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## Dots & Dashes: Piecing Together Transit's Future

NOVEMBER 2008

FTA Report No. 0044  
Federal Transit Administration

PREPARED BY

Delaware Valley Regional Planning Commission



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## Metric Conversion Table

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
<b>LENGTH</b>				
<b>in</b>	inches	25.4	millimeters	mm
<b>ft</b>	feet	0.305	meters	m
<b>yd</b>	yards	0.914	meters	m
<b>mi</b>	miles	1.61	kilometers	km
<b>VOLUME</b>				
<b>fl oz</b>	fluid ounces	29.57	milliliters	mL
<b>gal</b>	gallons	3.785	liters	L
<b>ft<sup>3</sup></b>	cubic feet	0.028	cubic meters	m <sup>3</sup>
<b>yd<sup>3</sup></b>	cubic yards	0.765	cubic meters	m <sup>3</sup>
NOTE: volumes greater than 1000 L shall be shown in m <sup>3</sup>				
<b>MASS</b>				
<b>oz</b>	ounces	28.35	grams	g
<b>lb</b>	pounds	0.454	kilograms	kg
<b>T</b>	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>TEMPERATURE (exact degrees)</b>				
<b>°F</b>	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C

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## ABSTRACT

Dots & Dashes is an interactive board game that is used at public planning meetings to engage stakeholders in long range transit planning. Groups of three to six people use game pieces with monetary values to choose the priorities of transit projects. The intent of this project was to bring a "bottom-up" style of public engagement to Delaware Valley residents and stakeholders for their long range public transit planning projects. The project was funded by FTA's Public Transportation Participation Program (PTP). A board game was developed to both review group preferences as well as teach its participants about negotiations and constraints within the planning process.



## EXECUTIVE SUMMARY

Funded through a grant from the Federal Transit Administration (FTA)'s Public Transportation Participation (PTP) pilot grant program, Dots & Dashes provides an opportunity for Delaware Valley residents and stakeholders to discuss and express their priorities for future investments in public transportation through a fun, hands-on game setting. Consistent with the objectives of the PTP program, Dots & Dashes was designed as a self-contained and branded package replicable by planners in other regions. In the simplest terms, planners interested in replicating the exercise need only to adjust the scales of the game board and game pieces to match their local area, as well as scale costs necessary to account for different time horizons or local project costs.

The genesis of Dots & Dashes resided in the desire to generate meaningful public and stakeholder outreach for the Delaware Valley Regional Planning Commission's (DVRPC) regional transit planning priorities and long-range plan, and to do so in a manner that would avoid the more static format of previous efforts, where decisions on projects are preassembled through analysis and research and then toured to sell the proposal to the public. While traditional outreach methods are successful in measuring individual preferences, they are less successful in engaging individuals in meaningful dialogue concerning preferences and outcomes.

To this end, Dots & Dashes employs a "bottom-up" style of outreach that is imperative in public transportation planning which, by its very nature, crosses many communities in a given region and affects many different stakeholder groups. This type of approach takes stakeholders beyond their own immediate needs, or those of just a specific project, to view planning issues in a broader, more holistic way. This is particularly relevant for the Delaware Valley region, which is composed of two states, nine counties, three public transit systems and urban, suburban, and rural areas.

Dots & Dashes is a program that condenses the long-range public transit planning process with its fiscal constraint, budgetary tradeoffs, and land use considerations into a board game appropriate for a range of stakeholder audiences, from lay citizens to transportation professionals. At the beginning of each Dots & Dashes session, players are introduced to the game with a PowerPoint presentation that summarizes background information and introduces the game pieces. Following this introduction, groups begin play by deciding how to divide their allotted budget on improvements to the existing system (e.g., fare modernization, greater frequencies, station enhancements) versus network expansion (new rail corridors, Bus Rapid Transit [BRT] corridors, transportation centers, or major station expansions). Specific existing system improvements are identified in writing, and the rest of the game is played to identify, distribute, and roughly cost out network expansion improvements on the regional game board. Each group ends the game with a list and map of future agreed-upon investment priorities

that, together with the results of other groups that play, informs DVRPC's next Long-Range Plan and other projects, including a new Long-Range Vision for Transit.

In playing Dots & Dashes, stakeholders express their preferences for public transit investments and are also educated about the planning process. Results of a participant survey indicated that respondents gained a better understanding of transit planning, as well as a better understanding of project negotiation and regional considerations. This method of public outreach is beneficial to participants as well as planners in that it captures regional priorities, educates stakeholders regarding the tradeoffs required to compose a plan, and provides consensual input into the public transit planning process.

## SECTION 1

# Introduction

Dots & Dashes is an outreach exercise developed as a way to engage citizens and stakeholders on their preferences for public transit investments in the Delaware Valley Regional Planning Commission (DVRPC) region. In spring 2007, DVRPC—the Metropolitan Planning Organization (MPO) for the bi-state Philadelphia region—received a grant through the Federal Transit Administration (FTA) Public Transportation Participation (PTP) pilot grant program to conduct an innovative, workshop-style planning exercise. Through the exercise, which takes the form of a board game (branded “Dots & Dashes”), regional stakeholders in groups of three to six negotiate their preferences within reality-based budgetary constraints. Each participating group then prioritizes regional public transit projects, improvements, and investment over a 30-year time horizon. Dots & Dashes has proven to be a robust method for gathering increasingly-sophisticated preference data in a way that is accessible for participants. The exercise’s origin, application, results, and transferability to other locations are discussed in this report.

Dots & Dashes condenses the long-range public transit planning process with its financial constraint, tradeoffs, and land use considerations into an outreach activity appropriate for a range of stakeholder audiences, from lay citizens to transportation professionals. The exercise does not simply tabulate individual stakeholder preferences, but rather assesses group preferences for transit projects and also educates participants through group negotiation and information sharing.

The key components in the development of Dots & Dashes were the design of the game itself (including rules, game pieces, and game board design), design of the way the game was to be played, and consideration of the methods of result tabulation. The central tenets of Dots & Dashes were that it would be a self-contained game package, its project selection framework would be derived from real costs, its conduct would approximate real-world transportation decision-making, and its outcomes would reflect meaningful outreach in terms of stakeholder participation as well as project and investment priorities.

## Background

Dots & Dashes is a method of public participation developed by DVRPC that seeks to avoid the static public hearing/lecture/open house style where decisions on projects are preassembled through analysis and research, and are then toured to sell the proposal to the public. The kind of bottom-up outreach that Dots & Dashes employs is especially imperative in public transportation planning which,

by its very nature, crosses many communities in a given region and affects many different stakeholder groups.

Public participation in the planning process, and particularly Dots & Dashes, is related to a variety of participation theories and practices, including collaborative planning and consensus-building. These participation theories and the methods developed within them informed the development of the Dots & Dashes game process. They also illustrate how Dots & Dashes fits into the overall spectrum of public participation in urban and transportation planning.

## Public Participation Practice and the Development of Dots & Dashes

Public participation in its various forms has become part of contemporary planning practice and is a mandated activity in many federal, state, or local planning processes. As a result of changes in government decision-making and societal views on planning, starting in the mid-20th century, planning practitioners looked to integrate participation into their plans, and planning practice and theory began to shift from the plan to the process of making a plan [1]. It became increasingly important to not only focus on making decisions for planning, design, or implementation, but also on how those decisions were made. The top-down technocratic approach to decision-making that characterized much of planning practice throughout the profession's history is evolving toward a more holistic and inclusive process and is increasingly mandated to do so by government at a variety of levels.

Public participation may take many forms, but the overall basis and goals of public participation should be that:

Individuals have a right to be informed, consulted and have the opportunity to express their views on governmental decisions... Citizen participation can generate trust, credibility, and commitment [for a planning proposal] ... including key parties “early, often, and ongoing,” can create a sense of ownership over a plan’s content, and can reduce potential conflict over the long term, because those involved feel responsible for its policies [2].

The shift in planning to a more inclusive process relates to the concepts of collaborative planning and consensus-building, which are practices designed to promote a more democratic, inclusive process for planning decision-making. The methods within these fields all rely on the presentation, development and sharing of information, and high levels of communication and engagement among a diversity of stakeholders.

Some methods of participation can be more beneficial than others in this regard. Charrettes, public workshops, and—in the case of Dots & Dashes—group decision-making in the guise of a board game, provide an opportunity to create dialogue and educational opportunities within the planning process more effectively than many traditional outreach approaches. Dots & Dashes requires groups of stakeholders to take turns nominating individually-preferred transit investments and then negotiate priorities among these investments as a group. The element of negotiation is critical to the success of the game: group preferences are reached through the consensus of individual players on specific transit expenditures. In this way, individual preferences are tempered by group discussion, resulting in more well-rounded group preferences. This relates to deliberation theory, which suggests that, through thoughtful discussions, citizens look at issues not just from their personal perspectives but from other perspectives as well [3]. It is believed that deliberation itself, or aspects of the setting in which deliberations occur, will lead people to adopt more pro-social or “community-oriented” reasons in their policy decisions [3].

The board game-style format of Dots & Dashes encourages the sharing of information among stakeholders, promoting a number of educational elements. Participants learn not only about transit issues and priorities in the region, but through the game rules engage in the plan-making process that professional planners use in their decision-making. At its heart, Dots & Dashes provides a setting in which individuals may argue, negotiate, and advocate in order to reach group agreement on a selection of project priorities. This relates to the notion of consensus-building, where a plan’s priorities are derived from bottom-up consensus: individual preferences inform group results, which are aggregated to inform regional priorities. While the planner helps with data, ideas, and strategies, and may even write the final synthesis, the basic elements of the plan grow out of group discussion [4].

## The Impacts of Expanded Collaboration in Dots & Dashes

One of the greatest benefits of public participation is that it channels differences into genuine dialogue among people with different perspectives. Participants have the opportunity to express their views and listen to other participant points of view. This exchange should include all stakeholders in the planning process, and those involved in the process should not be “trapped in seeing public participation as involving citizens, on the one hand, and government, on the other” [5]. Innes and Booher write:

Participation must be collaborative and it should incorporate not only citizens, but also organized interests, profit-making and non-profit organizations, planners and public administrators in a common framework where all are interacting and influencing

one another and are all acting independently in the world as well. This is not one-way communication from citizens to government or government to citizens. It is a multi-dimensional model where communication, learning and action are joined together and where the polity, interests and citizenry co-evolve. [5]

Public participation can create a new direct link between the public and the decision-makers in a bureaucracy [6]. Dots & Dashes, as a game devised for anyone from lay citizens to transportation professionals, was especially successful in creating an environment where everyone had information to share, and an opportunity to voice their views in a collaborative atmosphere. At Dots & Dashes events, citizens, transit advocates, transit agency officials, and planners sat together at tables to develop recommendations, with equal weight to individuals within groups and also between groups. This granting of equal weight to all viewpoints relates to the concept of collaborative planning, where all participants—public agencies, powerful private interests, and disadvantaged citizens—are treated equally within the discussions [5].

Collaborative planning practices tap into the community networks or “webs” in which people live their lives in order to develop political, social, and intellectual capital among participants [7]. The value derived from this open, shared atmosphere among stakeholders helps planning projects be responsive to community needs and desires and also smooths the overall planning and implementation process.

## The Game Board as Regional Visualization

Visualization techniques to encourage discussion, illustrate ideas, and formulate recommendations are also integral to successful planning processes. Steven Mullen writes that there needs to be a physical or visual component to conduct a successful public process, and that it is critical for participants to be visibly influencing an outcome [8]. Visualization in planning has become an important facet of the planning process, and the most recent federal transportation bill, Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) calls for states and MPOs to employ visualization techniques in their planning process.

In the case of Dots & Dashes, the game board and playing materials enhance the outreach process by illustrating certain information needed for decision-making, such as existing transit lines, geographic places, and commercial centers. As a region-wide exercise, the game board was especially beneficial in opening participants’ perspectives to a larger geographical area, beyond most participants’ communities or work places. It also allows participants to visualize as well as illustrate their recommended transit investments from a bird’s-eye regional context. As part of group dialogue during each exercise, the Dots & Dashes

game board was able to focus participants' discussion by having a readily available "sketch space" that helps participants explain their views or work out ideas. Bringing together the "visual" and the "verbal" allows Dots & Dashes to be an effective regional planning tool for a spectrum of stakeholders.

## Previous Related Exercises

The genesis of Dots & Dashes resided in the desire to generate meaningful public and stakeholder outreach for DVRPC's regional transit planning priorities and long-range plan, and to do so in a manner that would avoid the public hearing/lecture method which had commonly characterized previous efforts. While traditional outreach methods are successful in measuring individual preferences, they are less successful in informing these preferences through dialogue. Two efforts in particular informed the development of Dots & Dashes, and contributed concepts that were incorporated into the Dots & Dashes framework.

### Dollar Game

DVRPC used the "Dollar Game" during the *Destination 2030—The Future in Transit* forum, held in June 2004. In this exercise, roughly 150 local elected officials and decision-makers were shown budgets and descriptions for proposed projects and provided with 5 \$1,000,000 bills to invest in 16 defined transit projects and a 17th "Other" selection. Participants were asked to allocate their bills in million dollar increments as a way of expressing their preferences for transit projects benefiting the region. Regional decision makers could allocate the bills any way they saw fit to the project or projects they believed had the greatest value to the region and that could be publicly supported. In this exercise, 147 participants spent \$733 million on a set of 16 defined corridor-level or system-wide transit projects and an adjunct list of about 10 new projects. The list of "Other" projects reflected valid preferences that did not receive enough support to be prioritized individually. The results were presented to the Destination 2030 project selection committee as an input during the project selection process for DVRPC's Destination 2030 Long-Range Plan.

### Strings and Ribbons

Strings and Ribbons was developed by Dr. Lisa Beever for the Charlotte County, Florida, MPO in 1995 and used for a 2025 long-range plan outreach exercise. The Strings and Ribbons title refers to the materials used by participating groups to identify project preferences on a map during a one-to-three-hour exercise. Groups were supplied with a budget, a menu of cost options (e.g., cost per mile of a four lane highway, cost for a traffic signal, bridge, etc.), and game pieces (colored strings, ribbon, and dots), and were instructed to craft a regional map of transportation investments based on the group's consensus. The crafted maps

were then assessed qualitatively to discern preferences in the transportation networks arrived at by the groups.

### Ties to Dots & Dashes

Like the Dollar Game, Dots & Dashes participants had their choices informed by a menu of project examples (in this case, the projects included in DVRPC's *Destination 2030* long-range plan) and also had the capability of identifying their own project choices from outside the menu. The Strings and Ribbons exercise directly informed the Dots & Dashes process, as it included elements such as cost-constrained game pieces in scale with a map as well as rules encouraging negotiation and consensus-building within participant groups.

Dots & Dashes refined these elements in several ways. First, it was designed from the outset to be usable across the entire range of stakeholder expertise, by including all necessary information and processes within the game itself—outside expertise or lack thereof is consequently not a handicap within group play. To this end, the Dots & Dashes framework balanced reality-derived details with simple accessibility. Each player—whether a transportation professional or a neighborhood grandmother—is given the chance to speak and design and is provided with enough practical information to permit informed choices and encourage informed discussion.

Second, Dots & Dashes was designed as an outreach tool and as an educational tool: the game board, game rules, and introductory presentation inform players of relevant planning principles. The game board, for example, highlighted regional areas with high Transit Scores, a DVRPC and New Jersey Transit-developed method to illustrate transit supportiveness based on population and job densities as well as regionally-significant suburban centers and landmark places [9]. Not only are participants' preferences negotiated, collected, and tabulated, but participants receive an education regarding the constraints and tradeoffs that govern professional planning. Dots & Dashes thus becomes a two-way communication between planners and participants. Within each group, players engage one another in the sorts of debate and prioritization that planners engage in on an ongoing basis, and since every player works within the Dots & Dashes rules, the hierarchy between professionals and lay participants is removed.



## Design and Conduct of Dots & Dashes

The design of the Dots & Dashes game board reflects an effort to balance simplicity and a “blank slate” feel with sufficient information to inform players' decisions and generate constructive discussion. The final Dots & Dashes game board is illustrated in Figure 2-1 and includes elements such as:

- Major roadways and all rail routes for orientation to the existing transportation network.
- Designated employment, shopping, and commercial centers for use as player landmarks.
- Smart Growth Development Centers from DVRPC's *Destination 2030* Long-Range Plan.
- Locations within the top categories of DVRPC's Transit Score shaded in gray to highlight areas with population and job densities that are most supportive of transit [9].
- Dots & Dashes “cost menu” outlining required instructions for players.
- Key illustrating all necessary symbology.
- Logo to specifically brand the board as more than a map and to welcome participants to join in a task that feels significant to them (“piecing together transit’s future”).

The board itself was printed on a heavy plastic-like material rather than paper in order to replicate the more substantial look and feel of a typical board game. In addition, a cohesive branding was created to help market events and generate interest. It also reinforced the notion of playing in a “game world” and by game rules.

The Dots & Dashes game pieces take the form of four types of specifically-printed and colored adhesive stickers (two dots and two dashes), as detailed in Figure 2-2. The dots allow players to place node (or spot) improvements on their game boards, and the dashes are for corridor (or line) improvements. Each game piece has a dollar value on it, which reflects the rough capital cost of the improvements covered by that game piece, inflated to 2030 dollars and in scale with the game board (in the case of dashes, which have per inch/mile costs):

- **Rail dashes** (dark blue, \$500 million per sticker: \$170 million per game board inch [\$67 million per cm] or \$106 million per mile [\$66 million per km]) – Costs were derived from the most recent FTA New Starts Annual Report [10]. In an effort to balance a grounding in reality with simplicity (and ease of play by agency stakeholders and members of the public), costs for rail projects were averaged for all modes of rail. Rail dashes reflect

**Figure 2-1**  
Dots & Dashes  
Game Board





**Figure 2-2**

*Dots & Dashes  
Cost Menu with  
Game Piece Details*


## cost menu

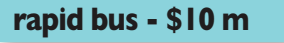
(all costs reflect 2030 dollars)

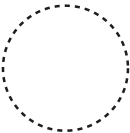
 = \$25 Million: Small dots are for smaller-scale single-place projects. Examples include a new/expanded station or a parking garage, but only one of these things (i.e., if you're proposing a Transportation Center with a garage and station, you should use a big dot).


 = \$100 Million: Big dots are for large-scale single-place projects. Examples include Transportation Centers that might have rail stations, parking garages, and bus facilities at one location.

NOTE: Station costs are included in the cost of each dash – there is no need to add dots on top of your dashes.

 **rail - \$500 m** = \$500 Million (\$170 Million/inch): Rail dashes are for proposed rail lines of any type (i.e., trolley/light rail, commuter/regional rail, or subway). The cost reflects the estimated average cost across all types of rail in 2030 dollars.

 **rapid bus - \$10 m** = \$10 Million (\$3.2 Million/inch): Rapid bus dashes are for proposed express bus or Bus Rapid Transit lines. Such projects would include permanent stations, modern vehicles with superior amenities to the typical bus, relatively frequent service, and other improvements.

 = \$ x 2: Within this circle, which represents roughly a 4-mile radius from Philadelphia City Hall, the regular costs for dots and dashes are doubled to reflect higher land, labor, and other costs in our regional core. **You should factor this cost-doubling in your Game Log.**

 = **DVRPC's Transit Score:** Used to show the places where transit service would be most effective. The gray shaded areas on this map are the locations in the region that have Transit Scores in the top two score categories (medium-high and high). These are the places that could be most supportive of rapid transit service (rail or bus). For more information on DVRPC's Transit Score, email Gregory Krykewycz, Transportation Planner, at [gkrykewycz@dvrpc.org](mailto:gkrykewycz@dvrpc.org).

the average per-mile cost of all rail projects (and exclusive-guideway BRT projects) in FTA's FY2008 Annual Report on New Starts, excluding the Second Avenue Subway and Trans Hudson Express/Access to the Region's Core projects. This includes 13 rail projects and 4 busway projects.

- **Rapid bus dashes** (light blue, \$10 million per sticker: \$3.2 million per game board inch [\$1.26 million per cm] or \$2 million per mile [\$1.24 million per km]) – Costs reflect the average per-mile cost of all in-street Bus Rapid Transit (BRT) oriented projects in FTA's FY2008 Annual Report on New Starts. This includes six BRT projects. Note that the cost per mile is reduced by Los Angeles' combined 120-mile (193 km) length for the extension of its Metro Rapid program.
- **Big dots and small dots** (yellow, \$100 million and \$25 million, respectively) – Costs for dots (node projects) were derived from order of magnitude costs in the most recent Southeastern Pennsylvania Transportation Authority (SEPTA) and New Jersey Transit capital budgets, inflated to 2030 dollars. Having two sizes of dots allows groups to propose two levels of investment. Small dots were intended to be used for smaller-scale, single-purpose projects (a station improvement or parking garage, for example). Big dots were indicated to be used for larger-scale projects combining multiple improvements (a new station and parking garage as part of a Transportation Center, for example).

By aggregating costs for the full spectrum of capital projects into four simple categories, certain projects will have their real-world costs exaggerated, with others being understated. Averaging the cost for all rail modes, for example, typically exaggerates the cost for commuter rail lines but understates the cost of urban heavy rail. However, these cost categories serve their purpose in the context of the exercise—they are reasonable on an order-of-magnitude basis, enabling easy to understand apples-to-apples comparisons within and between participant groups. Similarly, for rail and bus projects, operating and maintenance costs were not considered since accounting for these costs over a multi-decade time horizon would add significant complexity to the conduct of the game without affecting participants' decision making in a useful way (i.e., capital costs alone were sufficient to generate group negotiation under the total budget cap).

Figure 2-2 reflects the full cost menu that was printed on every game board to guide players. This cost menu includes the depiction of a ring around Philadelphia's City Hall, within which groups were instructed to double the costs of any stickers placed (to account for higher land, labor, and other costs such as the fact that proposed projects are more likely to have underground portions). It also includes a short explanation of the shaded Transit Score areas.

## Game Setting and Conduct

Participants are seated in groups of between three and six around a table with budget instructions, a map (game board), an infrastructure menu, calculator,

scratch paper, markers, and the Dots & Dashes playing pieces. It was determined through initial testing that three-person groups were the functional minimum, and that groups larger than six tended to function less smoothly. Participants are randomly assigned to groups in order to ensure a level of negotiation and consensus-building among disparate stakeholders within each group.

At each Dots & Dashes session, players are guided through a presentation that summarizes background (including DVRPC's long-range plan) and introduces the game pieces. Next, groups begin play by deciding how to allocate their spending on system improvements (e.g., fare modernization, greater frequencies, station enhancements) versus network expansion (new rail/BRT corridors, transportation centers, or major station expansions). Figure 2-3 depicts the Group Decision Sheet, which guides groups through this decision. Specific system improvements are identified in writing on the Group Decision Sheet, and the rest of the game is played to identify, distribute, and roughly cost out network expansion projects on the regional game board using the dots and dashes stickers.

Individual participants in each group nominate proposed transit investments, and the group's chosen budget for expansion projects creates a ceiling that forces group negotiation and discussion. The element of negotiation is critical and provides an educational component for the players about the tradeoffs between project costs and benefits. As a result, group project results are moderated by some of the same cost and land use constraints that confront professional planners. One hour is allotted for groups to produce a map.

## DVRPC Game Sessions

Dots & Dashes has been played by numerous stakeholders in a variety of settings. Participants to date have included:

- Representatives of DVRPC's member cities, counties, and transit agencies (including NJ TRANSIT, PATCO, and SEPTA).
- Members of DVRPC's standing Regional Citizens Committee (RCC).
- Members of the public and representatives of other interested stakeholder agencies who participated at DVRPC's central public event, held at the Center City Philadelphia Loews hotel on the evening of November 7, 2007.
- Student sessions (with results being kept separate from the general stakeholder/public results) have been conducted with graduate planning students at the University of Pennsylvania, Temple University, and West Chester University of Pennsylvania.
- Additional exercises continue to be conducted as requested on an ongoing basis, including a recent public session sponsored by the Clean Air Council, a local nonprofit organization.

**Figure 2-3**

*Dots & Dashes Group  
Decision Sheet*

<b>DOTS &amp; DASHES - Group Decision Sheet</b>							
<b>Date:</b> _____	<b>Team Name:</b> _____						
<b>Dots &amp; Dashes Dollars budget to spend <u>between now and 2030</u>: \$5.0 Billion</b>							
<p>1. Decide as a group how much of your budget, if any, you would like to spend on <u>System Improvements</u> (i.e., improvements to the existing transit system). If you choose to invest money in System Improvements, you need <i>at least a billion dollars to make a noticeable difference over 20+ years</i>. Examples include:</p> <table border="0"> <tr> <td>• Modern fare systems, including "smart cards"</td> <td>• Faster or more frequent train and/or bus service</td> </tr> <tr> <td>• Fares that can be used on SEPTA, PATCO, and NJ TRANSIT</td> <td>• Real-time information and better signage (e.g., "next bus/train in X minutes") throughout the system</td> </tr> <tr> <td>• Trains and/or buses with more amenities</td> <td></td> </tr> </table>		• Modern fare systems, including "smart cards"	• Faster or more frequent train and/or bus service	• Fares that can be used on SEPTA, PATCO, and NJ TRANSIT	• Real-time information and better signage (e.g., "next bus/train in X minutes") throughout the system	• Trains and/or buses with more amenities	
• Modern fare systems, including "smart cards"	• Faster or more frequent train and/or bus service						
• Fares that can be used on SEPTA, PATCO, and NJ TRANSIT	• Real-time information and better signage (e.g., "next bus/train in X minutes") throughout the system						
• Trains and/or buses with more amenities							
<b>System Improvements Budget:</b> \$ _____							
<p>2. If your group has chosen to allocate money to System Improvements (Step 1), please list up to three (3) priorities for improvements you'd like to see this money spent on:</p> <ul style="list-style-type: none"> <li>• _____</li> <li>• _____</li> <li>• _____</li> </ul>							
<p>3. The remaining money after System Improvements (Step 1) are subtracted from the initial \$5 Billion is available for System Expansion. This is the Dots &amp; Dashes budget to be spent over 20+ years on transit system expansion projects such as:</p> <ul style="list-style-type: none"> <li>• New rail lines and/or "rapid bus" routes</li> <li>• New transportation centers</li> <li>• New stations and/or parking garages</li> </ul>							
<i>This is your Dots &amp; Dashes System Expansion Budget:</i> \$ _____							
<b>Please carry over this dollar amount to the Game Log on the next page.</b>							

In each of these cases, participants were randomly assigned to groups to ensure a level of negotiation and consensus-building among disparate stakeholders within each group. Participant ZIP codes were collected and indicated that DVRPC was able to attract participants from throughout the region, including representatives from each county. Dots & Dashes is a significant component of public outreach related to DVRPC's long-range planning efforts and, consequently, varied methods were employed to promote the game. The



primary outlet for Dots & Dashes was the previously-noted event in November 2007 in Center City Philadelphia.

To promote this event, postcards were sent to contacts on DVRPC's extensive public participation outreach mailing list, which includes residents, local government officials, businesses, and non-profit & civic organizations. A website, [www.dotsanddashes.org](http://www.dotsanddashes.org), was developed for participants to obtain information about the event. The program was also advertised via DVRPC's various committees, including the Regional Citizens Committee and through "fax blasts" to businesses and organizations in southern New Jersey. In addition, the game was also advertised at several street fairs and conferences throughout the autumn of 2007.

## Aggregation and Analysis of Public Session Results

Each group's Dots & Dashes session resulted in three data outcomes:

- A group preference (as expressed through budget allocation) for system improvements versus network expansion.
- A list of priority projects for system improvement.
- A regional map (and matching project list) with priority network expansion projects located and costed out.

In the first two cases, tabulation of the results is a simple matter of addition and percentages. In the case of dot and dash (node and corridor) projects identified on each group's game board, however, participants had a theoretically infinite number of possibilities for project types and alignments. To identify the projects/corridors with the highest level of participant support, we erred on the side of aggregation. For example, a number of groups proposed some variation of rapid transit in Northeast Philadelphia. Some groups elected to extend the Broad Street Subway, some elected to extend the Market-Frankford Elevated Line, and two proposed BRT routes along similar alignments. Additionally, the terminus for individual proposals often varied. To identify the broad support for some form of rapid transit in Northeast Philadelphia, however, all such proposals were aggregated under the "Northeast Philadelphia Rapid Transit Line" umbrella.

Projects/corridors with both bus/BRT and rail proposals were also aggregated so that the priority of the corridor itself could be identified. Where one mode was identified far more frequently than the other, that mode was assigned to the aggregated project. The Northeast Philadelphia Rapid Transit Line, for example, was assigned a "Rail Line Extension" project type, as rail proposals outnumbered BRT proposals 15-2 for that project/corridor. Consistently aggregating in this way permitted consensus projects to rise to the surface as generally agreed-upon concepts.

SECTION  
**3**

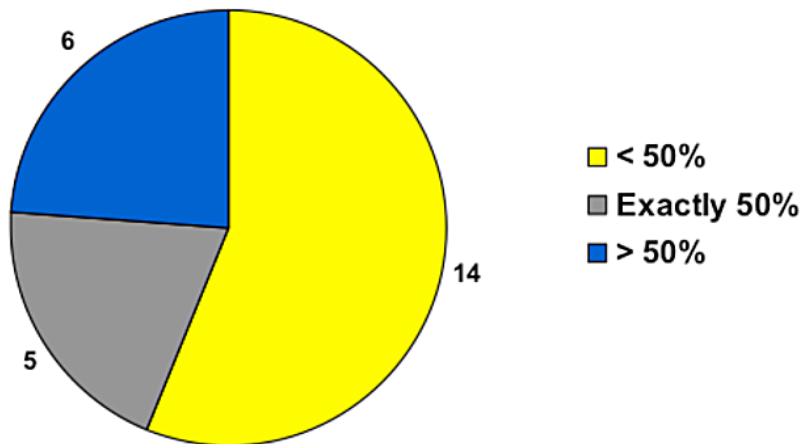
# Dots & Dashes Results Summary

While results were collected from each session and included in a master database, a detailed analysis and summary of results was only conducted for the events up to and including the November 2007 public event. This cut-off ensured that there was a “complete” set of results that could be used to inform DVRPC’s Long-Range Vision for Transit project. This section summarizes these results.

## System Improvements vs. Network Expansion

The first key decision made by each group concerned the portion of their total budget of Dots & Dashes Dollars (\$5 billion) that they wished to spend on improvements to the existing system, with the remaining amount being available for system/network expansion. Results from this simple choice provide a measure of participants’ prioritization of reinvestment versus new investment. Of the 25 Dots & Dashes groups, the mean and median amounts spent on improvements to the existing system were \$2 billion Dots & Dashes Dollars, or 40 percent of the total available budget. Amounts ranged from a low of \$0 to a high of \$3.18 billion. These results are further detailed in Figures 3-1 and 3-2.

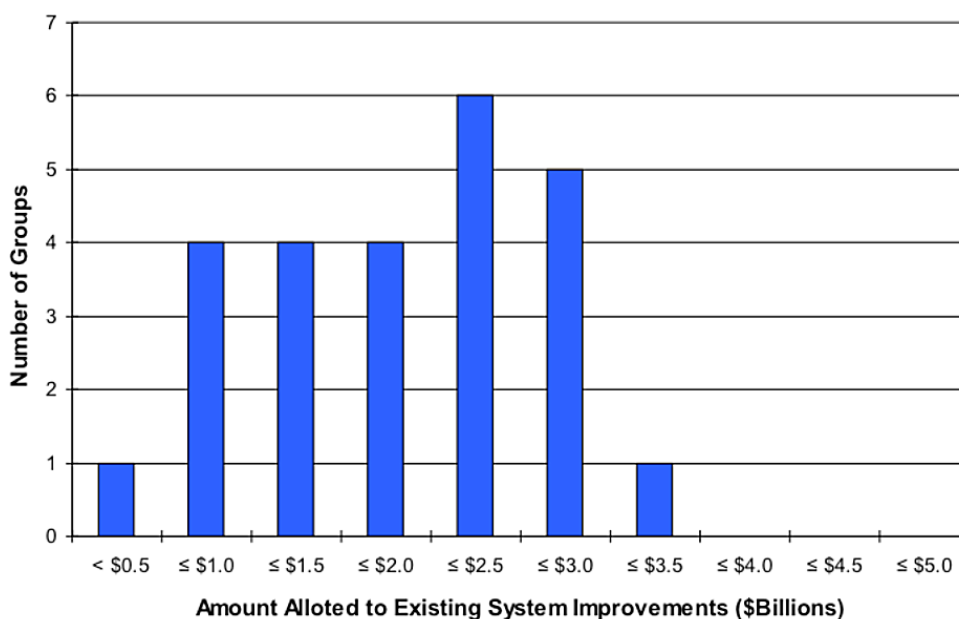
**Figure 3-1**  
*Group Share of Dots & Dashes Budget Spent on Existing System Improvements*



Source: DVRPC Dots & Dashes individual group results, 2007



**Figure 3-2**  
*Specific Amounts Spent  
 by Groups on Existing  
 System Improvements*



Source: DVRPC Dots & Dashes individual group results, 2007

## System Improvement Priorities

Following the division of Dots & Dashes budgets between existing system and network expansion improvements, groups were asked to identify specific improvements to the existing transit system; these decisions were to reflect the changes they'd like to see made using the amount of Dots & Dashes Dollars they had assigned for that purpose. Several examples were provided, without assigning cost values (as detailed in the Group Decision Sheet, Figure 2-3). Groups were then asked to identify up to three separate priorities, without ranking them in priority order. Table 3-1 summarizes the results for this part of the exercise.

These existing system improvement priorities reflect participants' general preferences for investment avenues. Major site-specific investments at a particular station, even if part of the current network, would be identified under the subsequent system expansion category. As these results indicate, fare modernization was the top priority among participants, particularly when combined with the related priority of "cross-system fares," which includes fare interoperability. Also widely identified were higher frequencies and faster service, as well as an improvement in passenger information systems. No other specific improvement was identified by more than one group.

## Network Expansion Priorities

Following the choice of priorities for improvements to the existing transit system, groups spent the remainder of their playing time choosing system or network expansion improvements and placing them on their regional game boards using Dots & Dashes game pieces. Table 3-2 summarizes the number of projects identified by groups for various project categories.

**Table 3-1**

*Existing System Improvements Identified by Dots & Dashes Participants*

Improvement to Existing System	# Dots & Dashes Groups Listing as Priority
Fare modernization	20
Faster/more frequent service	18
Real-time information and better signage	12
Cross-system fares	7
Free service for low income areas	1
Improved cleanliness and safety of stations	1
Infrastructure maintenance	1
More accessible transit for wheelchairs and bikes	1
More environmentally friendly ("clean") vehicles	1
Parking/access and transit-oriented station dev.	1
Trains/buses w/ more amenities	1
Trolley restoration	1
Upgraded stations and rolling stock	1

Source: DVRPC Dots & Dashes individual group results, 2007

**Table 3-2**

*Table 3-2 Types/Frequencies of Network Expansion Identified by Dots & Dashes Participants*

Type of Project	# Proposed by Dots & Dashes Groups
Multimodal transportation center	26
Express bus or BRT route	22
Rail line extension	19
New rail line	10
New station	7
Station improvements	5
New ferry service	2
Rail/BRT (tie)	1
Shuttle service	1

Source: DVRPC Dots & Dashes individual group results, 2007

As this table indicates, “Multimodal transportation center” (a “dot” improvement) was the project-type with the highest number of individual projects proposed by groups. Participants identified more rapid bus routes than rail line investments, although this is reversed when rail extensions are combined with new rail lines. This result reflects a telling preference for rail, as rapid bus routes were significantly less expensive under the Dots & Dashes cost framework. The “Rail/BRT (tie)” category includes one project/corridor for which an equal number of groups proposed rail and BRT.

Table 3-3 summarizes the top 30 expansion projects identified by participants (this includes every project identified by more than one group). Among the projects identified here, there is a clear separation for the top 5 “dash” or corridor projects, along with the top 3 “dot” or node projects. In combination, these projects are the specific consensus capital priorities resulting from Dots & Dashes. In order to showcase a blend of corridor and node projects, these projects were those selected from Dots & Dashes to be emphasized in DVRPC’s Long-Range Vision for Transit, along with system improvement priorities and policy emphases also generated by the Dots & Dashes outreach (note that the final project/priority list in the Long-Range Vision for Transit reflected a pooled consensus from Dots & Dashes, other outreach exercises, stakeholder discussions, and other DVRPC planning projects).

## Participant Responses and Outcomes for DVRPC

To date, Dots & Dashes has been played by more than 150 individual regional stakeholders. Through extensive and aggressive outreach, DVRPC has been able to attract representatives from each county, including individuals who had never before participated in a DVRPC outreach initiative. Through the results obtained to date, Dots & Dashes has fulfilled its principal mission for DVRPC—its aggregated results have helped to prioritize specific transit projects and investment priorities for DVRPC’s 2035 long-range plan, an associated Long-Range Vision for Transit, and other transit planning activities. Dots & Dashes has also become a resource for local planning education—sessions were held for planning students at three local universities (Temple University, West Chester University, and the University of Pennsylvania).

Additionally, participants in DVRPC’s central public event and one subsequent event were asked to complete surveys about their impressions of the experience. In total, 68 completed surveys were collected. These surveys asked two specific questions: whether respondents felt that they gained a

**Table 3-3**

Capital Project Priorities  
Identified by  
Dots & Dashes  
Participants

Project/Corridor	# Groups	Project Type
<i>Dash/Line Projects</i>		
<b>Northeast Philadelphia Rapid Transit Line</b>	<b>17</b>	<b>Rail Line Extension</b>
<b>Broad Street Subway Extension from Pattison Ave to Navy Yard</b>	<b>14</b>	<b>Rail Line Extension</b>
<b>Route 100 NHSL Spur from Hughes Park to King of Prussia</b>	<b>12</b>	<b>Rail Line Extension</b>
<b>PATCO Center City/Delaware Riverfront Expansion</b>	<b>10</b>	<b>Rail Line Extension</b>
<b>PATCO South Jersey Expansion</b>	<b>9</b>	<b>Rail Line Extension</b>
West Chester Pike Busway, 69th Street Terminal to I-476	6	Rapid Bus / BRT
R6 / Route 422 Corridor, Norristown to Wyomissing	6	Rapid Bus / BRT
Riverline Extension from Trenton Station to State Capital	4	Rail Line Extension
US 1 Bus Rapid Transit in Mercer & Somerset Counties	4	Rapid Bus / BRT
R3 Regional Rail Line Extension, Elwyn to Wawa	3	Rail Line Extension
R5 Regional Rail Line Extension, Thorndale to Atglen	3	Rail Line Extension
Cross County Metro, Thorndale to Trenton	3	Rapid Bus / BRT
R3 Regional Rail Line Extension, Wawa to West Chester	3	Rail Line Extension
Northeast Corridor (Amtrak) reroute via PHL airport	3	New Rail Line
RiverLINE extension, Camden to Gloucester City	2	Rail Line Extension
R5 Regional Rail Line Extension, Lansdale to Perkasio	2	Rail Line Extension
West Trenton to Trenton Connector	2	Rail / BRT (tie)
Double-tracking of Atlantic City Rail Line, where feasible	2	Other
Morrisville Station (Bucks County, R7)	2	New Station
City Branch Line / Historic Trolley from Penn's Landing to 52nd St	2	New Rail Line
South Philadelphia to Gloucester County Rail Line, Sports Complex/Navy Yard to Gloucester County	2	New Rail Line
Delaware River Ferry, Navy Yard to Gloucester County	2	New Ferry Service
Extension of Route 36 Trolley/Eastwick Multimodal Transportation Center	2	Extension/Multimodal
<i>Dot/Node Projects</i>		
<b>North Philadelphia Station/Transportation Center</b>	<b>5</b>	<b>Multimodal Transportation Center</b>
<b>Pennsauken Transportation Center (Connecting RiverLINE &amp; Atlantic City Rail Line)</b>	<b>5</b>	<b>Multimodal Transportation Center</b>
<b>Paoli Transportation Center</b>	<b>4</b>	<b>Multimodal Transportation Center</b>
Chester Rail Station Expansion	2	Multimodal Transportation Center
Consolidation of R5/Rt 100 Radnor Stations	2	Multimodal Transportation Center
Morrisville Station (Bucks County, R7)	2	New Station
Station improvements at Exton	2	Station Improvements
Transportation Center at Wayne Junction	2	Multimodal Transportation Center

Source: DVRPC Dots & Dashes individual group results, 2007

better understanding of transit planning, and whether they gained a better understanding project negotiation and regional considerations. On both questions, nearly 90 percent of respondents answered in the affirmative.

Respondents were also given an opportunity in the survey to provide feedback, and a variety of comments were received related to the information presented in the game, the conduct of the game, and the value of the exercise as it relates to DVRPC's public involvement goals. Several respondents noted the challenge of negotiating the trade-offs intrinsic to the regional transit planning process. One respondent noted that additional background information would have been helpful, such as socioeconomic data and information on the performance of comparable existing transit lines. Three participants challenged details concerning the costs for the Dots & Dashes game pieces, arguing that certain costs were inflated or lower than expected.

Multiple participants, likely those who were less familiar with the public transit planning process, also recommended a higher degree of facilitation by DVRPC staff at each individual group table, and a handful of survey respondents noted that additional up-front information regarding trade-offs and regional issues would have been helpful to their decision-making. This comment reinforces that for an outreach process such as Dots & Dashes that is intended to be usable by a fully lay audience, more supportive information will always be desired by some participants to inform their decisions. As an educational exercise, it can be helpful to have a more personalized interaction between planners and participants. At the same time, a few survey respondents acknowledged that the hands-on nature of physically placing the dots and dashes on the map helped them comprehend the exercise and subject matter in a way that would not have occurred via discussion or other methods.

In general, the participant survey results reinforced the tradeoffs considered for each of the key decisions concerning the exercise's conduct (e.g., more participant independence with less facilitation and technical guidance versus more direct planner involvement, or more project cost and design detail at the expense of the exercise taking longer to complete and potentially being more confusing for lay participants). Dots & Dashes was somewhat unique for DVRPC outreach in the greatly varying levels of knowledge among its intended audience. The target audience will continue to play a key role in DVRPC outreach design decisions for similar events in the future.

## Future Directions and Applications for Other Regions

Dots & Dashes was designed to be transferable for application in other cities and regions. In the simplest terms, planners interested in replicating the exercise need only adjust the scales of the game board and game pieces

to match their local area. Additionally, costs must be scaled as necessary to account for different time horizons or local project costs.

The framework of Dots & Dashes is flexible enough that local planners may consider further adapting the game for local preferences. For example, planners might consider an all-bus or all-rail Dots & Dashes, with costs being broken out for different types of bus or rail service. Dots & Dashes could also be used at a street-level scale to assess rider preferences for new local bus routes. In these cases, it might make sense for game piece costs to reflect operating costs to a greater extent.

The key ingredients for a working game are a budget cap for each participant group that is low enough to force negotiation and consensus-building (planners may choose to use a known actual budget if appropriate) and a menu of project or investment costs that conform to reality (in order to educate stakeholders about real-world costs and tradeoffs) as well as the self-contained cost framework of the game world. These simple requirements mean that Dots & Dashes could be adapted for use in road and highway planning, or even in land use planning to assess stakeholder priorities for development locations or land preservation. In the case of land use planning, budgets and costs could be expressed in terms of per-acre land values, utility or infrastructure carrying capacities, or even school children.

However, in adapting Dots & Dashes or similar exercises to their own purposes, planners should be careful to balance complexity with playability. The exercise should be detailed enough (and sufficiently grounded in reality) to educate players on real-world tradeoffs and the planning process, but simple enough to be understood by lay participants and completed in a reasonable amount of time.

## Conclusion

Dots & Dashes successfully fulfilled its original objectives in providing meaningful outreach for DVRPC's long-range planning for transit. It condenses (at least conceptually) much of the transportation planning process so that it becomes possible for a lay audience in about an hour to engage in planners' decision making. As a result of Dots & Dashes, planners are informed of participants' priorities for investments, and participants leave more informed of the difficult tradeoffs that govern decision making.

Additionally, this unique method of public outreach also introduced DVRPC's profile and mission to a new audience, individuals who may not have fully known of DVRPC's role in regional and transportation planning. As a result, new interest has been generated in DVRPC's other public outreach programs, such as the standing Regional Citizens Committee (RCC).

Finally, through a permanent Web presence (<http://www.dotsanddashes.org>) that details Dots & Dashes' background, development, and results, it fulfills the central mission of the PTP pilot grant program: it is replicable by planners in other regions.

# References

- [1] Neuman, Michael. 1998. Does Planning Need the Plan? *Journal of the American Planning Association* 64, 208-220.
- [2] Brody, Samuel D., David R. Godschalk, and Raymond J. Burby. 2003. Mandating Citizen Participation in Plan Making: Six Strategic Choices. *Journal of the American Planning Association* 69, 245-264.
- [3] Muhlberger, Peter. 2007. Pro-social Reasoning in Deliberative Policy Choices. *International Journal of Public Participation* 1(1).
- [4] Innes, Judith E. 1998. Information in Communicative Planning. *Journal of the American Planning Association* 64, 56-63.
- [5] Innes, Judith E., and David E. Booher. 2004. Reframing Public Participation Strategies for the 21st Century. *Planning Theory & Practice* 5(4), 419-436.
- [6] Creighton, James L. 2005. *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement*. John Wiley & Sons Inc., San Francisco.
- [7] Healey, Patsy. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*. University of British Columbia Press, Vancouver.
- [8] Mullen, Steven B. 2006. Community Visualization: the Key to Democratic Urban Planning. *Geo World*, November.
- [9] Lutin, Jerome M., Gregory R. Krykewycz, Joseph F. Hacker, and Thomas W. Marchwinski. 2008. Transit Score: A Screening Model for Evaluating Community Suitability for Transit Investments. *Transportation Research Record* 2063, 115-124.
- [10] Federal Transit Administration. 2007. FTA Annual Report on Funding Recommendations: Proposed Allocations of Funds for Fiscal Year 2008—New Starts, Small Starts, Alternative Transportation in Parks and Public Lands. Pursuant to Title 49, United States Code, Section 5309(k)(1).





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