MD Route 2: Express Bus Proposal

By: Group 2
Problem Statement

- Analyze bus routes and transportation operations along the Route 2 Corridor
- Identify alternatives for improving transit options and service quality
- Prioritize linking residents with points of interest and important transfer stations
Corridor Growth Management Plan

- Observes projected growth in employment and households over next 20 years which create additional travel demand
- Evaluates 9 most traveled regional highway corridors plus four important connector roads
- Total cost is $3.6 Billion
Route 2 Growth

- **Northbound**
  - Projected to carry 76,000 vehicles/day by 2035
  - 26% increase in traffic volume
- **Southbound**
  - Projected to carry 63,000 vehicles/day by 2035
  - 46% increase in traffic volume
- **Serves Annapolis, Glen Burnie, Severna Park, Pasadena, and Baltimore**
Route 2 Growth Plan Recommendations

- Northbound
  - Widen roadway from 4 to 6 lanes
  - New sidewalks
  - Permit land use densities to support transit in locations where redevelopment may occur

- Southbound
  - Pedestrian and Bicycle Improvement
  - Improve site design to orient new buildings and better manage congestion
Transportation Level of Service Forecasts for 2035
Proposed by AAC General Development Plan
Existing Demographics

- Zero Car Households
- Areas in Brooklyn Park, Glen Burnie
  - 135 - 2302 Households/square mile
Household Income

- Brooklyn Park and Glen Burnie
- At worst - 2056 - 9523 homes/square mi
Transit Commute Time

- Average Commute Time over 60 min
- More consistent along all of Route 2
Commuting Patterns

- 42% of AAC residents work within the county
- Majority of them work in Annapolis or Glen Burnie
Existing Public Transportation Routes

- Fastest Route (non-peak hours) takes 1hr and 30 min
- Local 14 ----> Cromwell Station ----> Hunt Valley Light Rail ---> BWI Light Rail
- Fastest Route (peak hours) takes 37 minutes from Cromwell Station to Annapolis
- BusLink Route 215
Existing Public Transportation Routes

Local 14

215 Commuter BusLink
Existing Demand

- High Demand for Local 14 bus
- Typically buses are completely full
- Demand calculation depends on bus type
  - 40ft bus has demand of 192 ppl/hr
  - 35ft bus has demand of 172 ppl/hr
Methodology
Proposed Public Transportation Routes

- Should take 54 minutes from Annapolis to Cromwell station during peak hours
- 5 buses every 22 min for peak
- 4 buses every 15 min for off-peak

Stop Addresses for Proposed Express Bus

<table>
<thead>
<tr>
<th></th>
<th>Stop Address</th>
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<tbody>
<tr>
<td>A</td>
<td>Row Boulevard &amp; Taylor Ave (WB)</td>
</tr>
<tr>
<td>B</td>
<td>1257 Ritchie Highway</td>
</tr>
<tr>
<td>C</td>
<td>Ritchie Hwy &amp; Robinson Rd</td>
</tr>
<tr>
<td>D</td>
<td>Ritchie Highway &amp; Jumpers Hole (NB)</td>
</tr>
<tr>
<td>E</td>
<td>Ritchie Highway &amp; Marley Station (NB)</td>
</tr>
<tr>
<td>F</td>
<td>Cromwell Station Loop</td>
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</tbody>
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Proposed Demand

- Expect high demand since Local 14 buses are usually full
- Traffic volume along Rt. 2 is expected to increase significantly
- Shorter commute ----> More ridership
Infrastructure Requirements

- Local 14 has bus stops along Route 2
  - Bus Stop Concrete Pads
  - Bus Shelters
  - Lane Markings
- Busses
- Hybrid/Diesel Fleet
  - 40 ft and 35 ft

- No new bus stops need to be Constructed
- Proposed stops are located at current Local 14 stops
- Additional Busses to accommodate new Route
  - Recommend 35 ft bus
Environmental Impacts

Existing Conditions

- Heavy Suburban Area leads to congestion on roads
  - No HOV lane currently
- Increase in Carbon Dioxide being released

Proposed Conditions

- Positive
  - Decrease in Carbon Dioxide emissions
  - Increased fuel efficiency
- Negative
  - Using of non-hybrid buses could deter an positive environmental impacts
Cost of Operation

**Current:**
- Main components are designed to last 12 years service
  - Servicing
    - Estimate of maintenance: $1.00/mile.
- Capital costs: $300,000-$350,000.
- Average employment wage of $29.76.
- Battery pack replacement every 6 years costing $27,500.
- Estimates the current costs for the county to be $53.29/hour/bus.

**Proposed:**
- 1 bus will be $395,000 with a lifespan of 12 years or 500,000 miles.
- Marketing costs
Performance and Service Measures

- **Current situation:**
  - Current round trip: approximately 3 hours in rush hour
    - Result: unreliable for commuting to work.
      - Demand: more centralized location of bus stops in order to optimize time, money and energy

- **Proposed Bus Line will allow:**
  - Reduction of travel time, fewer stops, reducing the travel time during operational hours, esp. during peak hrs.
    - Result: increase in commuter flexibility and reliability
  - Increase comfort.
    - Newer buses entice people to ride the bus.
    - Incorporation of an express route will allow for better seating due to demand being shared between the Local 14 and the proposed express route.
Optimization

TC = 2Dc/(vh) + (2qDv_t)/v + qhv_t

Peak:
- Initial headway = 23 minutes
- 5 buses
- Re-optimized = 22 minutes
- Total Cost = $1,779/veh hr

Off-peak:
- Initial headway = 16 minutes
- 4 buses
- Re-optimized = 15 minutes
Maryland Statewide Transportation Model (MSTM)
MSTM

- Used for statewide transportation planning
  - Demand forecasting
- Baseline - based on 2007
- Proposed - including our proposed route in year 2035
- Inputs
  - Type of service, speed, headway, stop delay, stop locations
- Outputs
- Challenges
Strengths/Weaknesses

**Strengths**
- Shorter commute times
- Hybrid buses reduce emissions
- Alleviates congestion
- Reduced cost since using existing infrastructure

**Weaknesses**
- High start-up costs
- Bus still stuck in traffic
Conclusion

Express bus along Route 2

- 6 stops
- 1hr 48min round trip
- 5 buses in peak hours, 4 in off-peak
Future Considerations

● Alternative ideas not developed:
  ○ Specialized or more advanced optimization calculation
  ○ New suburban routes
  ○ New technology
  ○ Save capital costs and invest in improving only local 14 route
  ○ New infrastructure such as Park and Rides
  ○ Additional lanes

● Accurate modelling and specific corridor study
  ○ Local data and surveys

● Utilize newer MSTM
Questions?