersections Baseline**

HCS2000: Unsignalized Intersections Release 4.1f

\_\_\_\_\_TWO-WAY STOP CONTROL SUMMARY\_\_\_\_\_

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #1-Division St/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Juneau Library  
 East/West Street: Division St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

\_\_\_\_\_Vehicle Volumes and Adjustments\_\_\_\_\_

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		3	72	9		3	257	0
Peak-Hour Factor, PHF		0.83	0.83	0.83		0.83	0.83	0.83
Hourly Flow Rate, HFR		3	86	10		3	309	0
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		56	0	3		4	1	18
Peak Hour Factor, PHF		0.83	0.83	0.83		0.83	0.83	0.83
Hourly Flow Rate, HFR		67	0	3		4	1	21
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

\_\_\_\_\_Delay, Queue Length, and Level of Service\_\_\_\_\_

Approach	NB	SB	Westbound				Eastbound		
			7	8	9		10	11	12
Movement	1	4							
Lane Config	LTR	LTR		LTR			LTR		
v (vph)	3	3		70			26		
C(m) (vph)	1252	1498		533			685		
v/c	0.00	0.00		0.13			0.04		
95% queue length	0.01	0.01		0.45			0.12		
Control Delay	7.9	7.4		12.8			10.5		
LOS	A	A		B			B		
Approach Delay				12.8			10.5		
Approach LOS				B			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #2 - Gee St & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Gee St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		6	95	8	2	398	5
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		6	106	8	2	447	5
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		32	2	4	4	4	17
Peak Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		35	2	4	4	4	19
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR			LTR		
v (vph)	6	2	41			27		
C(m) (vph)	1107	1475	427			537		
v/c	0.01	0.00	0.10			0.05		
95% queue length	0.02	0.00	0.32			0.16		
Control Delay	8.3	7.4	14.3			12.1		
LOS	A	A	B			B		
Approach Delay			14.3			12.1		
Approach LOS			B			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #3-Long Run Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Long Run Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		3	105	7		0	457	1
Peak-Hour Factor, PHF		0.85	0.85	0.85		0.85	0.85	0.85
Hourly Flow Rate, HFR		3	123	8		0	537	1
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		27	3	5		4	4	24
Peak Hour Factor, PHF		0.85	0.85	0.85		0.85	0.85	0.85
Hourly Flow Rate, HFR		31	3	5		4	4	28
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	3	0		39			36	
C(m) (vph)	1028	1452		370			490	
v/c	0.00	0.00		0.11			0.07	
95% queue length	0.01	0.00		0.35			0.24	
Control Delay	8.5	7.5		15.9			12.9	
LOS	A	A		C			B	
Approach Delay				15.9			12.9	
Approach LOS				C			B	



HCS2000: Unsignalized Intersections Release 4.1f

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #4-Stephen Richards/Riverside  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Stephen Richards Dr  
 North/South Street: Riverside Dr

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	5	29	22	76	8	30	3	105	57	110	409	5
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.90		0.90		0.90		0.90	
Flow Rate	61		125		182		581	
% Heavy Veh	2		2		2		2	
No. Lanes		1		1		1		1
Opposing-Lanes		1		1		1		1
Conflicting-lanes		1		1		1		1
Geometry group		1		1		1		1
Duration, T	0.25 hrs.							

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane	61		125		182		581	
Left-Turn	5		84		3		122	
Right-Turn	24		33		63		5	
Prop. Left-Turns	0.1		0.7		0.0		0.2	
Prop. Right-Turns	0.4		0.3		0.3		0.0	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
Geometry Group	1		1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj	0.2		0.2		0.2		0.2	
hRT-adj	-0.6		-0.6		-0.6		-0.6	
hHV-adj	1.7		1.7		1.7		1.7	
hadj, computed	-0.2		0.0		-0.2		0.1	

Worksheet 4 - Departure Headway and Service Time

---

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	61		125		182		581	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.05		0.11		0.16		0.52	
hd, final value	5.88		5.92		5.07		4.80	
x, final value	0.10		0.21		0.26		0.77	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	3.9		3.9		3.1		2.8	

Worksheet 5 - Capacity and Level of Service

---

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	61		125		182		581	
Service Time	3.9		3.9		3.1		2.8	
Utilization, x	0.10		0.21		0.26		0.77	
Dep. headway, hd	5.88		5.92		5.07		4.80	
Capacity	311		375		432		741	
Delay	9.53		10.45		9.80		22.24	
LOS	A		B		A		C	
Approach:								
Delay		9.53		10.45		9.80		22.24
LOS		A		B		A		C
Intersection Delay	17.48				Intersection LOS	C		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #5-Rivercourt Wy/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Rivercourt Wy  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		10	152	0		0	519	1
Peak-Hour Factor, PHF		0.84	0.84	0.84		0.84	0.84	0.84
Hourly Flow Rate, HFR		11	180	0		0	617	1
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		Yes				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		0	0	1		5	0	52
Peak Hour Factor, PHF		0.84	0.84	0.84		0.84	0.84	0.84
Hourly Flow Rate, HFR		0	0	1		5	0	61
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	11	0		1			66	
C(m) (vph)	952	1391		847			443	
v/c	0.01	0.00		0.00			0.15	
95% queue length	0.04	0.00		0.00			0.52	
Control Delay	8.8	7.6		9.3			14.5	
LOS	A	A		A			B	
Approach Delay				9.3			14.5	
Approach LOS				A			B	

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #6 -Parkwood Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Juneau  
 East/West Street: Parkwood Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		10	147	2	4	533	38
Peak-Hour Factor, PHF		0.81	0.81	0.81	0.81	0.81	0.81
Hourly Flow Rate, HFR		12	181	2	4	658	46
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	1	0	0	1	0
Configuration		L		TR	LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		19	0	16	1	0	4
Peak Hour Factor, PHF		0.81	0.81	0.81	0.81	0.81	0.81
Hourly Flow Rate, HFR		23	0	19	1	0	4
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage				No	/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config	L	LTR	LTR			LTR		
v (vph)	12	4	42			5		
C(m) (vph)	888	1382	367			381		
v/c	0.01	0.00	0.11			0.01		
95% queue length	0.04	0.01	0.38			0.04		
Control Delay	9.1	7.6	16.1			14.6		
LOS	A	A	C			B		
Approach Delay			16.1			14.6		
Approach LOS			C			B		



HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #9 - James Blvd & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: James Blvd  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		208	10	2	600	1	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	
Hourly Flow Rate, HFR		233	11	2	674	1	
Percent Heavy Vehicles		--	--	2	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?					/		
Lanes		1	0		0	1	0
Configuration		TR			LTR		
Upstream Signal?		Yes			Yes		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		19	0	14	2	0	4
Peak Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		21	0	15	2	0	4
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/	No	
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config		LTR	LTR	LTR	LTR	LTR	LTR	LTR
v (vph)		2	36	36	36	6	6	6
C(m) (vph)		1322	349	349	349	350	350	350
v/c		0.00	0.10	0.10	0.10	0.02	0.02	0.02
95% queue length		0.00	0.34	0.34	0.34	0.05	0.05	0.05
Control Delay		7.7	16.5	16.5	16.5	15.5	15.5	15.5
LOS		A	C	C	C	C	C	C
Approach Delay			16.5	16.5	16.5	15.5	15.5	15.5
Approach LOS			C	C	C	C	C	C

# HCM Signalized Intersection Capacity Analysis

## 7: Riverwood Dr & Riverside Dr

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		0.99	1.00		0.99	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.98	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1755	1523		1802	1526	1770	1863		1768	1863	1549
Flt Permitted		0.71	1.00		0.82	1.00	0.32	1.00		0.67	1.00	1.00
Satd. Flow (perm)		1309	1523		1516	1526	603	1863		1252	1863	1549
Volume (vph)	41	3	167	16	17	12	213	120	0	6	463	215
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	45	3	184	18	19	13	234	132	0	7	509	236
RTOR Reduction (vph)	0	0	161	0	0	11	0	0	0	0	0	114
Lane Group Flow (vph)	0	48	23	0	37	2	234	132	0	7	509	122
Confl. Peds. (#/hr)	15		15	16		16				1		1
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)		5.8	5.8		5.8	5.8	37.6	31.9		27.4	26.7	26.7
Effective Green, g (s)		6.8	6.8		6.8	6.8	38.6	32.9		29.4	27.7	27.7
Actuated g/C Ratio		0.13	0.13		0.13	0.13	0.72	0.62		0.55	0.52	0.52
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)		167	194		193	194	587	1148		706	966	804
v/s Ratio Prot							c0.05	0.07		0.00	c0.27	
v/s Ratio Perm		c0.04	0.02		0.02	0.00	0.24			0.01		0.08
v/c Ratio		0.29	0.12		0.19	0.01	0.40	0.11		0.01	0.53	0.15
Uniform Delay, d1		21.1	20.7		20.8	20.4	3.7	4.2		5.4	8.5	6.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.3	0.1		0.2	0.0	0.2	0.0		0.0	0.2	0.0
Delay (s)		21.5	20.8		21.0	20.4	3.8	4.3		5.4	8.8	6.7
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		20.9			20.8			4.0			8.1	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 10: Mendenhall Mall Rd & Riverside Dr

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗	↘	↑	↗	↘	↑	↗	↘	↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1767	1863	1548	1770	1863	1583	1769	1863	1548	1758	1863	1531
Flt Permitted	0.71	1.00	1.00	0.58	1.00	1.00	0.40	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	1328	1863	1548	1085	1863	1583	738	1863	1548	1217	1863	1531
Volume (vph)	27	20	51	43	59	29	70	139	52	63	425	93
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	30	22	57	48	66	33	79	156	58	71	478	104
RTOR Reduction (vph)	0	0	52	0	0	30	0	0	25	0	0	23
Lane Group Flow (vph)	30	22	5	48	66	3	79	156	33	71	478	81
Confl. Peds. (#/hr)	1		1				1		1	6		6
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	7.8	5.3	5.3	11.0	6.9	6.9	43.8	39.4	39.4	42.8	38.9	38.9
Effective Green, g (s)	8.6	5.8	5.8	11.8	7.4	7.4	44.8	40.1	40.1	43.8	39.6	39.6
Actuated g/C Ratio	0.12	0.08	0.08	0.17	0.10	0.10	0.64	0.57	0.57	0.62	0.56	0.56
Clearance Time (s)	4.3	4.5	4.5	4.3	4.5	4.5	4.3	4.7	4.7	4.3	4.7	4.7
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	1.0	0.2	0.2
Lane Grp Cap (vph)	179	153	127	224	196	166	538	1060	880	788	1046	860
v/s Ratio Prot	0.01	0.01		c0.01	c0.04		c0.01	0.08		0.01	c0.26	
v/s Ratio Perm	0.01		0.00	0.02		0.00	0.08		0.02	0.05		0.05
v/c Ratio	0.17	0.14	0.04	0.21	0.34	0.02	0.15	0.15	0.04	0.09	0.46	0.09
Uniform Delay, d1	27.6	30.0	29.8	25.1	29.3	28.3	5.4	7.2	6.7	5.3	9.1	7.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Delay (s)	27.8	30.2	29.8	25.3	29.6	28.3	5.4	7.2	6.7	5.3	9.2	7.2
Level of Service	C	C	C	C	C	C	A	A	A	A	A	A
Approach Delay (s)		29.3			27.9			6.6			8.5	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
 11: Stephen Richards Dr & Mendenhall Loop Rd

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.98		1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1807	1546		1780	1529	1770	1853		1744	1834	
Flt Permitted		0.60	1.00		0.68	1.00	0.15	1.00		0.56	1.00	
Satd. Flow (perm)		1113	1546		1247	1529	271	1853		1032	1834	
Volume (vph)	60	43	175	111	38	28	34	291	8	11	772	60
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	66	47	192	122	42	31	37	320	9	12	848	66
RTOR Reduction (vph)	0	0	160	0	0	26	0	1	0	0	2	0
Lane Group Flow (vph)	0	113	32	0	164	5	37	328	0	12	912	0
Confl. Peds. (#/hr)	2		2	8		8	7		7	19		19
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4	2			6		
Actuated Green, G (s)		13.4	13.4		13.4	13.4	58.8	54.9		52.6	51.8	
Effective Green, g (s)		14.0	14.0		14.0	14.0	60.8	55.9		54.6	52.8	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.73	0.67		0.65	0.63	
Clearance Time (s)		4.6	4.6		4.6	4.6	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	3.0	0.2		3.0	0.2	
Lane Grp Cap (vph)		186	259		209	256	285	1238		689	1157	
v/s Ratio Prot							c0.01	0.18		0.00	c0.50	
v/s Ratio Perm		0.10	0.02		c0.13	0.00	0.09			0.01		
v/c Ratio		0.61	0.12		0.78	0.02	0.13	0.27		0.02	0.79	
Uniform Delay, d1		32.3	29.6		33.4	29.1	9.3	5.6		5.1	11.3	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.8	0.1		16.1	0.0	0.2	0.0		0.0	3.4	
Delay (s)		36.1	29.7		49.5	29.1	9.5	5.7		5.1	14.7	
Level of Service		D	C		D	C	A	A		A	B	
Approach Delay (s)		32.1			46.3			6.0			14.6	
Approach LOS		C			D			A			B	

Intersection Summary

HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

**AM Peak Hour Unsignalized Intersections with Library**

HCS2000: Unsignalized Intersections Release 4.1f

\_\_\_\_\_TWO-WAY STOP CONTROL SUMMARY\_\_\_\_\_

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #1-Division St/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Juneau Library  
 East/West Street: Division St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

\_\_\_\_\_Vehicle Volumes and Adjustments\_\_\_\_\_

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		3	85	10		3	285	0
Peak-Hour Factor, PHF		0.83	0.83	0.83		0.83	0.83	0.83
Hourly Flow Rate, HFR		3	102	12		3	343	0
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		57	0	3		4	1	18
Peak Hour Factor, PHF		0.83	0.83	0.83		0.83	0.83	0.83
Hourly Flow Rate, HFR		68	0	3		4	1	21
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

\_\_\_\_\_Delay, Queue Length, and Level of Service\_\_\_\_\_

Approach	NB	SB	Westbound				Eastbound		
			7	8	9		10	11	12
Movement	1	4							
Lane Config	LTR	LTR		LTR			LTR		
v (vph)	3	3		71			26		
C(m) (vph)	1216	1475		493			650		
v/c	0.00	0.00		0.14			0.04		
95% queue length	0.01	0.01		0.50			0.12		
Control Delay	8.0	7.4		13.5			10.8		
LOS	A	A		B			B		
Approach Delay				13.5			10.8		
Approach LOS				B			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #2 - Gee St & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Gee St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		6	109	9	2	427	5
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		6	122	10	2	479	5
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		30	2	4	4	4	17
Peak Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		33	2	4	4	4	19
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
v (vph)	6	2	39			27		
C(m) (vph)	1077	1453	398			509		
v/c	0.01	0.00	0.10			0.05		
95% queue length	0.02	0.00	0.32			0.17		
Control Delay	8.4	7.5	15.0+			12.5		
LOS	A	A	C			B		
Approach Delay			15.0+			12.5		
Approach LOS			C			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #3-Long Run Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Long Run Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		3	119	7	0	488	1
Peak-Hour Factor, PHF		0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR		3	139	8	0	574	1
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		27	3	5	4	4	25
Peak Hour Factor, PHF		0.85	0.85	0.85	0.85	0.85	0.85
Hourly Flow Rate, HFR		31	3	5	4	4	29
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/ No /		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB 1 LTR	SB 4 LTR	Westbound			Eastbound		
			7 LTR	8 LTR	9 LTR	10 LTR	11 LTR	12 LTR
v (vph)	3	0	39			37		
C(m) (vph)	996	1433	341			464		
v/c	0.00	0.00	0.11			0.08		
95% queue length	0.01	0.00	0.38			0.26		
Control Delay	8.6	7.5	16.9			13.4		
LOS	A	A	C			B		
Approach Delay			16.9			13.4		
Approach LOS			C			B		

HCS2000: Unsignalized Intersections Release 4.1f

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #4-Stephen Richards/Riverside  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Stephen Richards Dr  
 North/South Street: Riverside Dr

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	5	29	22	108	8	30	3	120	72	110	441	5
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.90		0.90		0.90		0.90	
Flow Rate	61		161		216		617	
% Heavy Veh	2		2		2		2	
No. Lanes	1		1		1		1	
Opposing-Lanes	1		1		1		1	
Conflicting-lanes	1		1		1		1	
Geometry group	1		1		1		1	
Duration, T	0.25 hrs.							

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane	61		161		216		617	
Left-Turn	5		120		3		122	
Right-Turn	24		33		80		5	
Prop. Left-Turns	0.1		0.7		0.0		0.2	
Prop. Right-Turns	0.4		0.2		0.4		0.0	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
Geometry Group	1		1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj	0.2		0.2		0.2		0.2	
hRT-adj	-0.6		-0.6		-0.6		-0.6	
hHV-adj	1.7		1.7		1.7		1.7	
hadj, computed	-0.2		0.1		-0.2		0.1	

Worksheet 4 - Departure Headway and Service Time

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	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	61		161		216		617	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.05		0.14		0.19		0.55	
hd, final value	6.27		6.24		5.32		5.02	
x, final value	0.11		0.28		0.32		0.86	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	4.3		4.2		3.3		3.0	

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Worksheet 5 - Capacity and Level of Service

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	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	61		161		216		617	
Service Time	4.3		4.2		3.3		3.0	
Utilization, x	0.11		0.28		0.32		0.86	
Dep. headway, hd	6.27		6.24		5.32		5.02	
Capacity	311		411		466		710	
Delay	10.01		11.64		10.80		30.83	
LOS	B		B		B		D	
Approach:								
Delay		10.01		11.64		10.80		30.83
LOS		B		B		B		D
Intersection Delay	22.59				Intersection LOS	C		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #5-Rivercourt Wy/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Rivercourt Wy  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		8	182	0	0	583	1
Peak-Hour Factor, PHF		0.84	0.84	0.84	0.84	0.84	0.84
Hourly Flow Rate, HFR		9	216	0	0	694	1
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		0	0	1	5	0	55
Peak Hour Factor, PHF		0.84	0.84	0.84	0.84	0.84	0.84
Hourly Flow Rate, HFR		0	0	1	5	0	65
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/ No /		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR			LTR		
v (vph)	9	0	1			70		
C(m) (vph)	892	1350	808			398		
v/c	0.01	0.00	0.00			0.18		
95% queue length	0.03	0.00	0.00			0.63		
Control Delay	9.1	7.7	9.5			16.0		
LOS	A	A	A			C		
Approach Delay			9.5			16.0		
Approach LOS			A			C		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #6 -Parkwood Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Juneau  
 East/West Street: Parkwood Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		17	175	2	4	593	45
Peak-Hour Factor, PHF		0.81	0.81	0.81	0.81	0.81	0.81
Hourly Flow Rate, HFR		20	216	2	4	732	55
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	1	0	0	1	0
Configuration		L		TR	LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		19	1	16	4	1	7
Peak Hour Factor, PHF		0.81	0.81	0.81	0.81	0.81	0.81
Hourly Flow Rate, HFR		23	1	19	4	1	8
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage				No	/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config	L	LTR	LTR			LTR		
v (vph)	20	4	43			13		
C(m) (vph)	826	1343	298			289		
v/c	0.02	0.00	0.14			0.04		
95% queue length	0.07	0.01	0.50			0.14		
Control Delay	9.5	7.7	19.1			18.0		
LOS	A	A	C			C		
Approach Delay			19.1			18.0		
Approach LOS			C			C		





HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: AM Peak  
 Intersection: #9 - James Blvd & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: James Blvd  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		278	10	2	633	1	
Peak-Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	
Hourly Flow Rate, HFR		312	11	2	711	1	
Percent Heavy Vehicles		--	--	2	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	0
Configuration		TR			LTR		
Upstream Signal?		Yes			Yes		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		19	0	14	2	0	4
Peak Hour Factor, PHF		0.89	0.89	0.89	0.89	0.89	0.89
Hourly Flow Rate, HFR		21	0	15	2	0	4
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config		LTR	LTR	LTR	LTR	LTR	LTR	
v (vph)		2	36	6				
C(m) (vph)		1237	294	312				
v/c		0.00	0.12	0.02				
95% queue length		0.00	0.41	0.06				
Control Delay		7.9	18.9	16.8				
LOS		A	C	C				
Approach Delay			18.9	16.8				
Approach LOS			C	C				

# HCM Signalized Intersection Capacity Analysis

## 7: Riverwood Dr & Riverside Dr

12/3/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕	↕	↕	↕		↕	↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		0.98	1.00		0.99	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.97	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1751	1520		1796	1523	1770	1863		1768	1863	1549
Flt Permitted		0.71	1.00		0.82	1.00	0.34	1.00		0.68	1.00	1.00
Satd. Flow (perm)		1305	1520		1505	1523	628	1863		1262	1863	1549
Volume (vph)	69	4	135	16	15	12	143	112	0	6	459	148
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	76	4	148	18	16	13	157	123	0	7	504	163
RTOR Reduction (vph)	0	0	127	0	0	11	0	0	0	0	0	75
Lane Group Flow (vph)	0	80	21	0	34	2	157	123	0	7	504	88
Conf. Peds. (#/hr)	15		15	16		16				1		1
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)		7.5	7.5		7.5	7.5	42.0	36.2		31.9	31.1	31.1
Effective Green, g (s)		8.5	8.5		8.5	8.5	43.0	37.2		33.9	32.1	32.1
Actuated g/C Ratio		0.14	0.14		0.14	0.14	0.72	0.63		0.57	0.54	0.54
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)		186	217		215	218	586	1165		734	1005	836
v/s Ratio Prot							c0.03	0.07		0.00	c0.27	
v/s Ratio Perm		c0.06	0.01		0.02	0.00	0.16			0.01		0.06
v/c Ratio		0.43	0.10		0.16	0.01	0.27	0.11		0.01	0.50	0.11
Uniform Delay, d1		23.3	22.2		22.4	21.9	3.7	4.5		5.5	8.6	6.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.6	0.1		0.1	0.0	0.1	0.0		0.0	0.1	0.0
Delay (s)		23.9	22.2		22.5	21.9	3.8	4.5		5.5	8.8	6.7
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		22.8			22.3			4.1			8.3	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 10: Mendenhall Mall Rd & Riverside Dr

12/3/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗	↘	↑	↗	↘	↑	↗	↘	↑	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1767	1863	1548	1770	1863	1583	1769	1863	1548	1759	1863	1531
Flt Permitted	0.71	1.00	1.00	0.60	1.00	1.00	0.38	1.00	1.00	0.62	1.00	1.00
Satd. Flow (perm)	1328	1863	1548	1122	1863	1583	704	1863	1548	1142	1863	1531
Volume (vph)	27	20	51	43	59	36	70	202	50	66	454	93
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	30	22	57	48	66	40	79	227	56	74	510	104
RTOR Reduction (vph)	0	0	52	0	0	36	0	0	24	0	0	21
Lane Group Flow (vph)	30	22	5	48	66	4	79	227	32	74	510	83
Conf. Peds. (#/hr)	1		1				1		1	6		6
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	8.1	5.5	5.5	10.9	6.9	6.9	45.5	41.2	41.2	44.7	40.8	40.8
Effective Green, g (s)	8.9	6.0	6.0	11.7	7.4	7.4	46.5	41.9	41.9	45.7	41.5	41.5
Actuated g/C Ratio	0.12	0.08	0.08	0.16	0.10	0.10	0.64	0.58	0.58	0.63	0.57	0.57
Clearance Time (s)	4.3	4.5	4.5	4.3	4.5	4.5	4.3	4.7	4.7	4.3	4.7	4.7
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	1.0	0.2	0.2
Lane Grp Cap (vph)	181	154	128	220	190	162	520	1078	896	757	1068	878
v/s Ratio Prot	0.01	0.01		c0.01	c0.04		c0.01	0.12		0.01	c0.27	
v/s Ratio Perm	0.01		0.00	0.02		0.00	0.09		0.02	0.06		0.05
v/c Ratio	0.17	0.14	0.04	0.22	0.35	0.03	0.15	0.21	0.04	0.10	0.48	0.09
Uniform Delay, d1	28.3	30.8	30.5	26.2	30.3	29.3	5.4	7.3	6.6	5.1	9.1	7.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.2	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Delay (s)	28.5	31.0	30.6	26.4	30.7	29.3	5.5	7.4	6.6	5.2	9.2	7.0
Level of Service	C	C	C	C	C	C	A	A	A	A	A	A
Approach Delay (s)		30.1			29.0			6.8			8.4	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 11: Stephen Richards Dr & Mendenhall Loop Rd

12/3/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.98		1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00		0.98	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1803	1546		1779	1527	1770	1853		1743	1822	
Flt Permitted		0.55	1.00		0.62	1.00	0.14	1.00		0.56	1.00	
Satd. Flow (perm)		1022	1546		1150	1527	256	1853		1026	1822	
Volume (vph)	73	43	177	111	38	28	38	291	8	11	772	88
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	80	47	195	122	42	31	42	320	9	12	848	97
RTOR Reduction (vph)	0	0	162	0	0	26	0	1	0	0	3	0
Lane Group Flow (vph)	0	127	33	0	164	5	42	328	0	12	942	0
Conf. Peds. (#/hr)	2		2	8		8	7		7	19		19
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4	2			6		
Actuated Green, G (s)		14.6	14.6		14.6	14.6	63.2	59.1		58.4	56.7	
Effective Green, g (s)		15.2	15.2		15.2	15.2	65.2	60.1		60.4	57.7	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.72	0.67		0.67	0.64	
Clearance Time (s)		4.6	4.6		4.6	4.6	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	3.0	0.2		3.0	0.2	
Lane Grp Cap (vph)		173	261		194	258	271	1237		710	1168	
v/s Ratio Prot							c0.01	0.18		0.00	c0.52	
v/s Ratio Perm		0.12	0.02		c0.14	0.00	0.10			0.01		
v/c Ratio		0.73	0.13		0.85	0.02	0.15	0.27		0.02	0.81	
Uniform Delay, d1		35.5	31.8		36.3	31.2	10.5	6.0		4.9	12.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.0	0.1		26.2	0.0	0.3	0.0		0.0	3.9	
Delay (s)		48.4	31.8		62.5	31.2	10.7	6.1		4.9	15.9	
Level of Service		D	C		E	C	B	A		A	B	
Approach Delay (s)		38.4			57.5			6.6			15.8	
Approach LOS		D			E			A			B	
<b>Intersection Summary</b>												
HCM Average Control Delay		22.3		HCM Level of Service				C				
HCM Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		90.0		Sum of lost time (s)				16.0				
Intersection Capacity Utilization		78.6%		ICU Level of Service				D				
Analysis Period (min)		15										

c Critical Lane Group

**PM Peak Hour Unsignalized Intersections Baseline**

HCS2000: Unsignalized Intersections Release 4.1f

\_\_\_\_\_TWO-WAY STOP CONTROL SUMMARY\_\_\_\_\_

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #1-Division St/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Division St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

\_\_\_\_\_Vehicle Volumes and Adjustments\_\_\_\_\_

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		26	244	45		6	146	4
Peak-Hour Factor, PHF		0.86	0.86	0.86		0.86	0.86	0.86
Hourly Flow Rate, HFR		30	283	52		6	169	4
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		21	2	7		2	1	7
Peak Hour Factor, PHF		0.86	0.86	0.86		0.86	0.86	0.86
Hourly Flow Rate, HFR		24	2	8		2	1	8
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

\_\_\_\_\_Delay, Queue Length, and Level of Service\_\_\_\_\_

Approach	NB	SB	Westbound				Eastbound		
			7	8	9		10	11	12
Movement	1	4							
Lane Config	LTR	LTR		LTR			LTR		
v (vph)	30	6		34			11		
C(m) (vph)	1404	1224		471			673		
v/c	0.02	0.00		0.07			0.02		
95% queue length	0.07	0.01		0.23			0.05		
Control Delay	7.6	8.0		13.2			10.4		
LOS	A	A		B			B		
Approach Delay				13.2			10.4		
Approach LOS				B			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #2 - Gee St & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Gee St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		25	389	32	0	202	3
Peak-Hour Factor, PHF		0.97	0.97	0.97	0.97	0.97	0.97
Hourly Flow Rate, HFR		25	401	32	0	208	3
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		18	1	6	2	2	15
Peak Hour Factor, PHF		0.97	0.97	0.97	0.97	0.97	0.97
Hourly Flow Rate, HFR		18	1	6	2	2	15
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/	No	
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR	LTR	LTR	LTR	LTR	LTR
v (vph)	25	0	25			19		
C(m) (vph)	1360	1127	389			645		
v/c	0.02	0.00	0.06			0.03		
95% queue length	0.06	0.00	0.21			0.09		
Control Delay	7.7	8.2	14.9			10.8		
LOS	A	A	B			B		
Approach Delay			14.9			10.8		
Approach LOS			B			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #3-Long Run Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Long Run Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		36	446	28	2	230	1
Peak-Hour Factor, PHF		0.93	0.93	0.93	0.93	0.93	0.93
Hourly Flow Rate, HFR		38	479	30	2	247	1
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		13	4	0	4	2	19
Peak Hour Factor, PHF		0.93	0.93	0.93	0.93	0.93	0.93
Hourly Flow Rate, HFR		13	4	0	4	2	20
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR			LTR		
v (vph)	38	2	17			26		
C(m) (vph)	1318	1056	276			556		
v/c	0.03	0.00	0.06			0.05		
95% queue length	0.09	0.01	0.20			0.15		
Control Delay	7.8	8.4	18.9			11.8		
LOS	A	A	C			B		
Approach Delay			18.9			11.8		
Approach LOS			C			B		



HCS2000: Unsignalized Intersections Release 4.1f

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #4-Stephen Richards/Riverside  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Stephen Richards Dr  
 North/South Street: Riverside Dr

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	7	16	14	44	13	88	22	481	92	46	255	9
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.95		0.95		0.95		0.95	
Flow Rate	37		151		625		325	
% Heavy Veh	0		2		2		2	
No. Lanes		1		1		1		1
Opposing-Lanes		1		1		1		1
Conflicting-lanes		1		1		1		1
Geometry group		1		1		1		1
Duration, T	0.25 hrs.							

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane	37		151		625		325	
Left-Turn	7		46		23		48	
Right-Turn	14		92		96		9	
Prop. Left-Turns	0.2		0.3		0.0		0.1	
Prop. Right-Turns	0.4		0.6		0.2		0.0	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
Geometry Group	1		1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj	0.2		0.2		0.2		0.2	
hRT-adj	-0.6		-0.6		-0.6		-0.6	
hHV-adj	1.7		1.7		1.7		1.7	
hadj, computed	-0.2		-0.3		-0.1		0.0	

Worksheet 4 - Departure Headway and Service Time

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	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	37		151		625		325	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.03		0.13		0.56		0.29	
hd, final value	6.51		6.08		4.94		5.41	
x, final value	0.07		0.25		0.86		0.49	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	4.5		4.1		2.9		3.4	

Worksheet 5 - Capacity and Level of Service

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	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	37		151		625		325	
Service Time	4.5		4.1		2.9		3.4	
Utilization, x	0.07		0.25		0.86		0.49	
Dep. headway, hd	6.51		6.08		4.94		5.41	
Capacity	287		401		722		575	
Delay	9.97		11.15		30.11		13.45	
LOS	A		B		D		B	
Approach:								
Delay		9.97		11.15		30.11		13.45
LOS		A		B		D		B
Intersection Delay	22.18				Intersection LOS	C		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #5-Rivercourt Wy/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Rivercourt Wy  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		68	597	2	1	285	2
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR		73	648	2	1	309	2
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?					/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		5	0	6	4	0	28
Peak Hour Factor, PHF		0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR		5	0	6	4	0	30
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/	No	
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR			LTR		
v (vph)	73	1	11			34		
C(m) (vph)	1217	920	236			487		
v/c	0.06	0.00	0.05			0.07		
95% queue length	0.19	0.00	0.15			0.22		
Control Delay	8.1	8.9	21.0			12.9		
LOS	A	A	C			B		
Approach Delay			21.0			12.9		
Approach LOS			C			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #6-Parkwood Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: Parkwood Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		8	665	28	14	318	2
Peak-Hour Factor, PHF		0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR		8	692	29	14	331	2
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	1	0	0	1	0
Configuration		L		TR	LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		9	1	18	7	1	9
Peak Hour Factor, PHF		0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR		9	1	18	7	1	9
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB 1 L	SB 4 LTR	Westbound			Eastbound		
			7 LTR	8 LTR	9 LTR	10 LTR	11 LTR	12 LTR
v (vph)	8	14	28			17		
C(m) (vph)	1216	879	285			286		
v/c	0.01	0.02	0.10			0.06		
95% queue length	0.02	0.05	0.32			0.19		
Control Delay	8.0	9.2	19.0			18.4		
LOS	A	A	C			C		
Approach Delay			19.0			18.4		
Approach LOS			C			C		



HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #9 - James Blvd & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Baseline  
 Project ID: Riverside Dr Juneau  
 East/West Street: James Blvd  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1	2	3	4	5	6
		L	T	R	L	T	R
Volume			665	49	12	357	
Peak-Hour Factor, PHF			0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR			722	53	13	388	
Percent Heavy Vehicles			--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes			1	0		0	1
Configuration			TR			LT	
Upstream Signal?			Yes			Yes	

Minor Street:	Approach Movement	Westbound			Eastbound		
		7	8	9	10	11	12
		L	T	R	L	T	R
Volume		31	0	65	0	0	2
Peak Hour Factor, PHF		0.92	0.92	0.92	0.92	0.92	0.92
Hourly Flow Rate, HFR		33	0	70	0	0	2
Percent Heavy Vehicles		2	2	2	0	0	0
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage				No	/		No
Lanes		0	1	0		0	1
Configuration			LTR			LTR	

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config		LT		LTR			LTR	
v (vph)		13		103			2	
C(m) (vph)		802		263			652	
v/c		0.02		0.39			0.00	
95% queue length		0.05		1.77			0.01	
Control Delay		9.6		27.2			10.5	
LOS		A		D			B	
Approach Delay				27.2			10.5	
Approach LOS				D			B	

# HCM Signalized Intersection Capacity Analysis

## 7: Riverwood Dr & Riverside Dr

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↖	↖		↖	↕	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		0.98	1.00		0.98	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1748	1516		1741	1519	1770	1854		1769	1863	1549
Flt Permitted		0.73	1.00		0.71	1.00	0.51	1.00		0.29	1.00	1.00
Satd. Flow (perm)		1335	1516		1296	1519	941	1854		545	1863	1549
Volume (vph)	37	3	46	13	1	20	44	678	21	8	330	33
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	41	3	51	14	1	22	48	745	23	9	363	36
RTOR Reduction (vph)	0	0	46	0	0	20	0	1	0	0	0	12
Lane Group Flow (vph)	0	44	5	0	15	2	48	767	0	9	363	24
Confl. Peds. (#/hr)	15		15	16		16				1		1
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)		5.9	5.9		5.9	5.9	48.6	45.9		45.2	44.2	44.2
Effective Green, g (s)		6.9	6.9		6.9	6.9	50.6	46.9		47.2	45.2	45.2
Actuated g/C Ratio		0.10	0.10		0.10	0.10	0.75	0.69		0.70	0.67	0.67
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)		136	154		132	155	748	1282		416	1242	1033
v/s Ratio Prot							c0.00	c0.41		0.00	0.19	
v/s Ratio Perm		c0.03	0.00		0.01	0.00	0.04			0.01		0.02
v/c Ratio		0.32	0.03		0.11	0.01	0.06	0.60		0.02	0.29	0.02
Uniform Delay, d1		28.3	27.4		27.7	27.4	2.3	5.5		3.9	4.7	3.8
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.5	0.0		0.1	0.0	0.0	0.5		0.0	0.0	0.0
Delay (s)		28.8	27.5		27.8	27.4	2.3	6.0		3.9	4.7	3.8
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		28.1			27.6			5.8			4.6	
Approach LOS		C			C			A			A	

### Intersection Summary

HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	67.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 10: Mendenhall Mall Rd & Riverside Dr

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↖	↖	↗	↖	↖	↗	↖	↖	↗	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1768	1863	1549	1770	1863	1583	1769	1863	1549	1765	1863	1535
Flt Permitted	0.51	1.00	1.00	0.65	1.00	1.00	0.49	1.00	1.00	0.48	1.00	1.00
Satd. Flow (perm)	958	1863	1549	1210	1863	1583	913	1863	1549	891	1863	1535
Volume (vph)	176	151	89	82	92	133	197	341	131	71	213	67
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	198	170	100	92	103	149	221	383	147	80	239	75
RTOR Reduction (vph)	0	0	82	0	0	129	0	0	55	0	0	48
Lane Group Flow (vph)	198	170	18	92	103	20	221	383	92	80	239	27
Confl. Peds. (#/hr)	1		1				1		1	6		6
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	15.9	9.7	9.7	10.7	7.1	7.1	29.1	22.8	22.8	23.1	19.8	19.8
Effective Green, g (s)	16.7	10.2	10.2	11.5	7.6	7.6	30.1	23.5	23.5	24.1	20.5	20.5
Actuated g/C Ratio	0.29	0.18	0.18	0.20	0.13	0.13	0.53	0.41	0.41	0.42	0.36	0.36
Clearance Time (s)	4.3	4.5	4.5	4.3	4.5	4.5	4.3	4.7	4.7	4.3	4.7	4.7
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	1.0	0.2	0.2
Lane Grp Cap (vph)	372	332	276	281	248	210	579	765	636	430	668	550
v/s Ratio Prot	c0.06	0.09		0.02	0.06		c0.04	c0.21		0.01	0.13	
v/s Ratio Perm	c0.10		0.01	0.04		0.01	0.16		0.06	0.07		0.02
v/c Ratio	0.53	0.51	0.06	0.33	0.42	0.09	0.38	0.50	0.14	0.19	0.36	0.05
Uniform Delay, d1	16.2	21.2	19.5	19.3	22.8	21.8	7.6	12.5	10.6	10.1	13.5	12.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.6	0.0	0.2	0.4	0.1	0.2	0.2	0.0	0.1	0.1	0.0
Delay (s)	17.0	21.8	19.6	19.5	23.2	21.8	7.7	12.7	10.6	10.2	13.6	12.0
Level of Service	B	C	B	B	C	C	A	B	B	B	B	B
Approach Delay (s)		19.3			21.6			10.8			12.6	
Approach LOS		B			C			B			B	

### Intersection Summary

HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
 11: Stephen Richards Dr & Mendenhall Loop Rd

12/5/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.98		1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.97	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1798	1545		1772	1525	1766	1851		1770	1820	
Flt Permitted		0.65	1.00		0.65	1.00	0.37	1.00		0.12	1.00	
Satd. Flow (perm)		1213	1545		1188	1525	689	1851		230	1820	
Volume (vph)	60	29	86	74	20	27	185	981	34	36	438	52
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	66	32	95	81	22	30	203	1078	37	40	481	57
RTOR Reduction (vph)	0	0	84	0	0	27	0	1	0	0	3	0
Lane Group Flow (vph)	0	98	11	0	103	3	203	1114	0	40	535	0
Confl. Peds. (#/hr)	2		2	8		8	7		7	19		19
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4	2			6		
Actuated Green, G (s)		10.5	10.5		10.5	10.5	77.4	69.2		67.2	64.0	
Effective Green, g (s)		11.1	11.1		11.1	11.1	78.4	70.2		69.2	65.0	
Actuated g/C Ratio		0.11	0.11		0.11	0.11	0.80	0.72		0.71	0.67	
Clearance Time (s)		4.6	4.6		4.6	4.6	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	3.0	0.2		3.0	0.2	
Lane Grp Cap (vph)		138	176		135	174	658	1333		230	1213	
v/s Ratio Prot							c0.03	c0.60		0.01	0.29	
v/s Ratio Perm		0.08	0.01		c0.09	0.00	0.22			0.12		
v/c Ratio		0.71	0.06		0.76	0.02	0.31	0.84		0.17	0.44	
Uniform Delay, d1		41.6	38.6		41.9	38.4	3.4	9.6		11.1	7.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.3	0.1		20.2	0.0	0.3	4.5		0.4	0.1	
Delay (s)		55.0	38.6		62.1	38.4	3.7	14.1		11.5	7.8	
Level of Service		D	D		E	D	A	B		B	A	
Approach Delay (s)		46.9			56.8			12.5			8.0	
Approach LOS		D			E			B			A	

Intersection Summary

HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	97.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

**PM Peak Hour Unsignalized Intersections with Library**

HCS2000: Unsignalized Intersections Release 4.1f

\_\_\_\_\_TWO-WAY STOP CONTROL SUMMARY\_\_\_\_\_

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Analyst:           MJG
Agency/Co.:       TENW
Date Performed:    11/19/2013
Analysis Time Period: PM Peak
Intersection:       #1-Division St/Riverside Dr
Jurisdiction:      Juneau
Units: U. S. Customary
Analysis Year:     2015 Buildout
Project ID:  Riverside Dr Juneau
East/West Street:  Division St
North/South Street: Riverside Dr
Intersection Orientation: NS
Study period (hrs): 0.25
    
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\_\_\_\_\_Vehicle Volumes and Adjustments\_\_\_\_\_

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		25	268	46		6	170	4
Peak-Hour Factor, PHF		0.86	0.86	0.86		0.86	0.86	0.86
Hourly Flow Rate, HFR		29	311	53		6	197	4
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		22	2	7		2	1	7
Peak Hour Factor, PHF		0.86	0.86	0.86		0.86	0.86	0.86
Hourly Flow Rate, HFR		25	2	8		2	1	8
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

\_\_\_\_\_Delay, Queue Length, and Level of Service\_\_\_\_\_

Approach	NB	SB	Westbound				Eastbound			
			7	8	9		10	11	12	
Movement	1	4		7	8	9		10	11	12
Lane Config	LTR	LTR		LTR				LTR		
v (vph)	29	6		35				11		
C(m) (vph)	1371	1195		434				635		
v/c	0.02	0.01		0.08				0.02		
95% queue length	0.06	0.02		0.26				0.05		
Control Delay	7.7	8.0		14.0				10.8		
LOS	A	A		B				B		
Approach Delay				14.0				10.8		
Approach LOS				B				B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #2 - Gee St & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Gee St  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS  
 Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		25	414	33		0	227	3
Peak-Hour Factor, PHF		0.97	0.97	0.97		0.97	0.97	0.97
Hourly Flow Rate, HFR		25	426	34		0	234	3
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		19	1	6		2	2	15
Peak Hour Factor, PHF		0.97	0.97	0.97		0.97	0.97	0.97
Hourly Flow Rate, HFR		19	1	6		2	2	15
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound				Eastbound		
			1	4	7		8	9	10
Lane Config	LTR	LTR				LTR			
v (vph)	25	0				26			
C(m) (vph)	1330	1101				360			
v/c	0.02	0.00				0.07			
95% queue length	0.06	0.00				0.23			
Control Delay	7.8	8.3				15.8			
LOS	A	A				C			
Approach Delay						15.8			
Approach LOS						C			

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #3-Long Run Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Long Run Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		37	472	27	2	256	1
Peak-Hour Factor, PHF		0.93	0.93	0.93	0.93	0.93	0.93
Hourly Flow Rate, HFR		39	507	29	2	275	1
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		
Upstream Signal?		No			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		13	4	0	4	2	20
Peak Hour Factor, PHF		0.93	0.93	0.93	0.93	0.93	0.93
Hourly Flow Rate, HFR		13	4	0	4	2	21
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config	LTR	LTR	LTR	LTR	LTR	LTR	LTR	
v (vph)	39	2	17	17	17	27	27	
C(m) (vph)	1287	1032	251	251	251	530	530	
v/c	0.03	0.00	0.07	0.07	0.07	0.05	0.05	
95% queue length	0.09	0.01	0.22	0.22	0.22	0.16	0.16	
Control Delay	7.9	8.5	20.4	20.4	20.4	12.2	12.2	
LOS	A	A	C	C	C	B	B	
Approach Delay			20.4	20.4	20.4	12.2	12.2	
Approach LOS			C	C	C	B	B	

ALL-WAY STOP CONTROL(AWSC) ANALYSIS

Analyst: MJG  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #4-Stephen Richards/Riverside  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Stephen Richards Dr  
 North/South Street: Riverside Dr

Worksheet 2 - Volume Adjustments and Site Characteristics

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	7	16	14	72	13	88	22	509	120	46	283	9
% Thrus Left Lane												

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Configuration	LTR		LTR		LTR		LTR	
PHF	0.95		0.95		0.95		0.95	
Flow Rate	37		180		684		354	
% Heavy Veh	0		1		1		1	
No. Lanes		1		1		1		1
Opposing-Lanes		1		1		1		1
Conflicting-lanes		1		1		1		1
Geometry group		1		1		1		1
Duration, T	0.25 hrs.							

Worksheet 3 - Saturation Headway Adjustment Worksheet

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rates:								
Total in Lane	37		180		684		354	
Left-Turn	7		75		23		48	
Right-Turn	14		92		126		9	
Prop. Left-Turns	0.2		0.4		0.0		0.1	
Prop. Right-Turns	0.4		0.5		0.2		0.0	
Prop. Heavy Vehicle	0.0		0.0		0.0		0.0	
Geometry Group	1		1		1		1	
Adjustments Exhibit 17-33:								
hLT-adj	0.2		0.2		0.2		0.2	
hRT-adj	-0.6		-0.6		-0.6		-0.6	
hHV-adj	1.7		1.7		1.7		1.7	
hadj, computed	-0.2		-0.2		-0.1		0.0	

Worksheet 4 - Departure Headway and Service Time

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	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow rate	37		180		684		354	
hd, initial value	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
x, initial	0.03		0.16		0.61		0.31	
hd, final value	6.98		6.45		5.13		5.68	
x, final value	0.07		0.32		0.98		0.56	
Move-up time, m		2.0		2.0		2.0		2.0
Service Time	5.0		4.4		3.1		3.7	

Worksheet 5 - Capacity and Level of Service

	Eastbound		Westbound		Northbound		Southbound	
	L1	L2	L1	L2	L1	L2	L1	L2
Flow Rate	37		180		684		354	
Service Time	5.0		4.4		3.1		3.7	
Utilization, x	0.07		0.32		0.98		0.56	
Dep. headway, hd	6.98		6.45		5.13		5.68	
Capacity	287		430		701		604	
Delay	10.52		12.49		50.35		15.61	
LOS	B		B		F		C	
Approach:								
Delay		10.52		12.49		50.35		15.61
LOS		B		B		F		C
Intersection Delay	33.95							
					Intersection LOS	D		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #5-Rivercourt Wy/Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Rivercourt Wy  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound				Southbound		
		1 L	2 T	3 R		4 L	5 T	6 R
Volume		70	652	2		1	339	2
Peak-Hour Factor, PHF		0.92	0.92	0.92		0.92	0.92	0.92
Hourly Flow Rate, HFR		76	708	2		1	368	2
Percent Heavy Vehicles		2	--	--		2	--	--
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		
Upstream Signal?		Yes				No		

Minor Street:	Approach Movement	Westbound				Eastbound		
		7 L	8 T	9 R		10 L	11 T	12 R
Volume		5	0	6		4	0	30
Peak Hour Factor, PHF		0.92	0.92	0.92		0.92	0.92	0.92
Hourly Flow Rate, HFR		5	0	6		4	0	32
Percent Heavy Vehicles		2	2	2		2	2	2
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0		0	1	0
Configuration		LTR				LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB	SB	Westbound			Eastbound		
	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR	LTR			LTR		
v (vph)	76	1	11			36		
C(m) (vph)	1156	875	197			435		
v/c	0.07	0.00	0.06			0.08		
95% queue length	0.21	0.00	0.18			0.27		
Control Delay	8.3	9.1	24.4			14.0		
LOS	A	A	C			B		
Approach Delay			24.4			14.0		
Approach LOS			C			B		

HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #6-Parkwood Dr & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: Parkwood Dr  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		8	717	28	14	370	8
Peak-Hour Factor, PHF		0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR		8	746	29	14	385	8
Percent Heavy Vehicles		2	--	--	2	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	1	0	0	1	0
Configuration		L TR			LTR		
Upstream Signal?		Yes			No		

Minor Street:	Approach Movement	Westbound			Eastbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		9	1	18	7	1	9
Peak Hour Factor, PHF		0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR		9	1	18	7	1	9
Percent Heavy Vehicles		2	2	2	2	2	2
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage		No			/ No /		
Lanes		0	1	0	0	1	0
Configuration		LTR			LTR		

Delay, Queue Length, and Level of Service

Approach Movement	NB 1 L	SB 4 LTR	Westbound			Eastbound		
			7 LTR	8 LTR	9 LTR	10 LTR	11 LTR	12 LTR
v (vph)	8	14	28			17		
C(m) (vph)	1156	839	250			243		
v/c	0.01	0.02	0.11			0.07		
95% queue length	0.02	0.05	0.37			0.22		
Control Delay	8.1	9.4	21.2			20.9		
LOS	A	A	C			C		
Approach Delay			21.2			20.9		
Approach LOS			C			C		





HCS2000: Unsignalized Intersections Release 4.1f

TWO-WAY STOP CONTROL SUMMARY

Analyst:  
 Agency/Co.: TENW  
 Date Performed: 11/19/2013  
 Analysis Time Period: PM Peak  
 Intersection: #9 - James Blvd & Riverside Dr  
 Jurisdiction: Juneau  
 Units: U. S. Customary  
 Analysis Year: 2015 Buildout  
 Project ID: Riverside Dr Juneau  
 East/West Street: James Blvd  
 North/South Street: Riverside Dr  
 Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street:	Approach Movement	Northbound			Southbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		725	49	12	417		
Peak-Hour Factor, PHF		0.92	0.92	0.92	0.92		
Hourly Flow Rate, HFR		788	53	13	453		
Percent Heavy Vehicles		--	--	2	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		1	0		0	1	
Configuration		TR			LT		
Upstream Signal?		Yes			Yes		

Minor Street:	Approach Movement	Westbound			Eastbound			
		7 L	8 T	9 R	10 L	11 T	12 R	
Volume		31	0	65	0	0	2	
Peak Hour Factor, PHF		0.92	0.92	0.92	0.92	0.92	0.92	
Hourly Flow Rate, HFR		33	0	70	0	0	2	
Percent Heavy Vehicles		2	2	2	0	0	0	
Percent Grade (%)		0			0			
Flared Approach: Exists?/Storage		No			/	No		
Lanes		0	1	0	0	1	0	
Configuration		LTR			LTR			

Delay, Queue Length, and Level of Service

Approach Movement	NB 1	SB 4	Westbound			Eastbound		
			7	8	9	10	11	12
Lane Config		LT		LTR			LTR	
v (vph)		13		103			2	
C(m) (vph)		753		221			599	
v/c		0.02		0.47			0.00	
95% queue length		0.05		2.27			0.01	
Control Delay		9.9		34.8			11.0	
LOS		A		D			B	
Approach Delay				34.8			11.0	
Approach LOS				D			B	

# HCM Signalized Intersection Capacity Analysis

## 7: Riverwood Dr & Riverside Dr

12/3/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↖	↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		0.98	1.00		0.98	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1746	1517		1744	1521	1770	1855		1769	1863	1549
Flt Permitted		0.72	1.00		0.75	1.00	0.47	1.00		0.29	1.00	1.00
Satd. Flow (perm)		1325	1517		1366	1521	873	1855		541	1863	1549
Volume (vph)	65	3	74	13	1	19	69	661	20	8	323	57
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	71	3	81	14	1	21	76	726	22	9	355	63
RTOR Reduction (vph)	0	0	69	0	0	18	0	1	0	0	0	26
Lane Group Flow (vph)	0	74	12	0	15	3	76	747	0	9	355	37
Conf. Peds. (#/hr)	15		15	16		16				1		1
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		Perm
Protected Phases		4			8		1	6		5	2	
Permitted Phases	4		4	8		8	6			2		2
Actuated Green, G (s)		8.4	8.4		8.4	8.4	45.3	40.8		38.3	37.3	37.3
Effective Green, g (s)		9.4	9.4		9.4	9.4	47.3	41.8		40.3	38.3	38.3
Actuated g/C Ratio		0.14	0.14		0.14	0.14	0.73	0.64		0.62	0.59	0.59
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)		191	219		197	219	709	1189		372	1094	910
v/s Ratio Prot							c0.01	c0.40		0.00	0.19	
v/s Ratio Perm		c0.06	0.01		0.01	0.00	0.07			0.01		0.02
v/c Ratio		0.39	0.05		0.08	0.01	0.11	0.63		0.02	0.32	0.04
Uniform Delay, d1		25.3	24.1		24.1	23.9	2.9	7.0		5.4	6.9	5.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.5	0.0		0.1	0.0	0.0	0.8		0.0	0.1	0.0
Delay (s)		25.8	24.1		24.2	23.9	2.9	7.8		5.4	6.9	5.7
Level of Service		C	C		C	C	A	A		A	A	A
Approach Delay (s)		24.9			24.0			7.3			6.7	
Approach LOS		C			C			A			A	

### Intersection Summary

























HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	65.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 10: Mendenhall Mall Rd & Riverside Dr

12/3/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1768	1863	1549	1770	1863	1583	1769	1863	1549	1766	1863	1534
Flt Permitted	0.51	1.00	1.00	0.65	1.00	1.00	0.44	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	942	1863	1549	1210	1863	1583	812	1863	1549	773	1863	1534
Volume (vph)	176	151	89	82	92	139	197	395	131	77	267	67
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	198	170	100	92	103	156	221	444	147	87	300	75
RTOR Reduction (vph)	0	0	83	0	0	136	0	0	46	0	0	38
Lane Group Flow (vph)	198	170	18	92	103	20	221	444	101	87	300	37
Conf. Peds. (#/hr)	1		1				1		1	6		6
Turn Type	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8		8	4		4	2		2	6		6
Actuated Green, G (s)	16.4	10.0	10.0	10.8	7.2	7.2	31.6	25.4	25.4	25.6	22.4	22.4
Effective Green, g (s)	17.2	10.5	10.5	11.6	7.7	7.7	32.6	26.1	26.1	26.6	23.1	23.1
Actuated g/C Ratio	0.29	0.18	0.18	0.19	0.13	0.13	0.54	0.44	0.44	0.44	0.39	0.39
Clearance Time (s)	4.3	4.5	4.5	4.3	4.5	4.5	4.3	4.7	4.7	4.3	4.7	4.7
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	1.0	0.2	0.2
Lane Grp Cap (vph)	362	326	271	270	239	203	545	810	674	401	717	591
v/s Ratio Prot	c0.06	0.09		0.02	0.06		c0.04	c0.24		0.01	0.16	
v/s Ratio Perm	c0.10		0.01	0.04		0.01	0.18		0.07	0.08		0.02
v/c Ratio	0.55	0.52	0.06	0.34	0.43	0.10	0.41	0.55	0.15	0.22	0.42	0.06
Uniform Delay, d1	17.3	22.5	20.7	20.6	24.1	23.1	7.6	12.6	10.2	9.9	13.5	11.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.7	0.0	0.3	0.5	0.1	0.2	0.4	0.0	0.1	0.1	0.0
Delay (s)	18.2	23.2	20.7	20.9	24.6	23.2	7.8	13.0	10.3	10.0	13.7	11.6
Level of Service	B	C	C	C	C	C	A	B	B	B	B	B
Approach Delay (s)		20.5			23.0			11.1			12.7	
Approach LOS		C			C			B			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			15.5	HCM Level of Service				B				
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			60.0	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			53.9%	ICU Level of Service				A				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 11: Stephen Richards Dr & Mendenhall Loop Rd

12/3/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗	↖	↗		↖	↗	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.98		1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		0.99	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1791	1545		1773	1525	1767	1851		1770	1803	
Flt Permitted		0.65	1.00		0.56	1.00	0.35	1.00		0.11	1.00	
Satd. Flow (perm)		1206	1545		1039	1525	646	1851		208	1803	
Volume (vph)	84	29	90	74	20	27	189	981	34	36	438	76
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	92	32	99	81	22	30	208	1078	37	40	481	84
RTOR Reduction (vph)	0	0	86	0	0	26	0	1	0	0	5	0
Lane Group Flow (vph)	0	124	13	0	103	4	208	1114	0	40	560	0
Confl. Peds. (#/hr)	2		2	8		8	7		7	19		19
Turn Type	Perm		Perm	Perm		Perm	pm+pt			pm+pt		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4	2			6		
Actuated Green, G (s)		11.9	11.9		11.9	11.9	76.2	68.0		65.7	62.5	
Effective Green, g (s)		12.5	12.5		12.5	12.5	77.2	69.0		67.7	63.5	
Actuated g/C Ratio		0.13	0.13		0.13	0.13	0.79	0.71		0.69	0.65	
Clearance Time (s)		4.6	4.6		4.6	4.6	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	3.0	0.2		3.0	0.2	
Lane Grp Cap (vph)		154	198		133	195	622	1307		211	1172	
v/s Ratio Prot							c0.03	c0.60		0.01	0.31	
v/s Ratio Perm		c0.10	0.01		0.10	0.00	0.23			0.12		
v/c Ratio		0.81	0.06		0.77	0.02	0.33	0.85		0.19	0.48	
Uniform Delay, d1		41.4	37.5		41.2	37.2	4.1	10.6		12.4	8.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		24.2	0.0		22.1	0.0	0.3	5.4		0.4	0.1	
Delay (s)		65.6	37.5		63.4	37.3	4.4	16.0		12.9	8.8	
Level of Service		E	D		E	D	A	B		B	A	
Approach Delay (s)		53.2			57.5			14.1			9.1	
Approach LOS		D			E			B			A	

Intersection Summary

HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	97.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group