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THE TRAIL MODELING AND ASSESSMENT PLATFORM (T-MAP)

EMPOWERING ADVOCATES AND DECISION-MAKERS TO CREATE HEALTHIER PLACES FOR HEALTHIER PEOPLE

A Game-Changer: Taking Trail Development to an Entirely New Level

When Rails-to-Trails Conservancy (RTC) opened its doors in 1986, there were about 250 miles of open rail-trail in America. In our early years, we primarily focused on building individual trails in rural areas for purpose of preserving corridors and creating recreational opportunities.

Today, there are more than 21,000 miles of rail-trail in rural, suburban and urban communities that is used by tens of millions of Americans every year for walking, running, skating and biking. In addition to recreation, our trails produce multiple benefits by increasing mobility, catalyzing economic development and improving public health by providing access to safe places to lead an active lifestyle.

We are now on the verge of linking these thousands of miles of trail into seamless networks connecting people and destinations in communities across America. When fully realized, the many benefits produced by this vision can best be summarized as creating *healthier places for healthier people* by knitting together trail systems that improve the economic, social and environmental health of a place and the personal health of its people.

To some, this vision may seem utopian. But we are confident that it is well within reach. This confidence arises from the fact that over the last 20 years America has invested billions of dollars in creating trails in communities across America. The vast majority of these individual trails are well loved and heavily used. But their full societal benefit has not yet been realized because they were not originally conceived as elements of larger trail systems that facilitate active transportation. As a result, these trails were not systematically designed to maximize their multiple benefits.

And therein lies an extraordinary opportunity. We find ourselves at a “tipping point” when relatively small investments to improve the connectivity of trail infrastructure promise to produce outsized returns because we will be fully realizing the benefits of past investment. With 21,000 miles of rail-trail already on the ground, we are excited by the opportunity to greatly increase use – and thereby realize greater benefit –by systematically closing gaps and improving connections among existing trails and therefore creating trail systems that better connect people and destinations.

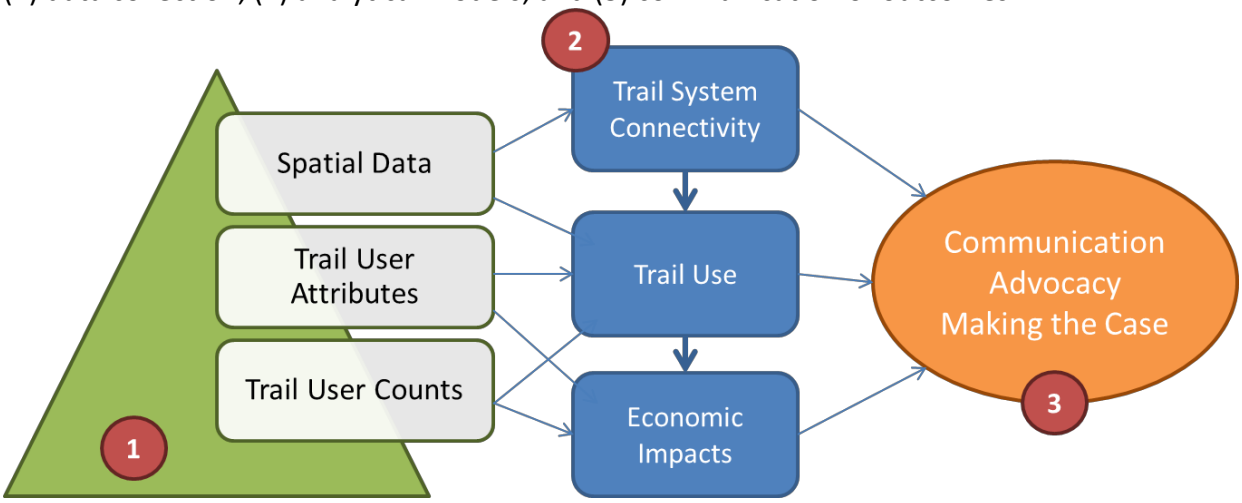
(It should also be emphasized that the opportunity to achieve high rates of return with relatively modest public investment is also consistent with current limits on public infrastructure budgets. At a time of severe fiscal constraint, investments of a much smaller magnitude than traditional highway projects – but with a much higher rate of return – offer the opportunity to do a lot more with a lot less. These systems could be created with as little as three cents of every federal surface transportation dollar.)

While we are confident of the large returns on investment from creating such trail systems, we are aware that some transportation decision makers are skeptical of such claims. Departments of transportation, in particular -- and their traditional supporters in legislative bodies – give considerable credence to quantitative methods for planning and prioritizing transportation investments. Such forecasting tools have been used in the highway planning process for decades, but have only recently begun to be developed for trail, bicycle and pedestrian investment. As a result, road projects are defined as *needs*, while trail projects are often considered *amenities*.

Therefore, **the purpose of this proposal is to request funding of $1.2 million over three years for the creation of a cutting-edge innovation: a Trail Modeling and Assessment Platform (T-MAP).** Building on years of experience in on-the-ground trail work, this proposal will develop a project planning, data collection, and impact assessment platform suitable for application to individual trails and trail systems, designed from Day One for versatile, flexible adaptation to accommodate local needs. This platform will empower trail advocates and local decision-makers by providing them with the analytical capacity to forecast the impact of investments in creating trail systems. The platform framework is structured around the goal of making the case that such investment is cost-effective. Systematic assessments will also optimize investments across competing projects to yield the greatest possible return on the investment of scarce public resources.

Components of the Platform

The framework presented in the figure below illustrates the three components of the platform: (1) data collection; (2) analytical models; and (3) communication of outcomes.



This organizing framework provides a vision for coordinating existing efforts within and external to RTC supporting trail development and advocacy. It is based on our assessment of the current state of trail-related research and methods, policy advocacy, trail development and promotion. There is growing demand for more data and evidence-based decision-making in all of these arenas. This platform is designed to meet that demand. The components within the platform can be applied in sequence or individually. Platform deliverables include standardized and simple data collection tools, robust and validated analytical models, and clean, clear communications products all designed to empower local elected officials, planners and trail advocates to make the case for trail investment.

RTC will create an advisory committee to oversee this project comprised of leading transportation researchers at academic institutions and from the community of practice to ensure that each platform component is both accurate and credible. (Technical changes to this proposal could result due to the advisory committee review.) In addition, the platform development team will include RTC staff and both academic and professional partners.

A data-driven, quantitative, persuasive platform for trail investment will be **a game-changer that will take our movement to an entirely new level of effectiveness and sophistication**, permitting us to take advantage of the extraordinary opportunity to realize the full benefits of 20 years of trail investment. As a toolkit, the component products within the platform will be an indispensable resource to both RTC staff in our fieldwork and a resource to support and empower our partners, other advocates, and planners at large. Our vision for T-MAP is to provide 21st century tools for the trails community and synchronize research and practice-based efforts to advance trails and trail systems. By implementing this platform, we can make this vision real – bringing T-MAP within the capacity and budget of every community organization or government agency with jurisdiction over trails.

Models: The Platform Core

At the core of the platform is a suite of general analytical models that can be used independently for a specific purpose or in concert, depending upon the needs of a community. The following lists potential models in this series:

1. "Trail Score:" Measuring Trail System Connectivity

At present, RTC has the capacity to measure trail *proximity*. Using Census data, we can determine how many people live within a given distance of any trail in our data base. But we have no capacity to gauge the *connectivity* of a trail system. In other words, we currently lack the methodology to precisely measure the extent to which a trail system effectively connects people in proximity to the destinations to which they might travel. There is a critical need for such a methodology, as we cannot implement trail projects on a performance basis or evaluate trail systems based on important goals like equity without measurement tools.

To develop this tool, RTC will create an algorithm to model the extent to which any trail system effectively connects "origins and destinations." This algorithm will calculate one "Trail Score" for the entirety of an existing trail system. The algorithm will be derived in close consideration

of state-of-the art research on connectivity of urban bicycling and pedestrian networks. This tool could be used for making three different kinds of comparisons.

First, RTC, working with local partners, could use this tool for a gap analysis of existing trail systems to identify most critical gap closures or to measure the impact of competing investments to improve connectivity. For example, an existing trail system could have a Trail Score of 50. If one gap in the system is closed, the Trail Score might increase to 54. If a competing investment were made, the Trail Score might increase to 56. This tool will permit planners to compare the costs of competing investments to determine which ones will most cost-effectively improve the connectivity of a trail system by connecting more people to more destinations per dollar spent.

Second, the same tool could also be applied to specific types of connectivity – for example, if it is a priority for a community to connect low-income households with children. Such a tool enables planners to evaluate trail systems and plans for their equity or other impacts. This would allow planners, funders, and communities to set specific goals for their trail systems and then measure progress towards those goals. The same tool could also be applied at multiple spatial scales to evaluate different aspects of connectivity at both the regional and neighborhood levels.

Third, calculating Trail Scores for multiple communities using a common set of destinations could create the opportunity for places to benchmark the quality of their trail system to those in other communities. Such a score could raise awareness of the importance of trail system connectivity while fueling local support for actions to improve its Trail Score.

This methodology hinges on correctly identifying important destinations for trail users. RTC will use a combination of trail expertise accumulated through 27 years of partnering with communities to achieve their trail goals and original data collected directly through trail user surveys to establish the benchmark destination types that determine a Trail Score. Such destinations could include major employers, schools, parks, transit stops and grocery stores.

2. Trail Travel Forecaster

In traditional transportation planning, it is standard procedure to use a model to estimate the impacts of any given investment on future travel behavior. But there is no such model for trail investment. Thousands of miles of trail have been built without any hard data about expected use or performance. The general principle of “if we build it, they will come” has generally proven to be true. But because hard data on anticipated use doesn’t exist, it is much harder for trail advocates to make the case for the trail project by pointing out the economic benefits that will accrue to a community from trail investment.

To create such a model, RTC will use automated continuous travel counters to simultaneously conduct “trail counts” on 18 trails in 9 climatic regions of the country in cities of 200,000 people and greater. Based upon a 12 month period of count data and additional data on land use, topography, climate and socio-demographic factors of the neighboring population, RTC will

develop a model that can estimate future trail use for urban trails from any investment in new trail capacity. The model will also be able to factor shorter counts of trail use on existing trails to produce estimates of total annual trail use.

3. Health Savings Calculator
Increased trail use from investments in trail infrastructure that increase trail system connectivity will result in more residents in proximity of a trail system meeting the Surgeon General's recommendations for physical activity. Such changes in personal behavior lead to significant health benefits, which lead to savings in health care costs associated with a sedentary life style. Research on health impact assessment of active transportation has made great progress in recent years. The beneficial effects of physical activity are well established. Existing models assess usage of active transportation for its impacts on overall mortality and outcomes like cardiovascular disease, Type 2 diabetes, and cancer, among others. In collaboration with researchers in this area these existing methodologies will be adapted to assess health impacts of trail usage.

RTC will create an online calculator quantifying in dollars the health impact of trail use through avoided health care expenditures associated with a list of physical activity-related morbidities. The calculator will derive figures of avoided cases (mortality and selected morbidities) due to physical activity from trail use, and calculate per-case health care costs derived from reviews of the literature.

4. Transportation Calculator
It is particularly useful to quantify tradeoffs internal to the transportation sector related to mode choice. In *Active Transportation for America*, RTC explored the economic impacts related to reduced driving under alternative hypothetical mode shift scenarios. The distinction of trips for sheer leisure and trips for "transportation purposes" is a crucial factor impacting assessments of transportation benefits (i.e. reduced emissions or effects on congestion). The logical next step for this work is to apply the methodology to real trips. We will explore the potential of a trail user survey to capture the distribution of trip purposes among trail users to estimate the percentage of trail trips that may substitute for trips with a motor vehicle. These trip distances can then be combined with unit price estimates for various costs associated with driving to extrapolate additional economic impacts of trail use, including:

- Gasoline consumption
- Greenhouse gas emissions
- Road wear-and-tear

Data Collection: The Platform Foundation

At the heart of data-driven decision-making is the never-ending need for more and better data. The table below enumerates the separate data requirements of each potential model within the platform. There are three types of data included in the table: GIS data, trail user count data, and user survey data. There is considerable synergy between the data requirements of the various models within the platform. By building the models in tandem as a platform, we can

combine and share the high fixed-costs of data collection in one effort for all of the models, allowing us to leverage multiple products from a single endeavor. This coordination and aligning of priorities, resources, and expertise is a natural role for RTC, in order to catalyze research that advances the trail-building movement.

The table below outlines the data required to initially construct the models, followed by the data required for each and any application of the model.

	Construction Data Reqs.			Application Data Reqs.		
Model	GIS	Survey	Count	GIS	Survey	Count
Trail Connectivity Metric		Trip purpose information from trail users to determine most relevant origins and destinations of network users		Topographically correct GIS network data for street and trail networks will always be required for local application		
Trail Use/Trail Demand	Trail characteristics for each trail in the study		A nationally representative sample of 24 hour, seven days a week, year-long counts of bicyclists and pedestrians	Trail characteristics		Optional local calibration with additional count data
Health Savings	Model construction is based on existing secondary data				Demographic data about trail users, including age and gender; average trip length	Count or count estimate required
Real Estate				Local parcel data		
Transportation				Trail characteristics	Average trip length	Optional local calibration with additional count data

Every model has data collection requirements in order to be applied locally. These data calibrate the general models of the toolbox to the local context, providing a necessary boost to validity. Therefore, the platform includes a set of data collection instruments that will set a next-generation standard for active transportation research. Traillink.com is already the only national source for GIS data about trails, and this research project will expand that database even further in the study area communities. For field data collection, we will create a tablet- and mobile-based platform for collecting manual counts and user surveys. These tools will enable other communities to efficiently collect the necessary local data to apply the models in the toolbox.

Key features of this data collection platform will be:

- All data collection will occur electronically, inverting the traditional cost structure of paper-based approaches.
- An online database where all data collected in any location through the toolkit is archived for research purposes and publicly accessible, subject to data use agreement.
- Leveraged on existing open-source applications to minimize development costs and duplication of existing tools.
- Interface for developing custom survey forms based on required core templates, allowing users to adapt basic trail survey research tools to local needs.
- Tablet-based data collection on GPS-enabled devices will support the “smart” collection and archiving of new media, such as photos – automatic geocoding and time-stamping of all data and media to ensure that every piece of data is traceable to a specific time and place.

Additional Context: RTC's Geospatial Data Base

In 2004, the RTC board of directors adopted an ambitious goal: By 2020, 90 percent of Americans will live within three miles of a trail system. In the course of debating this goal, we determined that there was no data in the public domain that would permit us to benchmark our progress toward achieving the goal. Therefore, we decided that it would be necessary for RTC to map all open rail-trails to create such a benchmark.

As a result, RTC has now amassed a geospatial data base that includes more than 24,000 miles of trail maps, including both rail-trails and other multi-purpose trails. Not only has this data base permitted us to track progress toward our goal, it has been the basis of RTC's highly successful trail finder web site, TrailLink.com, which was visited by more than 3.5 million trail users in 2012.

This same data base will serve as the basic platform for a powerful new tool to use in the trail building process. By creating a geospatial map for a place that includes open trails, trails under development, rail and utility corridors -- embedded with local destinations and demographic data -- it becomes possible to identify the gaps that can be filled and to identify options for connecting two trails that do not yet connect.

Not only is there a great need to create a Trail Modeling and Assessment Platform, but due to our previous investment in creating a geospatial trails data base that exists nowhere else, RTC is uniquely qualified to do it.

Communication: The Platform Hook

There are many tools, calculators, and models for impact assessment already available at varying levels of sophistication and adaptability to trails. A critical distinction between T-MAP and prior efforts is RTC's core understanding of the importance of storytelling and communication in order to reach key audiences. While the foundation of T-MAP is data, and the core is sophisticated modeling, the usefulness and reach of the platform can only be maximized through the seamless inclusion of communications tools and products for understanding, explaining, and persuading. Each platform component will include a semi-standard report format and presentation outline to help communities convert model output into tables, graphs, and factsheets. The platform interface will give users the option to feed quantitative results automatically into this communications module, accompanied by explanatory text. This is a critical step in bringing T-MAP within the budget and capacity of most potential users. From our field experience, we know that users of models can benefit from additional guidance on how to put numerical output to work in making the case for trails. This will also help ensure that model results will be communicated and interpreted correctly.

The Beta Phase

The first two years of this project will be devoted to data collection and the creation of the modeling and assessment tools. Year Three will provide the opportunity for Rails-to-Trails

Conservancy to gain operational experience in using the Trail Modeling and Assessment platform with trail building partners in places across the country.

For example, RTC analysis of our geospatial data base reveals that seven metropolitan statistical areas (MSAs) have already achieved RTC's goal that 90 percent of their residents live within three miles of a trail system. These are places in which a great deal of public investment has already been made in creating trail systems. They provide an excellent laboratory for testing the value of the new tools in measuring the connectivity and analyzing gaps in current trail systems. During the data collection phase RTC will identify four regions to focus on beta testing the platform before making it publically available.

Conclusion

Upon completion, the Trail Assessment and Modeling Platform will be available for use in two basic ways. First, some of the tools – such as the Trail Travel Forecaster and Health Savings Calculator -- will be available on railstotrails.org for use by RTC partners to analyze the impacts of local trail projects. These tools will be supplemented by communications tools to help them to effectively make the economic case for increased trail investment in their communities.

Second, the entire suite of tools, coupled with RTC's geospatial data base and decades of trail building experience, will create the capacity within RTC to work in partnership with local advocates and decision makers to conduct the economic analysis necessary to make the case for significant public investment in regional trail systems. This work will prioritize making connections and filling gaps to greatly increase trail use in communities that have enjoyed significant trail investment in recent decades.

Regardless of which way the platform is used, it will be a game changer. For the first time, the trail movement will have access to sophisticated analytical tools similar to those that have traditionally been used in the development of road projects. The Trail Assessment and Modeling Platform will empower our movement with a powerful suite of tools that will permit us to demonstrate convincingly how trail investment can create healthier places for healthier people.