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Port Authority GIS Study
Abstract

As an academic mapping project, a study of the ridership and scheduling operations of the Port Authority will be conducted. Using GIS software and Access Database tools, the bus and rail routes will be analyzed looking at several indicators of operational efficiency as well as determining the resource needs of each route. Operational efficiency measures will be based on passengers per vehicle hour, passengers per trip, and percentage of vehicle hours that are revenue service hours. Resource needs of routes will be represented by total vehicle hours required to serve a route and peak vehicles required for each division. Maps will be produced to demonstrate these measures in addition to showing number of trips and time span of service.

The data and calculations are based on the November 2005 pick from the scheduling pick data that the technology department graciously provided. The ridership figures from November 2005 will be used in conjunction with the scheduling data. At the conclusion of the study, a presentation of findings and possible courses of action will be presented on February 15, 2005 at the ACTC General Membership Meeting.

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Procedure

The study originally was expected to compare routes by monthly ridership per hour and ridership per trip based on hard copy data that Allegheny County Transit Council (ACTC) members receive. However, I received the equipment and operator schedules for Weekday, Saturday, Sunday and Holiday times. The original data was imported into excel from the comma separated source files and combined for each of the six divisions. Each division was named by its two digit code that PAT uses for describing them.

> 10= Ross Division (Bus division in North Suburbs)
> 24= Collier Division (Bus division in Southwest Suburbs)
> 46= West Mifflin Division (Bus division in Southeast Suburbs)
> 56= East Liberty Division (Bus division in East End of the city)
> 60= Harmar Division (Bus division in North East Suburbs)
> 80= South Hills Division (Rail division in South Suburbs)

Three columns were then added in the Excel Sheets to calculate Revenue Service, Layover, and Dead Head in minutes. Revenue Service (RS) is defined as time spent to provide scheduled service that is shown on any public timetable. Layover (LO) is time the bus (and driver) is at rest and waiting to continue operation of schedule. This wait is not considered revenue service, even if a timetable refers to it. Dead head (DH) is time spent for the bus to travel between service points and/or the division without reasonable expectation of carrying passengers. These three figures add up to total vehicle hours that are used to measure the amount of manpower and vehicle time required to service a route. These numbers are important in determining efficiency of service delivery (as based on percent of Revenue Service over Total Service) and service consumption (Ridership per vehicle hour).

The data in Excel is then imported into Access in 6 tables, one per division. Access queries were then applied on these tables to provide information on the operations on each route. First, an "Operator Run" query was created to replicate a "PATOCARD", which is Port Authority colloquial for a Port Authority Transit Operator card which provides the operator the schedule for the day. This query organizes the data from each division by day, Run Number, then time and trip. As with the original division table, all operator runs will be shown together in the same table. *The presentation in February will include a report based on this query that will create the PATOCARD for individual run numbers. A commented PDF of the card will be attached to this document.*

Another query in Access was the Vehicle Hours Query. This yielded a summary of RS, LO, DH, and Total Vehicle hours per route. This information was exported to Excel and Ridership information was inserted into the sheet. Riders per hour in a certain route was calculated by dividing average ridership per weekday, Saturday, or Sunday over total vehicle hours of the day in question. That sheet was imported into a geodatabase to

Hi Mike,

As promised, here are the suggestions I wrote down following your
presentation on 12/20.

* Define some terms in advance, specifically those which are internal to
the transit industry, and so which cannot be expected to be
self-explanatory:
        -- Revenue hour, Vehicle hour, Passengers per vehicle hour,
straights vs. swings (referring to shifts worked),

* Emphasize the significance of Port Authority's18pvh and 50pvh thresholds

* Regarding the percent efficiency of a route (per vehicle hour), show a distribution of these routes over a bell curve. It may help to have four such curves: Weekday, Sat, Sun/Hol, and overall. For the charts generated, I would color-code each standard deviation, then carry that color code into any charts you have which show the routes, both text and graphical. As an initial suggestion, I'd use this code:

        Blue   below 2nd stddev
        Green   below 1st stddev
        Grey   center
        Orange   above 1st stddev
        Red   above 2nd stddev

* If a hands-on graphical interface can be set up, generate some of these maps with overlays that can be turned on/off
        -- by Division
        -- by type of service day
        -- by which stddev routes fall into

* Can any of these graphs be rendered with HTML instead of through ESRI ArcWhatever? If so, that would facilitate defining the colors through Cascading Style Sheets instead of hard-wiring either the HTML or something even further upstream. That would make it far easier to tweak the colors, line sizes, etc., than through the upstream software. (I think.)

* I recall during the presentation that you were able to zoom in on the area detail surrounding Allegheny Center. This allowed for much easier visual understanding of all the types of lines being presented (color, thickness, etc.).

HTH,
Stu