**Call to the Audience Guidelines**

- 2 Call to the Audience opportunities
- Must fill out participant card
- Participants called in the order cards are received
- 3 minutes allowed per participant
- CTF Facilitator will call on speakers and manage time
- CTF members cannot discuss matters raised
- CTF cannot take action on matters raised
- CTF members can ask project team to review an item

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**Meeting Agenda**

1. Call to Order/Agenda Review/Announcements 15 min
2. 1st Call to the Audience 3 min
3. Public Input Report, and Reports on Project Presentations & Outreach 50 min
4. Update and Discussion of Future Broadway Corridor High Capacity Transit Improvements 50 min
5. Review Potential Cross Sections and Performance Assessments, and Potentially Endorse a Representative Set of them to Move Forward into Review by Stakeholder Agencies 85 min
6. Considerations for September Public Meeting #3 10 min
7. 2nd Call to the Audience 10 min
8. Next Steps/CTF Roundtable 15 min
9. Adjourn

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**Call to the Audience**

15 Minutes

Please limit comments to 3 minutes

- Called forward in order received
- CTF members cannot discuss matters raised
- CTF cannot take action on matters raised
- CTF members can ask project team to review an item

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**Review Public Input Report**

**Jenn Toothaker**

Public Input Report consists of a spreadsheet and attachments:

- **Spreadsheet** = Input received from 5/21/2013 - 6/9/2013
- **Attachments** = Documentation of only new input received

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**Reports: Past and Upcoming Project Presentations & Outreach**

- June 3, 2013 CTAC Meeting
Update and Discussion of Future Broadway Corridor High Capacity Transit Improvements

Carlos de Leon, Deputy Director
City of Tucson Department of Transportation

Purpose of Presentation
To provide more information to the Broadway Citizens Task Force (CTF) for them to consider in determining how to accommodate HCT on Broadway during development of corridor concepts, including:
- Update the CTF on rough initial Bus Rapid Transit (BRT) modeling results
- Provide BRT design concept and best practices information for consideration during this Broadway segment’s planning & design process

Presentation Outline
- Brief Review of Current Bus Transit Services
- Brief Review of PAG’s High Capacity Transit Plan (HCTP) Recommendations
- Overview of Bus Rapid Transit (BRT) and BRT Elements
- Results from Initial BRT Conceptual Analysis
- Considerations for How to Preserve the Opportunity to Implement Future HCT on Broadway

Brief Review of Current Bus Transit Service

Current Transit on Broadway
- Two Routes
  - Route 8
  - Route 108 Express

Current Transit on Broadway
- Route 8
  - Runs Broadway Blvd. & S. 6th Ave. every 15 mins.; Branches at Broadway & Wilmot, every 30 mins.
  - 161 Bus Stops
  - Highest ridership route in Sun Tran system
    - 3,182,789 million boardings, FY11-12
    - About 55% (1,733,666) boardings along Broadway Blvd.
    - About 9% of total Sun Tran ridership
Current Transit on Broadway

- Route 108 Express
  - 3 trips in A.M., 3 trips in P.M.
  - Limited stops, only 22 in each direction
  - 22,596 boardings, FY11-12
- Performs at average of Sun Express system
- The only express route with parallel Sun Tran service along entire route

2009 High Capacity Transit Plan Recommendations

- 2009 Plan completed by Pima Association of Governments
- Provides a financially unconstrained menu of options, to be implemented based on funding availability
  - High Capacity Transit (HCT)
    - High volume of passengers
    - Fast and convenient service
  - Types
    - Express Bus
    - Modern Streetcar
    - Bus Rapid Transit
    - Light Rail
    - Commuter Rail

2009 High Capacity Transit Plan Recommendations

- 2009 High Capacity Transit System Plan performed initial evaluations and identified priority corridors
  - Sixteen Initial Corridors Identified
  - Eight Selected Corridors for Evaluation:
    - Ridership
    - Right of Way Availability
    - Potential Capital and Operating Costs
  - Two Priority Corridors Identified:
    - Broadway Blvd.
    - 6th Avenue/Nogales Highway

2009 High Capacity Transit Plan Recommendations

- Identified Broadway Corridor for BRT
  - Favorable future ridership projections
    - 3,887 daily riders (~120,497 monthly ridership)
    - In 2011-2012 counts, this would be the 4th highest ridership route in the system
  - Existing bus lanes
  - Planned expansion
  - Relative low cost
  - Conducive to Transit-Oriented Development (TOD)
  - Serves transit-dependant populations

2009 High Capacity Transit Plan Recommendations

“The do not appear to be any constraints to implementing BRT service on Broadway Boulevard in the near term. In fact, the existing transit facilities within this corridor, including dedicated transit lanes and the upcoming transit priority signal timing upgrade, make implementation of BRT relatively straightforward.”

This statement is generally true of Broadway to the east of Alvernon, but within this Broadway: Euclid to Country Club project area, there are challenges.”
Major Activity Centers Along Broadway

Broadway HCT Options

- Bus Rapid Transit in Near Term, 0-10 years
- Streetcar between Downtown and El Con Mall in Mid Term, 10 to 20 Years
- Light Rail in Long Term > 20 years

Overview of Bus Rapid Transit (BRT) and BRT Elements

BRT Spectrum & Related Capital Costs

BRT Spectrum

<table>
<thead>
<tr>
<th>BRT Attribute</th>
<th>&quot;Lite&quot;</th>
<th>&quot;Hybrid&quot;</th>
<th>Full Implementation</th>
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<tbody>
<tr>
<td>Right-of-Way</td>
<td>Church Cuts</td>
<td>Congestion Reduction Separated Lanes</td>
<td>Bus/Automobile Separation</td>
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<tr>
<td>Stations</td>
<td>Improved Passenger Experience</td>
<td>Enhanced Passenger Information &amp; Fare Collection</td>
<td>Enhanced Loading</td>
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<tr>
<td>Service</td>
<td>Higher Service Frequency</td>
<td>Red Bus &amp; Rapid Service Options</td>
<td>Consistent Transit Options &amp; Reliability</td>
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<tr>
<td>Route Structure</td>
<td>Single Route with Transfers, Color Coding</td>
<td>Multiple Route Operations with Transfer Facilitates Integration with Regional Transit</td>
<td>One Seat Riders, South-Bound Transfer Reduction</td>
</tr>
<tr>
<td>Integration Technology</td>
<td>Digital Mobility Information</td>
<td>Enhanced Integration Information</td>
<td>Enhanced Stability and System Survivability</td>
</tr>
</tbody>
</table>
Bus Rapid Transit

“Bus Rapid Transit can best be described as a combination of facility, systems, and vehicle investments that convert conventional bus services into a fixed-facility transit service, greatly increasing their efficiency and effectiveness to the end user.”


BRT Benefits to Passengers

<table>
<thead>
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<th>User Experience</th>
<th>Broad Benefits</th>
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<tbody>
<tr>
<td>• Reduced transit travel time</td>
<td>• Capital Cost Effectiveness</td>
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<tr>
<td>• Increased trip reliability</td>
<td>• Operating Cost Efficiency</td>
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<tr>
<td>• Improved transit connections and more direct service</td>
<td>• Transit-supportive land development</td>
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<td>• Decreased station stop dwell times and waiting times</td>
<td>• Environmental Quality</td>
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<td>• Enhanced system identity</td>
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<tr>
<td>• Increased travel comfort</td>
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<tr>
<td>• Enhanced safety and security</td>
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</table>

BRT Systems

• Started in Curitiba, Brazil in 1974
• Applied worldwide in major urban areas
• 20 systems in U.S., 1 systems rated as silver and 4 bronze by Institute of Transportation and Development Policy

BRT Elements

• Running ways
• Stations
• Vehicles
• Fare Collection
• Intelligent Transportation Systems (ITS)
• Service Structure & Relationship to Existing Bus Transit
• Branding

Running Way

• Defines BRT travel parameters
• Most critical component in determining system performance
• Important to public perception and identity
• Characteristics of running ways
  – Running way type
  – Running way markings
  – Running way guidance

Running Way Types

- Grade-Separated
- At-Grade Transitway
- On-Street Bus Lanes
- Mixed Flow
Running Way – Mixed Flow

Running Way – On Street Bus Lane

Running Way – At Grade Separated

Running Way – Grade Separated

Stations
- Level boarding
- Real-time information
  - Arrival time
  - Route maps
  - Schedule
- Enhanced amenities
  - Increased comfort: shade, fare vending, other vending
  - Enhanced safety: lighting, emergency telephones, video cameras

Vehicles
Fare Collection
- On-Board, Driver-Validated System
- On-Board, Conductor-Validated System
- Off-Board Barrier System
- Off-Board, Barrier-Free, or Proof-of-Payment (POP) System
- Fare Medium
  - Cash
  - Magnetic Card
  - Smartcard

Intelligent Transportation Systems (ITS)
- Transit Vehicle Prioritization
- Intelligent Vehicle Systems
- Operations Management Systems
- Passenger Information Systems
- Safety and Security Systems

Service Structure & Relationship to Existing Bus Transit
- Route Length
- Route Structure
- Service Span
- Service Frequency
- Station Spacing
- Methods of Schedule Control

Branding
- Provides system identity
- Creates impression of high quality
- Helps boost ridership

Results from Initial BRT Conceptual Analysis

PAG Initial BRT Alternatives Analysis
- “Sketch level” analysis provides very rough information; helps to guide focus of next level of analysis
- Coordinated by Pima Association of Governments (PAG) staff, in conjunction with the PAG Transit Working Group
- Performed as part of a partnership between PAG and University of Arizona
- To evaluate potential time savings of BRT and impact on existing traffic
BRT Study Area

11-mile corridor

BRT Initial Alternatives Analysis Modeling

• Model Inputs
  – Overall lane configuration:
  • Indirect left turns assumed at every intersection
  • Hybrid & Outside-running lane model:
    – Includes center-running lane in project area (Euclid-C. Club)
    – Reintegrate with outside-running traffic lanes from C. Club to Columbus
    – Diamond Lanes between Columbus and Camino Seco
    – Back to mixed traffic between Camino Seco and Houghton
  • Model Inputs
    – Overall lane configuration:
      • Indirect left turns assumed at every intersection
      • Hybrid & Outside-running lane model:
        – Includes center-running lane in project area (Euclid-C. Club)
        – Reintegrate with outside-running traffic lanes from C. Club to Columbus
        – Diamond Lanes between Columbus and Camino Seco
        – Back to mixed traffic between Camino Seco and Houghton

PAG Initial BRT Alternatives Analysis

Alternatives Reviewed
1: Center Running Dedicated Lanes
   • Buses given signal priority and vehicle left-turns limited to major intersections
2: Outside Lane Mixed Traffic
   • Vehicles operate in diamond lanes or mixed traffic
   • Some use of BRT elements
3: Hybrid Center Lane and Outside Lane/Mixed Traffic
   • Dedicated median running way along Broadway Euclid to Country Club expansion
   • After Country Club, reintegrate with traffic and travel in diamond lanes to Columbus, travel in diamond lanes from Columbus to Camino Seco, then back to mixed to Houghton

PAG Initial BRT Alternatives Analysis

Alternative 1
Center Running Dedicated Lanes
Buses given signal priority and vehicle left-turns limited to major intersections

Alternative 2
Outside Lane Mixed Traffic
Vehicles operate in diamond lanes or mixed traffic; Some use of BRT elements
PAG Initial BRT Alternatives Analysis

Alternative 3

Hybrid Center Lane and Outside Lane/Mixed Traffic

- Dedicated median running way along Broadway Euclid to Country Club expansion
- After Country Club, reintegrate with traffic and travel in diamond lanes to Columbus, travel in diamond lanes from Columbus to Camino Seco, then back to mixed to Houghton

PAG Initial BRT Alternatives Analysis

BRT Alternatives Descriptions

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<th>BRT Element</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
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<tr>
<td>Running Way</td>
<td>Dedicated</td>
<td>On-street Bus</td>
<td>混合</td>
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<tr>
<td>Stations</td>
<td>Level Boarding</td>
<td>On-Board Bus</td>
<td>MedCenter/Outside</td>
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<tr>
<td>Vehicles</td>
<td>Specialized</td>
<td>Specialized</td>
<td>Hybrid</td>
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<td>Fare Collection</td>
<td>On-Board</td>
<td>On-Board</td>
<td>混合</td>
</tr>
<tr>
<td>Intelligent Transportation System</td>
<td>Transit Board</td>
<td>None</td>
<td>Transit Priority Card Jump</td>
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<tr>
<td>Branding</td>
<td>Unique Branding</td>
<td>Unique Branding</td>
<td>混合</td>
</tr>
</tbody>
</table>

PAG Initial BRT Alternatives Analysis

Travel Time Comparison

- Modeling assumed one-way trips between Ronstadt TC and Harrison
- Estimated total travel time based on departure time
- Travel times compared between alternatives and against current Route 8
- Route 8 trip times represent Ronstadt to/from Harrison only, no S. 6th or Wilmot legs

BRT vs. Rt. 8 Travel Time Comparison

- Route 8 corridor trip: 45 minutes
- BRT corridor trip: 31 minutes
- BRT savings over Rt. 8: 14 minutes
- BRT savings per mile: 1.2 minutes per mile

*All calculations represent average trip times over total 11-mile corridor length
Running Way
- Defines BRT travel parameters
- Most critical component in determining system performance
- Important to public perception and identity
- Characteristics of running ways
  - Running way type
  - Running way markings
  - Running way guidance

Summary of Results
- Broadway BRT ridership would be 4th highest in the region
- Separated/dedicated lanes provide the most significant time savings
- Hybrid model is an improvement over outside-running only lanes

Considerations for How to Preserve the Opportunity to Implement Future HCT on Broadway

Realities of Implementing HCT on Broadway
- Additional planning and analysis required to select a preferred service system (costs money; takes time)
- Funding source(s) need to be identified and committed before HCT can be implemented
  - Federal funds require local match
  - Local funding requires finding funding streams
- Commitment to Operations and Maintenance Costs and responsibilities is needed

Realities of Implementing HCT on Broadway
- Schedule/timing of implementation is uncertain until key decisions made and funding identified
- Current activities are conducive to continued, accelerated BRT planning efforts:
  - Downtown development (and related construction, population, and jobs which has created congestion)
  - Convenient circulation once passengers are downtown, particularly once Streetcar is built
  - Additional population and jobs in other centers along Broadway
  - New Park-N-Ride built at Broadway/Houghton

Design Considerations for Broadway Planning & Design
- Broadway Roadway Project funding does not include money to implement BRT service, but can support facility construction that works today and could accommodate BRT in the future
  - Potential to use as cost match for Federal funding in the future
- RTA Plan includes funding for transit enhancements on Broadway, but not BRT
  - Supports incremental improvements of existing bus service, and potential future BRT
Design Considerations for Broadway Planning & Design

Bottom Line: Allow enough Right-of-Way in improved roadway to accommodate future HCT (“preserve the opportunity”)

Design Considerations for Broadway Planning & Design

- Relationship to Existing Local Bus Service
  - BRT would operate at higher frequencies (for example, every 10-15 mins.)
  - Local bus could be reduced in frequency (for example, from every 10-15 mins. to every 30 mins.)
  - With pullouts for local bus service and reduced frequency of local bus service, vehicular flow can continue to move quickly

Design Considerations for Broadway Planning & Design

- Dedicated lanes
  - Center-running performed the best in the initial modeling (with 30% time-savings)
  - Center-running lanes assumed for project area for Hybrid model
  - Removal of traffic lanes in the future could be very challenging
  - Access to roadway’s adjacent properties
    - Center-running limits left turns
    - Outside-running limits right turns into adjacent properties
  - Interaction with traffic mainly occurs at intersections

Design Considerations for Broadway Planning & Design

- Intersection design
  - Indirect left was assumed at all major intersections
  - Center-running lanes
    - No left turns permitted on any section
    - Transit stations built in center median, on far side of intersection

Design Considerations for Broadway Planning & Design

- Station design
  - Bus pullouts are better for vehicular flow, NOT transit
  - Relationship to existing bus transit stops
  - Platforms
  - Bike lanes

LA Metro Rapid: Incremental BRT

- Simple route layout: easy to find/use
- Frequent: 3-10 minutes during peak
- Fewer stops: ¾ mile apart
- Level boarding (LB buses speed-up dwell times)
- Enhanced stations: maps, lighting, canopies, “Next Bus” displays
- Same fare
- Minimal investment:
  - Signal priority
  - Passenger information
  - Strong branding (buses, stations etc.)

Results after demonstration:
- 23-29% reduction in travel times
- 38-42% increase in riders/weekday
- 1/3 of total choice riders,
  - **Same cost** *Cliff Henke, PB TR&S, Inc.*
Next Steps for PAG and COT for Transit Improvements/Enhancements

• Utilize results from Comprehensive Operational Analysis currently underway to identify opportunities for existing enhancements and/or BRT system funding
  — Incremental system enhancements for bus transit overall
  — Potential local funding of incremental BRT implementation
• Pursue initiating an application for the Federal Small Starts Program funding program
  — Alternatives analysis (would look at BRT, Streetcar extension, and Light Rail Transit)
  — Efforts to commence sometime after SunLinks (Streetcar) is operational

Review Cross Sections and Performance Assessments

Phil Erickson
Community Design + Architecture

Agenda for this item

• Introduction
  — Schedule
  • Not likely to have an endorsement of all cross sections and performance assessment tonight
  • Will talk about options for meetings between now and the Public Workshop during Next Steps agenda item
  — CTF Feedback and Questions
  • Process
  • Schedule
  • Questions regarding Performance Measure assessments

Planning and Design of Broadway

Building from Needs & Desires to Performance Measures
Overview of New & Update Materials

- Have all of these materials in Power Point and can discuss in more detail if needed:
  - Linking Goals and Performance Measures
  - Southern Arizona Transit Advocates Concept
  - Updated Performance Measure Assessment
Small Group Session

- Select a scribe
- For next 20 minutes discuss and write down:
  - What assessments or concepts do not make sense to you or your stakeholders?
  - Are there changes that could be made to the performance measure definitions or assessments that would make more sense?
  - What additional information or clarification would be helpful?

Small Group Session

- Report out and discussion for 10 minutes
  - What assessments or concepts do not make sense to you or your stakeholders?
  - Are there changes that could be made to the performance measure definitions or assessments that would make more sense?
  - What additional information or clarification would be helpful?
Discussion of specific concepts, performance measures, and assessments

- Based on input from small group discussions start with those concepts, performance measures, and assessments that need the most clarification or adjustment to make more sense.

### Linking Goals and Performance Measures

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<td><strong>Neighborhoods and Districts</strong></td>
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**Potential Goal Statements**

**Related Performance Measures**

- Improved pedestrian safety
- Decreased travel time
- Enhanced bike infrastructure
- Increased park access
- Reduced air pollution
- Increased green space

**Related Performance Measures**

- Reduced traffic congestion
- Increased public transportation usage
- Enhanced pedestrian comfort
- Improved accessibility
- Increased green space
- Reduced maintenance costs

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**Related Performance Measures**

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**Potential Goal Statements**

**Related Performance Measures**

- Improved pedestrian safety
- Increased bike infrastructure
- Enhanced park access
- Reduced air pollution
- Increased green space

**Related Performance Measures**

- Reduced traffic congestion
- Increased public transportation usage
- Enhanced pedestrian comfort
- Improved accessibility
- Increased green space
- Reduced maintenance costs

---

**Linking Goals and Performance Measures**

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<tr>
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**Related Performance Measures**

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- Increased bike infrastructure
- Enhanced park access
- Reduced air pollution
- Increased green space

**Related Performance Measures**

- Reduced traffic congestion
- Increased public transportation usage
- Enhanced pedestrian comfort
- Improved accessibility
- Increased green space
- Reduced maintenance costs
Draft Cross Section Concept Options

- Four families of section concept types
  - 4 mixed-flow travel lanes (3 concepts)
  - 4 mixed-flow travel lanes + transit (2 concepts)
  - 6 mixed-flow travel lanes (2 concepts)
  - 6 mixed-flow travel lanes + transit (2 concepts)

- Range of concepts
  - Include different facilities for pedestrians, bicycles, transit, and vehicles
  - In response to input from the public, stakeholder agencies, and the CTF
    - Evolving Goals and definition of “functionality”
    - Evolving set of design parameters and criteria (i.e.; min. lane widths, target speed, landscape maintenance requirements, etc.)

Four Lane
Potential R.O.W. Range – 67 to 134 feet

Option 4A: 67’ Right-of-Way

Four Lane
Potential R.O.W. Range – 67 to 134 feet

Option 4B: 100’ Right-of-Way

Four Lane + Transit
Potential R.O.W. Range – 89 to 156 feet

Option 4+T A: 118’ Right-of-Way

Four Lane + Transit
Potential R.O.W. Range – 89 to 156 feet

Option 4+T B: 152’ Right-of-Way
Six Lane
Potential R.O.W. Range – 89 to 152 feet

Option 6A: 114’ Right-of-Way

Six Lane
Potential R.O.W. Range – 89 to 152 feet

Option 6B: 152’ Right-of-Way

Six Lane
Potential R.O.W. Range – 89 to 152 feet

Option 6B: 152’ Right-of-Way

Six Lane + Transit
Potential R.O.W. Range – 109 to 172 feet

Option 6+T A: 146’ Right-of-Way

Six Lane + Transit
Potential R.O.W. Range – 109 to 172 feet

Option 6+T B: 174’ Right-of-Way

Southern Arizona Transit Advocates Concept

Option 4+T SATA: 80’ Right-of-Way (East of Campbell)

Option 4+T SATA: 79’ Right-of-Way (West of Campbell)
Exploration of “Fitting” Cross Section Concepts in Existing Conditions

- Illustrate prototypical conditions along Broadway
- How Cross Section Concepts can be integrated to
  - Avoid potential impacts to parking and buildings
  - Reduce potential for property acquisition
  - Maximize positive impacts to character of the street and its context
- Maximize support for walking, biking, and transit

- Begins to illustrate positive and negative impacts that will be more fully assessed during the alignment design process
- Range of design parameters related to context and particular street elements
  - Commercial building frontages
    - Visibility
    - Parking and access
    - Walkways and sidewalks
  - Residential building frontages
    - Privacy
    - Landscaped pool setbacks
  - Flexibility in width for various street design elements – “section cards”
  - Potential to enhance some elements of Cross Section Concepts if space allows (i.e.; additional landscape, sidewalk, or other space within the cross section)

Existing Prototypical West of Campbell

Existing Condition: 90’ Right-of-Way

Four Lane Prototypical West of Campbell

Option 4A: Modified 90’ Right-of-Way (matching existing R.O.W)

Four Lane + Transit Prototypical West of Campbell

Option 4+T A: Modified 112’ Right-of-Way

Six Lane + Transit Prototypical West of Campbell

Option 6+T A: 146’ Right-of-Way

Existing Prototypical East of Campbell

Existing Condition: 80’ Right-of-Way
Option 4A: Modified 138’ Right-of-Way
(58’ roadway width maintaining existing parking and buildings)

Option 6A: Modified 138’ Right-of-Way
including parking and public sidewalks at building fronts

Overview Performance Measures

- Reflective of
  - Public input and discussions with CTF to date
  - Guidance from US EPA’s Guide to Sustainable Transportation Performance Measures
  - Other best practices research including:
    - ITE, Designing Walkable Urban Thoroughfares: A Context Sensitive Approach
    - NACTO, Urban Bikeway Design Guide
    - US Access Board Public Right-of-Way Accessibility Guidelines
    - AASHTO Green Book
- Starting point for selecting and further developing “Transportation” and “Non-transportation” measures for Broadway

Updated Performance Assessment
**Updated Performance Assessment**

**Pedestrian Access and Mobility**

1a. Functionality of Streetside for Pedestrian Activity

1b. Separation from Vehicular Traffic

1c. Pedestrian-Oriented Facilities or Improvements

1d. Walkable Network/Neighborhood Connections

1e. Pedestrian Crossings

1f. Vehicle/Pedestrian Conflicts at Driveways

1g. Universal Design

1h. Walkable Destinations

1i. Ease of Transition to Walking

**Description**

- Is there enough width to support desired activity, landscaping, street furnishings and other improvements

**Measurement**

- Meet or exceed ITE Walkable Thoroughfare Manual guidance

**Factors**

- Width of pedestrian/landscape area
- Infrastructure provided in area

**Ability to Effect**

- High

**Ability to Evaluate**

- High for this point in process

---

**Pedestrian Access and Mobility**

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Functionality of Streetside for Pedestrian Activity</td>
<td>Meet or exceed ITE Walkable Thoroughfare Manual guidance</td>
<td>Width of pedestrian/landscape area, Infrastructure provided in area</td>
<td>High</td>
</tr>
</tbody>
</table>

**Table 4.1 Central Zone Characteristics**

<table>
<thead>
<tr>
<th>Character Class</th>
<th>Character Type</th>
<th>Character Elements</th>
<th>Building Type</th>
<th>Area of Public Access</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Pedestrian Access and Mobility

1b. Separation from Vehicular Traffic

Description
• Width and design character of area between outside edge of vehicle lane and sidewalk

Measurement
• Width meets or exceed ITE Walkable Thoroughfare Manual guidance
• Frequency and quality of street trees or other large landscape

Factors
• Width of landscape area
• Width of bicycle lane
• Frequency and quality of large landscape

Ability to Effect
• High

Performance Assessment
• 1b. Separation from Vehicular Traffic
  – Similar to 1a as buffer guidance is included in ITE Manual recommendations
  – Possibly combine 1a, 1b, and 1c into one Performance Measure

Functionality of Streetside for Pedestrian Activity

1c. Pedestrian-oriented Facilities or Improvements

Description
• Extent of shade, lighting, seating, drinking fountains and other features to serve pedestrian needs and provide for visual interest

Measurement
• % shade, lighting levels and consistency, number/frequency of design features
• Qualitative evaluation

Factors
• Provision for and increase in number of features

Ability to Effect
• Minimal at the cross section and alignment level, beyond provision of enough pedestrian area to allow for detailed facilities. Evaluation of space is generally covered by measures 1a and 1b.

Ability to Evaluate
• Moderate at this level of design
  – Design does not currently include details for streetscape design, but lower cost cross section concepts may allow more budget to be spent on pedestrian facilities

Performance Assessment
• 1c. Pedestrian-oriented Facilities or Improvements
  – Similar to 1a and 1b
  – Influenced more by extent of shade and space for amenities
  – Possibly combine 1a, 1b, and 1c into one Performance Measure

1d. Walkable Network/Neighborhood Connections

Description
• Ability for pedestrians to access neighborhoods and pedestrian network

Measurement
• Number, length, and quality of connections

Factors
• Likely varies by quality of environment on Broadway and frequency of crossings
• Frequency and quality of connections to adjacent pedestrian network

Ability to Effect
• High to Moderate

Ability to Evaluate
• Low
  – Quality of environment along Broadway is measured through #1a and #1b
  – Other factors require alignment and crossing design
### Pedestrian Access and Mobility

#### 1e. Pedestrian Crossings

<table>
<thead>
<tr>
<th>Description</th>
<th>Ease of crossing Broadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement</td>
<td>Frequency, length, and quality of pedestrian crossings</td>
</tr>
<tr>
<td>Factors</td>
<td>Width and number of lanes (through and turn)</td>
</tr>
</tbody>
</table>

#### Performance Assessment

- **1e. Pedestrian Crossings**

Assume that number of crossings is equal (except that existing conditions would have fewer than any future option); therefore current assessment is about the quality and distance of the crossing.

#### Pedestrian Access and Mobility

<table>
<thead>
<tr>
<th>Description</th>
<th>Conflicts between pedestrians and vehicles exist at driveways for site access, strongly related to #2b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement</td>
<td>Provision of level pedestrian crossings</td>
</tr>
<tr>
<td>Factors</td>
<td>Width of roadway to accommodate level pedestrian crossings</td>
</tr>
</tbody>
</table>

#### Performance Assessment

- **1f. Vehicle / Pedestrian Conflicts at Driveways**

  Rated Option 4A, and SADA concept, as negative because the sidewalk would be sloped or go down to street grade at the drive access points because of the narrowness of the sidewalk, landscape width and sidewalk width determines ranking of other concepts – more width provides more ability for vehicles to slow and see pedestrians.

#### Pedestrian Access and Mobility

<table>
<thead>
<tr>
<th>Description</th>
<th>Going beyond base requirements of access (ADA) design for people of all ages and abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement</td>
<td>Provision of access and mobility design elements that achieve Universal Design</td>
</tr>
<tr>
<td>Factors</td>
<td>All other pedestrian access and mobility factors measure performance related to aspects of universal design</td>
</tr>
</tbody>
</table>

#### Performance Assessment

- **1g. Universal Design**

  Ability to Effect: High
  Ability to Evaluate: Low – Details are not provided by current level of design.
Performance Assessment

• 1g. Universal Design
  - Primarily relates to design details and intersection design
  - Related & assessed Performance Measures

  • Sidewalk width is covered by 1a & 1b
  • 1e Pedestrian Crossings
  • 1i Driveway conditions

Universal Design

Pedestrian Access and Mobility

1h. Walkable Destinations

Description
- Presence and access to jobs, homes, shopping, etc.
- Presence of sufficient density of other uses and access from other uses to support market for employment, shopping, etc.

Measurement
- Determine density of households and jobs within walkable distance of uses along Broadway

Factors
- #1d Walkable Network/Neighborhood Connections
- Potential for jobs, commercial uses, and homes along Broadway

Ability to Effect
- High for #1d
- Uncertain for land use related factors (#6f Land Use Mix, and other non-transportation performance measures)

Ability to Evaluate
- Same as #1d
- Low to Moderate for non-transportation performance measures (to be discussed further on Thursday)

Performance Assessment

• 1h. Walkable Destinations
  - Related to 1d and Economic Vitality Performance Measures all of which cannot be assessed at current level of design

Pedestrian Access and Mobility

1i. Ease of Transition to Walking

Description
- The ability of users to become pedestrians

Measurement

Factors
- Proximity and number of parking lots
- Proximity and number of bicycle parking/lockers
- Number of bus stops/transit stations
- Number and type of comfort and safety features (lighting, seating, shade)
- Number of attractions/commercial uses

Ability to Effect
- High

Ability to Evaluate
- Not at this level of design

Performance Assessment

• 1i. Ease of Transition to Walking
  - Related to physical design factors outside of the street right of way which cannot be assessed at current level of design
# Bicycle Access and Mobility

## 2a. Separation of Bikes and Arterial Traffic

<table>
<thead>
<tr>
<th>Description</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater separation is a factor related to bicyclist safety and comfort, and therefore likely bicycle use of Broadway</td>
<td>Bike lane is a legal bike lane (as opposed to a &quot;striped shoulder&quot;)</td>
<td>High</td>
<td>High for cross section and location of transit stops</td>
</tr>
<tr>
<td></td>
<td>Combination of bike lane and buffer (painted line or other) width</td>
<td></td>
<td>Low for intersections (crossings of bike lane for right turns)</td>
</tr>
<tr>
<td></td>
<td>Buffer other than painted line</td>
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<tr>
<td></td>
<td>Location of transit stops (street side or median)</td>
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</tbody>
</table>

## 2b. Bike Conflicts with Crossing Vehicles (note this includes the 2c perf. measure)

<table>
<thead>
<tr>
<th>Description</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicles cross bike lanes for a variety of reasons, the design and frequency of these crossings can affect bicyclist safety and comfort</td>
<td>Frequency and type of traffic crossing bike lanes</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length of uninterrupted bike lane</td>
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<tr>
<td></td>
<td>Design details of crossing area</td>
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<tr>
<td></td>
<td>Reducing number and length of crossing points</td>
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<td>Design details of crossing area</td>
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</tbody>
</table>

## 2c. Vehicle/Bike Conflicts at Side Streets (combined into 2b)

## 2d. Pavement Condition

## 2e. Bike Facility Improvements

## 2f. Bike Network Connections

## 2g. Corridor Travel Time

## 2h. Bike Crossings

---

## Performance Assessment

### 2a. Separation of Bikes and Arterial Traffic

- 5 ft. width negative [-]
- 6 ft. width neutral (ITE Manual recommendation)
- 7 ft. width positive [+]

### 2b. Bike Conflicts with Crossing Vehicles

- Assume all options are neutral for vehicles crossing bike lane to get to curbs cuts or dedicated right turn lanes
- Options that require buses to cross over to bus pull outs are neutral
- Options with dedicated transit lanes in the middle get a single + for that, still would have local buses pulling into bus pull outs.
Performance Assessment
• 2d. Pavement Conditions
  — Detailed design issues effect assessment

Performance Assessment
• 2e. Bike Facility Improvements
  — Mainly design details
  — Concepts with otherwise low construction cost get a + for ability to invest more budget in bike facilities

Performance Assessment
• 2f. Bike Network Connections
  — Frequency of connections to neighborhoods likely consistent across concepts
  — 2h. Quality of bike crossings will contribute to assessment
**Bicycle Access and Mobility**

### 2g. Corridor Travel Time

**Description**
- The time it takes for average and advanced riders to travel the length of Broadway

**Measurement**
- VISSIM analysis of travel time and signal delay

**Factors**
- Signal timing
- #2b Bike Conflicts with Crossing Vehicles

**Ability to Effect**
- High

**Ability to Evaluate**
- Not viable at current level of design
- Requires alignment and intersection design

---

**Performance Assessment**
- 2g. Corridor Travel Time
  - Needs detailed design and VISSIM analysis to make assessment

---

**Bicycle Access and Mobility**

### 2h. Bike Crossings

**Description**
- Convenience and safety of bike crossings will support bike use

**Measurement**
- Frequency and length of crossings
- Average signal delay at crossings (VISSIM analysis)

**Factors**
- Width and number of lanes (through and turn)
- Width and number of medians
- Level of bicycle comfort in medians
- Frequency of crossings
- Signal timing design (VISSIM analysis)

**Ability to Effect**
- High

**Ability to Evaluate**
- Moderate at this phase – several factors are directly related to cross section design, several are not

---

**Performance Assessment**
- 2h. Bike Crossings
  - Assume some basic improvements at crossings and more crossings for all concept options, so this gives:
    - Four lane options 1 plus
    - Six lane options 1 plus
    - Eight lane options are neutral, except for 6+T B given its large width.

---

**Transit Access and Mobility**

### 3a. Distance to Transit Stops
### 3b. Transit Stop Facilities
### 3c. Corridor Travel Time
### 3d. Schedule Adherence
### 3e. Frequency and Hours of Service
### 3f. Accommodation of Future High Capacity Transit
### 3g. Riders per Vehicle
### 3a. Distance to Transit

**Description**
- Number and location of transit stops and the number of households, jobs, and services within walking distance has an relationship to transit ridership

**Measurement**
- Number of households, jobs, and square feet of commercial use within walking distance of transit stops

**Factors**
- 1d. Walkable Network/Neighborhood Connections
- 3h. Walkable Destinations
- Several non-transportation performance measures

**Ability to Effect**
- Low to Moderate

**Ability to Evaluate**
- Low to None
- Other factors require alignment and crossing design
- Land use policies related to non-transportation measures are not part of this project

### Performance Assessment

**3a. Distance to Transit Stops**
- Cannot assess at current level of design as transit stops are not located

### 3b. Transit Stop Facilities

**Description**
- Design qualities of transit stops can support transit use

**Measurement**
- % shade, lighting levels and consistency, number/frequency of other design features
- Qualitative evaluation by designers and users

**Factors**
- Provision for and increase in number of features

**Ability to Effect**
- High

**Ability to Evaluate**
- Low to Moderate at this level of design, right of way could be increased at transit stops to provide space for facilities
- Design does not currently include details for streetscape design, but lower cost cross section concepts may allow more budget to be spent on transit facilities

### Performance Assessment

**3b. Transit Stop Facilities**
- Existing facilities are generally poor, although there are a few bus pull outs
- Four lanes get a ++ when pull outs except those with wider pedestrian areas get a + because of lower construction cost may be more budget to improve transit stops. SARA also gets a ++ because of transit platforms for streetcar
- Six lanes get neutral with pull outs as this is now the regional standard
- BRT is middle of roadway gets a ++ because it is assumed that this investment in roadway infrastructure for BRT would mean commitment to high-level of improvements on the platforms

### 3c. Corridor Travel Time

**Description**
- Time for traveling the length of the corridor affects transit ridership

**Measurement**
- VISSIM results accounting for signal timing, transit priority treatments, traffic delay, merges, and boarding time at transit stops
- Initial assessment based on traffic assessment of current PAG projections and 30% reduced traffic growth option, with qualitative comparisons based on professional experience and judgment of relationship between transit and vehicular travel time

**Factors**
- Dedicated lanes, transit priority treatments at intersections, level boarding, off-vehicle ticketing, and other measures

**Ability to Effect**
- Moderate to High

**Ability to Evaluate**
- Low to Moderate at current level of design (presence of transit only lanes)
- Other factors require higher level of design and commitments from Sun Tran

### Performance Assessment

**3c. Corridor Travel Time**
- Existing corridor travel time is lower than existing vehicular travel time, so two negatives rather than the one negative for 4a. Movement of Through Traffic
- Four and six lanes with pull outs, signal prioritization, etc. are assumed to be slower than vehicular movement, because all boxes must pull into bus pull outs and this slows the bus travel time
- Dedicated transit lanes with accompanying signal prioritization, etc. are assumed to have roughly the same corridor travel time as vehicles, except for where the dedicated lane is outside lane (Option 6+TA), because it would have issues with right turning vehicles and the BRT may need to use the bus pullouts. Also, SARA is one minus sign less than the vehicular through movement performance measure because at least a portion of the service is in a dedicated lane
Transit Access and Mobility

3d. Schedule Adherence

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership is encouraged by transit that is on time. Some elements of project design can support schedule adherence.</td>
<td>Variation in travel time across a sampling of VISSIM modeling runs</td>
</tr>
</tbody>
</table>

Factors

<table>
<thead>
<tr>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Low to Moderate at current level of design (presence of transit only lane; likely combine with 3c) Other factors require higher level of design and commitments from Sun Tran</td>
</tr>
</tbody>
</table>

Performance Assessment

- 3d. Schedule Adherence
  Rough combining of 1b and 3c with a bit more weight to 3c.

---

Transit Access and Mobility

3e. Frequency and Hours of Service

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>New frequently transit vehicles arrive at a stop and the hours of service can affect transit riderhip levels</td>
<td>This is a Sun Trans operations issue for the most part Potential service efficiencies related to other transit performance measures could provide Sun Trans the opportunity to increase service levels along Broadway</td>
</tr>
</tbody>
</table>

Factors

<table>
<thead>
<tr>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>None</td>
</tr>
</tbody>
</table>

Performance Assessment

- 3e. Frequency and Hours of Service
  - Mainly a Sun Trans operation issue
  - Potential relationship to other Performance Measures
    - Transit
    - Walkability
    - Economic Vitality

---

Transit Access and Mobility

3f. Accommodation of Future High Capacity Transit

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability of the roadway and roadside design to accommodate future high capacity transit can ultimately improve performance of design concepts in relation to other transit performance measures Also affects long term viability of the design concept, see 5g Certainty</td>
<td>Provision of dedicated transit lanes Roadside or median width allows for future transit improvements</td>
</tr>
</tbody>
</table>

Factors

<table>
<thead>
<tr>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Low Moderate at this level of design Right of way could be increased at transit stops to provide space for facilities Design does not currently include details of intersection design</td>
</tr>
</tbody>
</table>

Performance Assessment

- 3f. Accommodation of Future High Capacity Transit
  - Existing and 4 lanes get +++ because they would end up having one lane in each direction for vehicular traffic if dedicated transit lanes were provided
  - 5a lane options get ++ because even though these could be converted to 4+T with dedication of lanes, there would likely be resistance to reducing traffic lanes once they are in place and construction would need to occur to make the conversions 6+T has right turning vehicle issues so ++ 4+T and 4+T gets +++ because they provide for high-quality high-capacity transit with implementation of the concept 5A is rated neutral because only one direction is in a dedicated lane while the service levels are reduced by the other direction running in a shared lane.
Transit Access and Mobility

<table>
<thead>
<tr>
<th>Ability</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3g. Riders per Vehicle</td>
<td>• Efficiencies in number of riders per vehicle, while avoiding overcrowded, improve cost performance of service and potentially cost to riders (also can reduce pollution per person trip)</td>
</tr>
<tr>
<td>Description</td>
<td>Measurement</td>
</tr>
<tr>
<td>- Average daily rider per transit vehicle</td>
<td>• Using transportation model and transit service assumptions</td>
</tr>
<tr>
<td>- Average riders per peak hour transit vehicle</td>
<td></td>
</tr>
<tr>
<td>Factors</td>
<td>Ability to Effect</td>
</tr>
<tr>
<td>- Other transit performance measures that affect transit ridership and service efficiencies</td>
<td>Low to Moderate</td>
</tr>
<tr>
<td>Ability to Evaluate</td>
<td>• Cannot be measured at current level of design</td>
</tr>
</tbody>
</table>

Performance Assessment

- 3g. Riders per Vehicle
  - Service planning for the type of transit investments in concepts has not been developed
  - Need further definition of design and BRT service

Vehicular Access and Mobility

4a. Movement of Through Traffic
4b. Intersection Delay – Overall Intersection Performance
4c. Intersection Delay – Worst Movement
4d. Accident Potential
4e. Lane Continuity
4f. Persons per Vehicle or Person Trips
4g. Access Management Management for Adjacent Properties

Vehicular Access and Mobility

4a. Movement of Through Traffic

| Description | Measurement |
| - A range of criteria and intervention realizations can measure effectiveness of moving through traffic which can have an affect on a variety of other transportation, environment, and economic factors. |
| - Number of traffic lanes | - Time of day, travel time, average speed, volume, travel time reliability, & vehicle occupancy by lane |
| Factors | Ability to Effect |
| - Number of traffic lanes | Moderate or current level of design as only number of traffic lanes and presence of transit only lanes are defined |
| - Signal phase and timing | Moderate |
| - Intersection design | Moderate |
| - Access management | Moderate |
| - Transit service design | Moderate |
| Ability to Evaluate | • 

Performance Assessment

- 4a Movement of Through Traffic
  - Existing section with current volume: impacts of issues dropping in through lanes and high number of HAWK signals that are not synchronized with other signals. Through traffic flow is less than BRT potential. Through traffic demand is substantial. Development of the corridor will not significantly increase, however, adding intersection capacity will result in long travel times and excessive delay. 
  - 6 lane options w/o exclusive transit lanes – do not provide sufficient through-capacity on the signalized intersections for existing growth scenario. These options assume that additional turning lanes are provided in the key intersections (5x7 in Campbell, Couch, Century Blvd) and bus pullouts and coordinated pedestrian HAWK signals are provided. 
  - 4 lane options with exclusive transit lanes – through traffic operations will be improved assuming that a sufficient modal shift from car to transit (BRT) occurs to reduce vehicular demand. 
  - 6 lane options w/o exclusive transit lanes – 4) to good through traffic operations depending upon growth scenario, assumed bus pull outs and coordinated pedestrian HAWK signals. 
  - 4 lane options with exclusive transit lanes – good to very good through traffic operations depending upon growth scenario and assuming that a sufficient modal shift from car to transit (BRT) occurs to reduce vehicular demand. 
  - The SHTF concept is rated lower than the 6 lane mixed flow options because the streetcar shared lanes are estimated to reduce performance for through lanes.
### Vehicular Access and Mobility

#### 4b. Intersection Delay – Overall Intersection Performance

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction delay for both Broadway and cross street traffic has an effect on the overall street network in the project area (and potentially beyond)</td>
<td>Traffic modeling</td>
<td>Number of through and turn lanes</td>
<td>High</td>
<td>Low to None</td>
</tr>
<tr>
<td></td>
<td>Average 95 percentile queue length</td>
<td>Length of turn lanes</td>
<td>Interception design is not a part of current design concepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average delay</td>
<td>Signal design, including crossing time considerations for pedestrians and bicycles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume to Capacity Ratio (V/C)</td>
<td>Transit priority treatments</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other intersection design features</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4b. Intersection Delay – Worst Movement

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction delay for worst movement at intersections has an effect on the overall street network in the project area (and potentially beyond)</td>
<td>Traffic modeling</td>
<td>Number of through and turn lanes</td>
<td>High</td>
<td>Low to None</td>
</tr>
<tr>
<td></td>
<td>Average 95 percentile queue length</td>
<td>Length of turn lanes</td>
<td>Intersection design is not a part of current design concepts</td>
<td></td>
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<tr>
<td></td>
<td>Average delay</td>
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<tr>
<td></td>
<td>Volume to Capacity Ratio (V/C)</td>
<td>Transit priority treatments</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other intersection design features</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4d. Accident Potential

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certain factors have been identified in the literature as contributing to higher accident rates and severity of accidents</td>
<td>Based on review of the literature quantitatively and qualitatively evaluate certain design features and design criteria</td>
<td>Number of access points to adjacent properties</td>
<td>High</td>
<td>Low to None</td>
</tr>
<tr>
<td></td>
<td>Number of side street access points</td>
<td>Number of bike lane cross over length</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4e Lane continuity</td>
<td>Others?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4e. Lane Continuity

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merging the number of lanes in the roadway cross section following an intersection or for other reasons decreases roadway capacity and increases potential for crashes</td>
<td>Analyze performance of lane reductions using VISSIM</td>
<td>Number and design of lane drop locations</td>
<td>High</td>
<td>Low to None</td>
</tr>
<tr>
<td></td>
<td>Compare with performance of similar lane reductions in Tucson</td>
<td>Currently design concepts do not propose additional through lanes at intersections</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4f. Person Trips for multiple measures

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
<th>Factors</th>
<th>Ability to Effect</th>
<th>Ability to Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-modal measures allowing evaluations on a per person basis</td>
<td>Convert vehicle, transit, and bicycle trips to person trips for the corridor</td>
<td>Number of traffic lanes</td>
<td>High</td>
<td>Not viable at current level of design</td>
</tr>
<tr>
<td></td>
<td>Use traffic model and VISSIM to assess different modal performance for</td>
<td>Signal design/trimming</td>
<td>Requires realignment and intersection design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corridor travel time</td>
<td>Intersection design</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average delay</td>
<td>Access management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel time reliability</td>
<td>Transit service design</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other measures as appropriate</td>
<td>#23-Bike Conflicts with Crossing Vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dedicated transit lanes, transit priority treatments at intersections, level boarding, off-vehicle ticketing, and other measures</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Performance Assessment

- Meaningful assessment of these vehicular Performance Measures requires
  - More detailed design
  - VISSIM modeling
Vehicular Access and Mobility

4g. Access Management for Adjacent Properties

Description
• Changes to curb-cut/driveway access from Broadway to parking and loading for adjacent business to improve traffic flow, reduce conflicts with pedestrians and bicycles, and generally reduce potential for accidents.
• Can require shared access with adjacent properties

Measurement
• Quantitative and qualitative evaluation by planning team of reduced conflicts and quality of site access

Factors
• Reduction in number and width of curb-cut/driveway access
• Maintenance of site functionality

Ability to Effect
• High

Ability to Evaluate
• Not viable at current level of design
• Requires alignment design

Sense of Place

5a. Historic Resources

Sense of Place

5a'. Significant Resources

5b. Visual Quality

5c. Broadway as a Destination

5d. Gateway to Downtown

5e. Conduciveness to Business

5f. Walkable Community

5g. Certainty

Performance Assessment

• 5a. Historic Resources

Sense of Place

5a. Historic Resources

Description
• The number of historic structures lost due to direct impact
• The number of historic structures with limited usefulness as a result of loss of parking, setback, site access, and other conditions

Measurement
• Count of historic structures lost by category

Factors
• Roadway width
• Streetside area width
• Alignment placement

Ability to Effect
• High

Ability to Evaluate
• Moderate to High at current level of design
• More definitive as intersections and alignment are designed

Sense of Place

5a. Historic Resources

Description
• The number of significant structures lost due to direct impact
• The number of significant structures with limited usefulness as a result of loss of parking, setback, site access, and other conditions

Measurement
• Count of significant structures lost by category

Factors
• Roadway width
• Streetside area width
• Alignment placement

Ability to Effect
• High

Ability to Evaluate
• Moderate to High at current level of design
• More definitive as intersections and alignment are designed
Performance Assessment

• Sa. Significant Resources

  Based on review of relationship to future ROW to existing ROW and distance between building facades.

Sense of Place

Sb. Visual Quality

Description
• Ability of the roadway design to enhance visual quality using a mix of features

Measurement
• Qualitative assessment (project team and input from CTF)

Factors
• Design of median and streetside landscaping
  • Number and location of placemaking features (including public art, wayfinding, lighting, furniture, etc.)
  • Width of roadside areas for streetscape elements and landscaping

Ability to Effect
• High

Ability to Evaluate
• Moderate at current level of design
  • Design does not currently include details for streetscape design, but lower cost cross section concepts may allow more budget to be spent on visual quality

Sc. Broadway as a Destination

Description
• Promote development and civic spaces that would be attractive to users from surrounding neighborhoods, the city, and the region
  • Provide visual quality, access, and other features that make Broadway appealing to development and customers

Measurement
• Qualitative evaluation

Factors
• Factors related to Sb Visual Quality
  • Coordinate façade improvement, parking management, and other programs and improvements
  • Land use regulations supporting development sought

Ability to Effect
• Moderate

Ability to Evaluate
• Low for current level of design and planning

Sc. Gateway to Downtown

Description
• Visual quality, ease of mobility, and similar features that improve connection to downtown

Measurement
• Qualitative evaluation

Factors
• To be determined through discussions with CTF

Ability to Effect
• Moderate

Ability to Evaluate
• Low to Moderate at current level of design

Performance Assessment

• Sc. Broadway as a Destination

  Need further
  • Development of street design and its potential impact on future character of uses along the street
  • Understanding of economic vitality
  • Review definitions and factors with CTF
**Performance Assessment**

- **5d. Gateway to Downtown**
  - Review description and discuss factors with CTF

  Roughly combination of transit and vehicular access and mobility with community character

---

**Sense of Place**

**5e. Conduciveness to Business**

- **Description**
  - The type and size of businesses that would be drawn to the corridor under various development approaches
- **Measurement**
  - Qualitative evaluation
- **Factors**
  - To be determined through discussions with CTF and professional experience
  - Site access and parking location
  - Building size and design accommodated
  - Other TBD
- **Ability to Effect**
  - Moderate
- **Ability to Evaluate**
  - Low at this level of design

---

**Sense of Place**

**5f. Gateway to Downtown**

- **Description**
  - Review description and discuss factors with CTF

  Roughly a combination of pedestrian access and mobility and 5a which is impact on properties

---

**Sense of Place**

**5f. Walkable Community**

- **Description**
  - Need further design of
    - Site access and parking
    - Site revitalization and reuse
    - Others...
  - Review definitions and factors with CTF

- **Measurement**
  - See measures under "1. Pedestrian Access and Mobility"
- **Factors**
  - See measures and factors under "1. Pedestrian Access and Mobility"
- **Ability to Effect**
  - Varies
- **Ability to Evaluate**
  - Varies

---

**Sense of Place**

**5g. Certainty**

- **Description**
  - Relates to comments received, “Do it right this time so it doesn’t have to be done again.”

- **Measurement**
  - Qualitative evaluation
- **Factors**
  - Capacity projections
  - Ridership projections (bus transit, BRT)
  - Flexibility to meet changing transportation needs
- **Ability to Effect**
  - Moderate to High
- **Ability to Evaluate**
  - Moderate to High at current level of design

- See also performance measures:  
  - 1a Functionality of Streetside for Pedestrian Activity  
  - 1b Pedestrian-Oriented facilities or improvements  
  - 1c Pedestrian Design  
  - 2b Bike Facility Improvements  
  - 3a Accommodation of future high-capacity transit  
  - 4a Movement of through traffic  
  - 5a Parking
### Performance Assessment

- **5g. Certainty**
  - Consider moving this out of Sense of Place and making it a stand alone Performance Measure
  - Ability to accommodate foreseeable transportation demand into the future

Roughly a combination of:
- 1a. Functionality of Streetside for Pedestrian Activity,
- 1c. Pedestrian-Oriented Facilities or Improvements,
- 2e. Bike Facility Improvements,
- 3f. Accommodation of Future High Capacity Transit, and
- 4a. Movement of Through Traffic

### Environment/Public Health

#### 6a. Greenhouse Gases
- **Description**
  - Corridor design features that can reduce CO$_2$ emission
- **Measurement**
  - Quantitative analysis
- **Factors**
  - Proportion alternative modes of transportation
  - Level of congestion
  - Quality of vehicle fleet, fuel, etc.
- **Ability to Effect**
  - Moderate
- **Ability to Evaluate**
  - Not at current level of design
  - Some factors ultimately not affected by this project

#### 6b. Other Tailpipe Emissions
- **Description**
  - Identification and reduction of other important tailpipe emissions, such as particulates
- **Measurement**
  - Quantitative evaluation
- **Factors**
  - Proportion alternative modes of transportation
  - Level of congestion
  - Quality of vehicle fleet, fuel, etc.
- **Ability to Effect**
  - Moderate
- **Ability to Evaluate**
  - Not at current level of design
  - Some factors ultimately not affected by this project
Performance Assessment

- 6b. Other Tailpipe Emissions
  - Requires more detailed
    - Design
    - Technical analysis

Environment/Public Health

6c. Heat Island Effect

Description
- Determine comparative heat island effect of various alternatives

Measurement
- Qualitative and quantitative evaluation

Factors
- Reduce roadway and sidewalk pavement contribution to heat gain through a combination of shade, solar reflectivity (high albedo) of materials, and area of pavement
- Increase landscaped area
- Increase amount of shade

Ability to Effect
- High

Ability to Evaluate
- Moderate at current level of design (amount of landscaped area & number of trees)
- High with more detailed design and selection of building materials

Assume existing condition is the base “neutral” condition. Slight penalty for more R.O.W. paving with assumption that much of existing area outside of R.O.W. is hardscaped and that new pave could be high albedo and consideration of shade from landscape

Heat Island Effect

6d. Water Harvesting

Description
- Retain rainfall onsite to benefit project landscaping

Measurement
- TDOT Active Practice Guideline “Green Streets” [draft]

Factors
- Width and depth of median and streetside areas
- Amount of reduction in runoff on paved areas
- Types of materials used (pervious pavement)

Ability to Effect
- High

Ability to Evaluate
- Moderate at current level of design
- High as design is developed further

Performance Assessment

- 6d. Water Harvesting
  - Ratio of landscaped to pavement width
Environment/Public Health

6e. Walkability/Bikeability

Description
- Design elements that will encourage biking and walking over driving

Measurement
- See 1. Pedestrian and 2. Bicycle Access and Mobility performance measures

Factors
- Number of bike and pedestrian facilities and features
- Continuity of treatments
- Comfort and security features
- 5f. Walkable Community

Ability to Effect
- High to Moderate depending on performance measure

Ability to Evaluate
- High to not viable at current level of design depending on performance measure
- High to Low depending on performance measure

Performance Assessment
- 6e. Walkability / Bikeability

- Roughly combination of Bicycle Access and Mobility with 5f Walkable Community (which considers all Pedestrian Access and Mobility Performance Measures)

Environment/Public Health

6f. Land Use Mix

Description
- Ability to accommodate mixed use development within walking and biking distance of the Broadway corridor, and to support transit ridership

Measurement
- Qualitative analysis

Factors
- Support of mixed use by current/future zoning
- Determine if, and what type of policy and procedural changes are needed
- Count and size of parcels conducive to accommodate desired land use mix

Ability to Effect
- Low to indirect

Ability to Evaluate
- Not at current level of design
- Moderate as design is developed in more detail (i.e.; alignment) and policy issues are discussed

Performance Assessment
- 6f. Land Use Mix

- Requires more detailed
  - Alignment and intersection design for extent of impact to existing parcels

Environment/Public Health

6g. Affordability

Description
- Combined housing and transportation costs for users of the Broadway corridor

Measurement
- Qualitative evaluation

Factors
- Relates to other measures:
  - 1, 2, & 3 – Pedestrian, Bicycle, and Transit Access & Mobility
  - 5f Walkable Community
  - 6b. Other Tailpipe Emissions
  - 7g. Job Impacts

Ability to Effect
- Low

Ability to Evaluate
- Not at current level of design and planning

Performance Assessment
- 6g. Affordability

- Pedestrian, Bicycle, and Transit Access and Mobility provide some indication, but more detailed technical analysis would allow for better understanding
- Other related Performance Measures cannot be assessed at current level of design and analysis
**Economic Vitality**

7a.-7b. Change in Economic Potential  
7c.-7d. Change in Business Revenue  
7e.-7f. Change in Sales Tax Revenue  
7g.-7h. Change in Property Tax Revenue  
7i. Business Impacts  
7j. Job Impacts

---

**Economic Vitality**

- Ability to Evaluate  
  - Not at current level of design and planning  
    (cross section width is an indicator, but in some cases remnant parcels may have more economic potential than existing parcels)

---

**Economic Vitality**

- Impacts to parking, access, and ultimately buildings all affect viability of existing businesses and development  
- Future development potential needs to be assessed  
- Real estate and business market potential also needs to be assessed
### Economic Vitality

#### 7a – 7b. Change in Economic Potential

**Description**
- Suitability of parcels along Broadway to provide for current commercial or residential use, repurposed, or adaptive reuse, or to provide future mix of commercial and residential uses, and open space

**Measurement**
- Qualitative analysis by economic and other planning team members to estimate use potential of existing and remnant land

**Factors**
- Possibly new land use policy and strategic planning for the disposition of remnant parcels (not part of current project scope of work)
- Roadway alignment and width
- Access management plan

**Ability to Effect**
- Moderate

**Ability to Evaluate**
- Not at current level of design and planning (cross section width is an indicator, but in some cases remnant parcels may have more economic potential than existing parcels)

#### 7c – 7d. Change in Business Revenue

**Description**
- Determine current and potential amounts of revenue generated by businesses along the corridor (by segments/not parcel-specific)

**Measurement**
- Analysis by economic and other planning team members
  - City data (confidentiality will be respected)
  - InfoUSA
  - Standard & Poor's

**Factors**
- Possibly new land use policy and strategic planning for the disposition of remnant parcels (not part of current project scope of work)
- See 7a-7b Change in Economic Potential

**Ability to Effect**
- To be determined

**Ability to Evaluate**
- Not at current level of design and planning (see 7a-7b Change in Economic Potential)

#### 7e – 7f. Change in Sales Tax Revenue

**Description**
- The amount of existing and anticipated sales tax generated from the businesses on the corridor

**Measurement**
- City collected data (confidentiality will be respected)
- Qualitative evaluation

**Factors**
- Revenues collected on businesses currently in corridor
- Anticipated revenues for businesses that would remain in corridor after construction
- Possibly new land use policy and strategic planning for the disposition of remnant parcels (not part of current project scope of work)
- Width of roadway
- Placement of alignment
- Access management plan

**Ability to Effect**
- To be determined

**Ability to Evaluate**
- Not at current level of design and planning (see 7a-7b Change in Economic Potential)

#### 7g – 7h. Change in Property Tax Revenue

**Description**
- Amount of current and anticipated future property tax generated from the properties along the corridor

**Measurement**
- County Assessor data
- Qualitative evaluation

**Factors**
- New land use policy and strategic planning for the disposition of remnant parcels (not part of current project scope of work)
- Width of roadway
- Placement of alignment
- See 7a-7b Change in Economic Potential

**Ability to Effect**
- To be determined

**Ability to Evaluate**
- Not at current level of design and planning (see 7a-7b Change in Economic Potential)
Economic Vitality

7i. Business Impacts

Description
- The absolute number and size in terms of annual revenue

Measurement
- Quantitative assessment based on InfoUSA data and alignment impact evaluation

Factors
- Limit impacts to businesses/properties to one side of roadway at any particular location
- See 7a-7b Change in Economic Potential

Ability to Effect
- To be determined

Ability to Evaluate
- Not at current level of design and planning (see 7a-7b Change in Economic Potential)

---

Project Cost

8a. Construction Cost

8b. Acquisition Cost

8c. Income for Reuse of City-owned Property

---

Economic Vitality

7j. Job Impacts

Description
- Potential change in number of jobs

Measurement
- Estimate of current and potential future employment in project area (may be challenging to track given business relocations and/or job creation under various alternatives)

Factors
- To be determined
- See 7a-7b Change in Economic Potential

Ability to Effect
- To be determined

Ability to Evaluate
- Not at current level of design and planning (see 7a-7b Change in Economic Potential)

---

Project Cost

Performance Assessment

- 8a. Construction Cost
  Extent of improvements and investment in transit facilities for dedicated transit lane options
Considerations for September Public Meeting #3

Jenn Toothaker, Project Manager
City of Tucson Department of Transportation
**Initial Discussion of Public Meeting #3**  
**September 5, 2013**

**Task-Related Goals:**
- Present Initial Draft Cross Sections and Performance Measures
- Obtain public input on:
  - Cross-sections to move into next task/analysis
  - Performance measures/evaluation criteria

---

**Distilling Cross Section Concepts**

<table>
<thead>
<tr>
<th>4 Lanes</th>
<th>4 Lanes plus Transit Lanes</th>
<th>6 Lanes</th>
<th>6 Lanes plus Transit Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A (112’ r.o.w.)</td>
<td>Option 6-7 A (138’ r.o.w.)</td>
<td>Option 6A (166’ r.o.w.)</td>
<td>Option 6-7 A (142’ r.o.w.)</td>
</tr>
<tr>
<td>Option B (130’ r.o.w.)</td>
<td>Option 6-7 B (152’ r.o.w.)</td>
<td>Option 6B (152’ r.o.w.)</td>
<td>Option 6-7 B (174’ r.o.w.)</td>
</tr>
<tr>
<td>Option C (111’ r.o.w.)</td>
<td>Option 6-7 SATA (existing r.o.w.)</td>
<td>Option 6C (112’ r.o.w.)</td>
<td>Option 6-7 SATA (existing r.o.w.)</td>
</tr>
</tbody>
</table>

---

**Distilling Performance Measures**

**CTF Assessment of Initial Concepts**

<table>
<thead>
<tr>
<th>Sensitivity of Place</th>
<th>Present at Public Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic and Significant Resources</td>
<td>Visual Quality</td>
</tr>
<tr>
<td>Long Term Certainty</td>
<td></td>
</tr>
</tbody>
</table>

**Environmental / Public Health**

<table>
<thead>
<tr>
<th>Eco: Heat Island</th>
<th>Water Harvesting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkability/Bikability</td>
<td></td>
</tr>
</tbody>
</table>

**Economic Vitality**

<table>
<thead>
<tr>
<th>Project Cost</th>
<th>Project Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>Acquisition Cost</td>
</tr>
</tbody>
</table>

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**Initial Discussion of Public Meeting #3**  
**September 5, 2013**

**Distilling Concepts, Performance Measures, and Assessments**
- Cross Section Concepts
  - Focus on 4 functional families with variations on organization and design of elements within the functional families
- Performance Measures
  - Compile some into combined measures

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**Initial Discussion of Public Meeting #3**  
**September 5, 2013**

- Are there any specific ideas about you have about:
  - CTF roles in the event?
  - Format of the event or table activities?
  - Overall content and discussion?
Call to the Audience

10 Minutes
Please limit comments to 3 minutes

• Called forward in order received
• CTF members cannot discuss matters raised
• CTF cannot take action on matters raised
• CTF members can ask project team to review an item

Next Steps/Roundtable

Jenn Toothaker

• Schedule Leading up to Public Meeting
  – July 25
    • Informational Presentations
      – Update on Downtown Links and Ronstadt Transit Center
      – Continued Discussion of cross sections, performance assessments
    • Potential endorsement of content for September Public Meeting
    • Discussion/Endorsement of September Public Meeting Format

  – Is there a need for an additional meeting?

Next Steps/Roundtable

• Set an additional CTF Meeting
  – Options:
    • CTF Meeting in early August, Public Meeting in September
    • CTF Meeting in late August or early September, Public Meeting in late September or October

CTF Next Steps / Roundtable

Thank You for Coming – Please Stay in Touch!

Broadway: Euclid to Country Club
Web: www.tucsonaz.gov/broadway
Email: broadway@tucsonaz.gov
Info Line: 520.622.0815

RTA Plan
www.rtamobility.com