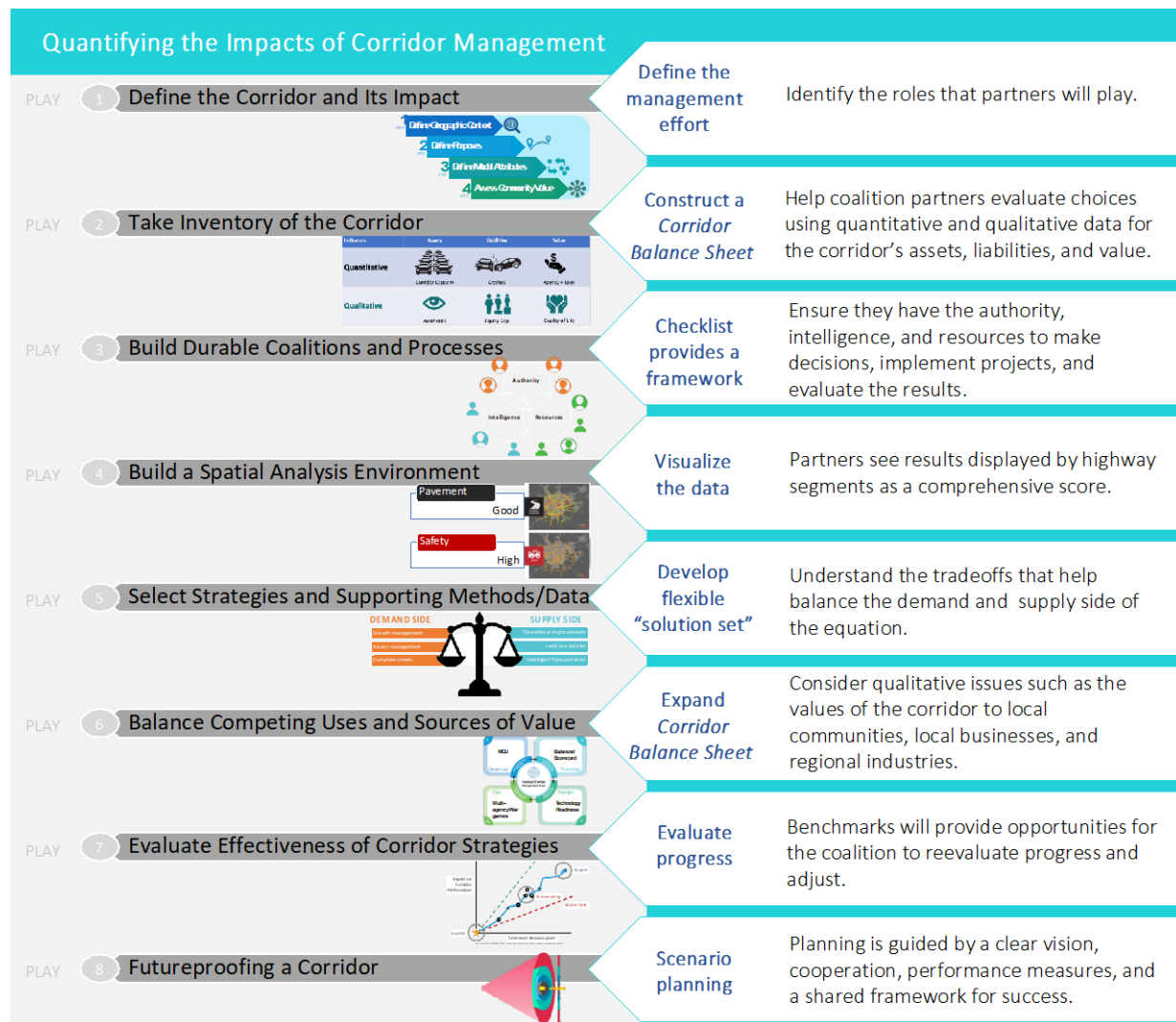


Executive Summary:

Transportation Corridors are defined by the infrastructure, services, and relationships connecting places. A corridor can be a national resource connecting large cities, a regional passage connecting a state’s trade centers, or local pathways connecting through a city or town. The NCHRP Playbook on Quantifying the Impacts of Corridor Management is for professionals and groups seeking to have a quantifiable impact on how corridors perform for states, communities, neighborhoods, businesses, and people. A “play” is a practical approach to a key aspect of implementing corridor management. Plays are offered for understanding how specific corridor management efforts should be defined and approached, what it means to manage a corridor, and how to manage different types of corridors for intended impacts.

The eight plays from the playbook are summarized in Figure ES - 1:

Figure ES - 1 Summary of 8 Plays



A key to effectively managing a corridor for impact is knowing the types of players involved and their roles. If a state agency attempts to manage a corridor only to achieve statewide performance targets based on its authority and ownership of the infrastructure, it may miss out on key opportunities to create value in local economies or support a local tax base. If a stakeholder coalition attempts to manage a local main street solely to enhance community quality of life it may encounter unintended impacts related to safety or mobility challenges or have effects on other communities who rely on reliable passage through the area. Success requires knowing who the players are, their unique opportunities for impact, and how to engage them. For this reason, practical plays are needed to identify the players in a corridor strategy, and adeptly manage their unique impact potential.

Coalitions and partnerships have long been understood as essential to corridor management. NCHRP Synthesis 337 (2004) describes how memoranda of understanding, joint powers agreements, and other arrangements can formalize a corridor coalition.¹ However, a durable coalition requires more than simply an agreement to participate in a corridor. Successful corridor managers follow programmatic steps to identifying coalition partners over time, keeping a coalition current, and tracking corridor management outcomes to demonstrate intended payoffs for coalition partners. Practical plays on building and sustaining durable coalitions focused on performance is a recommended feature for impact-based corridor management.

The strategies both for managing corridors and demonstrating the impact of corridor management grow from knowing the corridor's players, assets, liabilities, and intended impacts. Successful corridor management pinpoints strategies based on a holistic understanding of who the current and intended users are, the desired impacts of the management effort, and how those factors may change over time. A play on selecting management strategies with a firm grasp of how the impact is envisioned, measured, and evaluated is a key feature of effective management. Keeping Score: Benchmarks, methods, and techniques Historically, corridor management has often centered around a singular "corridor study" undertaken to develop objectives and strategies and updated periodically. However, what are managers to do if the world changes before a corridor study is updated? What if the study is never updated? Are there ways for corridor managers to track how the world changes around them and adjust their coalitions and management strategies in real-time? A play for practical uses of benchmarking and techniques for navigating a changing corridor environment is a vital feature of a corridor management strategy. It's about adapting for the future: Sustaining management regime/effort Can a corridor management regime be "future-proof"? Are there ways to identify and track if a corridor has a "personality type" and how a corridor's economic, demographic, or physical "personality" changes over time? How do emerging opportunities in areas such as big-data or machine learning present opportunities for corridor management regimes to function as livinglearning systems? A play for future-proofing the practice of corridor management, establishing a learning-corridor research roadmap can set the groundwork for a new future in corridor management.

¹ Kristine M. Williams. NCHRP Synthesis 337: Cooperative Agreements for Corridor Management (Washington D.C.: Transportation Research Board of the National Academies, 2004), <https://www.nap.edu/read/23332/chapter/1#v>

PLAY 1 | Defining a Corridor for Managing Impacts

Defining Corridors as End-to-End Connections: Connecting Resources and Markets: When defining a corridor management effort, it is helpful to define the corridor in terms of end-to-end connections, instead of facilities. It can often be helpful to identify resources and markets to be connected and find corridor termini representing where the underlying markets are located. In this way, a corridor may not have only two termini but maybe a fork, or a system connecting multiple nodes.

Defining the Scope and Role of a Corridor In

Context: Because corridors are part of much larger networks, any corridor management effort will only be managing one part of the corridor’s identity. When defining the scope of a corridor management effort, it is important to first consider the larger system of which your corridor is a part. Understanding corridors as nested systems (APP 3.3) can be a helpful way of identifying other agencies and groups that may be managing the same corridor, but at a different level or in a different context.

Considerations for Defining Corridors

- ✓ Identify communities/stakeholders that are within a same-day travel radius of the corridor’s termini.
- ✓ Check with DOT, Municipalities to see if other coalitions or management efforts exist
- ✓ Identify user-groups who may use the corridor for (1) commerce, (2) recreation, (3) exercise, (4) business location or (5) other uses.

Selecting Characteristics to Define a Corridor Management Regime

Framework for a Corridor Management Regime: Because corridors are complex, it can be difficult to understand which performance measures, data sources, impact methods, or stakeholders are relevant for managing impact. There is a wide range of methodologies, performance indicators, and data sources that can inform a corridor management process if managers have a clear understanding of corridor management

objectives. A principal challenge of defining a corridor management effort entail establishing corridor objectives specific enough to suggest a manageable set of performance indicators. Figure ES-2 demonstrates an overarching process for managing corridors, in which the umbrella represents a starting point for recognizing where the corridor fits into the overall larger system of transportation

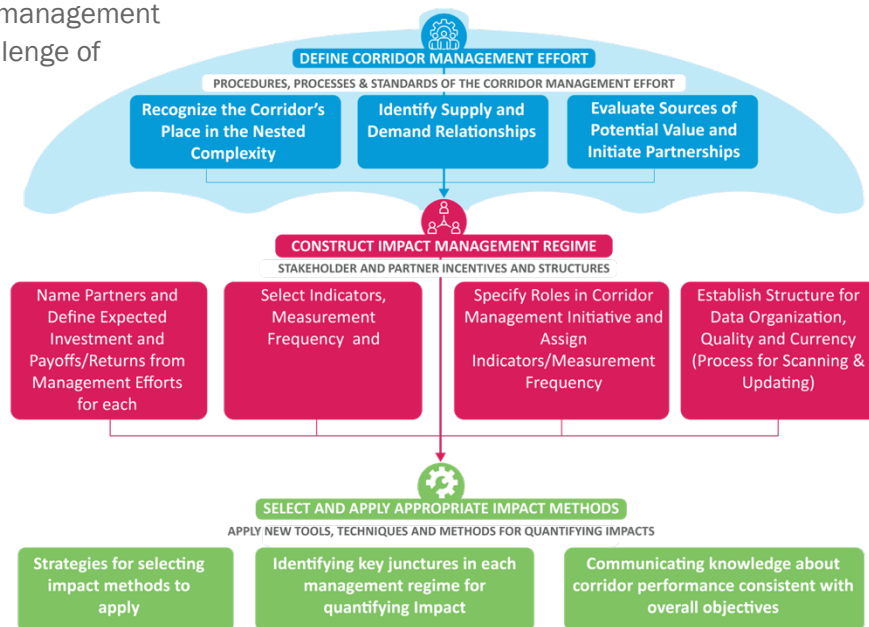
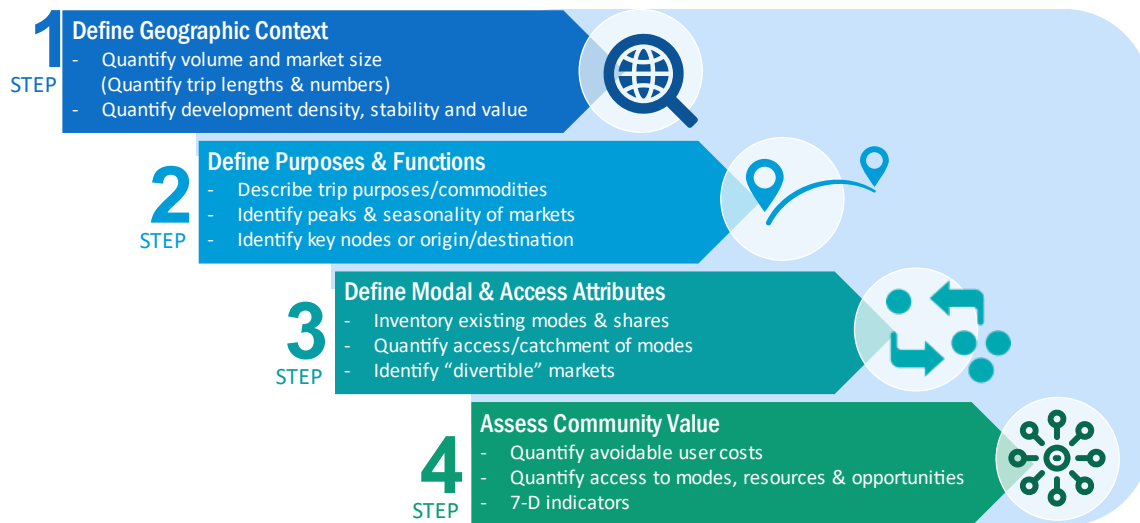


Figure ES - 2 Framework for Defining Corridors through Selecting Indicators

markets, considering both the infrastructure (supply) as well as changing market (demand) aspects of the context. The red boxes suggest steps for establishing a management regime, such that specific tools, data, and methods (shown in the green boxes) can be pinpointed best suited to the expectations and motivations of corridor management partners.

Programmatic Steps for Defining a Corridor and Its Impact: For this reason, it can be helpful to begin with some basic facts about a corridor in the scoping and definition process. For example, simply by considering factors such as (1) the geographic context and area-types connected by a corridor, (2) the types of trips, commodities, or freight movements of interest, (3) available (or desired) modes of transportation, and (4) characteristics of affected communities interfacing with the corridor; it is possible to significantly narrow down the menu of relevant data, methods, performance indicators and stakeholders for defining a corridor impact management regime. Figure ES-3 offers a step-wise process for “orienting” a corridor to its context in such a way that can enable managers to select which data, methods, tools, and partners will best serve a corridor management initiative.

Figure ES - 3 Programmatic Steps for Orienting a Corridor Program



It is important not to limit the definition of a corridor to its existing needs and characteristics. When considering a corridor’s typology, it is helpful to apply the steps and methods of this play not only in terms of existing characteristics, but future desired or needed characteristics. For example, even if a corridor today does not include multiple passenger or freight modes or does not traverse dense suburban or urban areas it may be wise to include these characteristics in the corridor definition when stakeholders view such changes on the horizon. Defining corridors in aspirational terms is of particular importance when land development is transforming the area surrounding a corridor. Understanding how changes in development density, access density, and available right-of-way affect future performance needs is vital to defining a corridor.

PLAY 2 | Taking Inventory of a Corridor

Corridors are often defined by their geography, stakeholders, assets, and liabilities. However, a corridor's assets go far beyond available right-of-way and the improvements to the land (pavements and structures). Likewise, liabilities may go beyond physical or functional obsolescence. Successful corridor management includes consideration of high-value locations and economic assets (natural resources, universities, international gateways, or concentrations of skilled workers). An inventory includes considering liabilities such as poverty, political instability, or scarce funding availability (both public and private equity investments). It is also important for corridor managers to understand corridor liabilities and pain points and missing assets.

Defining a Market Area: To inventory corridor assets and liabilities, it is essential to define the universe of space, infrastructure, and economic activity that are considered to be part of the corridor. Defining the market or influence area of a corridor is as much a qualitative as a quantitative process that defies a purely rational approach. Figure ES-4 below summarizes key considerations for defining a corridors' market area.

Figure ES - 4 Defining Considerations to Inventory a Corridor

Defining Considerations	Effect on Corridor Influence Area
<p>Criterion #1 Proximity: Drive time, truck delivery time, or mileage from/to corridor termini or core infrastructure elements. (Drive time or mileage standard buffer or margin)</p>	<p>Minimum: Influence area should encapsulate at least a 30-minute commuting radius of core infrastructure assets, and a 180-minute freight delivery radius of key freight assets.</p> <p>Maximum: Influence area should not extend beyond proximity within which freight or passenger trips can reasonably be expected to utilize the corridor.</p>
<p>Criterion #2 Jurisdictional Boundaries: Boundaries of cities, states, counties, or other governmental entities that may be valuable as coalition partners, or may have authority to support corridor management efforts.</p>	<p>Maximum: Boundary areas should include enough jurisdictions can draw and support more robust coalitions and resources.</p> <p>Minimum: Boundaries should include only jurisdictions reasonably expected to (1) experience impact and (2) offer input or resources to the management effort.</p>
<p>Criterion # 3 Policy Sensitivity: Limitation of market area to areas that can reasonably be expected to be responsive to corridor improvement strategies.</p>	<p>Maximum: Boundary areas should be small enough that effective management tactics can reasonably show a % change in key indicators such as congested VMT, population, or business within commuting or delivery radius.</p> <p>Minimum: They should at least be large enough to capture the full extent of accessibility effects.</p>
<p>Criterion #4 Political Constituencies: Boundaries that align with political districts, stakeholder groups, or other entities.</p>	<p>Subject to other Criteria: Boundary areas should not be artificially constructed in ways that contradict criteria 1, 2, and 3 above solely to address political constituencies. However, areas should be inclusive of interested political districts or entities when the other criteria are met.</p>

Defining a Time Horizon: In addition to selecting an appropriate physical market influence area for a corridor, managers should select an appropriate time horizon in which to consider a corridor's assets and liabilities. Because highway and bridge infrastructure can have a life of 25- 50 or more years, it is advisable to choose a planning horizon long enough to account for a stream of benefits that may result from corridor management actions. For example, if a corridor strategy may involve a \$50 million bridge replacement for a bridge with a 50-year life, then it is prudent to select a planning horizon that will capture not only the \$50 million outlay during the construction period but also the long-term life which the bridge is intended to serve.

Constructing a Corridor Balance Sheet: A corridor's "Balance Sheet" can be understood as a summary of its assets and liabilities as an economic resource within the corridor market area over the selected time horizon. In business terms, corridor management is a way to increase a corridor's overall value by investing to reduce its liabilities while enhancing its assets. Unlike corporate balance sheets, a corridor balance sheet may include both tangible (quantifiable) assets and liabilities as well as intangible (soft) considerations. The objective of inventorying a corridor in balance sheet terms is not to engage in an accounting exercise so much as to recognize (1) which aspects of a corridor can be understood as assets, and which aspects are liabilities, (2) consider ways that a corridor's economic value or equity can be enhanced through management strategies, and (3) revisit the balance sheet over time to assess if there is a "Bottom Line" improvement in corridor value through the management effort.

PLAY 3 | Building Durable Corridor Coalitions

Critical Elements for a Coalition: A corridor coalition must be more than simply a group of people with a vision and intention to improve corridor performance. Much as fire requires oxygen, fuel, and heat – a corridor coalition requires essential elements of (1) authority, (2) intelligence, and (3) resources in order to affect change towards a corridor vision. Coalition partners should be selected to ensure the appropriate mix of these vital elements. *NCHRP-917: Right-Sizing Transportation Investments - A Guidebook for Planning and Programming* offers a discussion about durable and effective partnerships, citing corridor management as an example of where these three elements have often been successfully integrated.²

Using Context to Identify and Assess Coalition Partners: Effective corridor coalitions rarely form spontaneously. Effective coalitions can evolve out of common political or economic interests and must include the key to authority, intelligence and resources. An essential task is identifying parties to be involved in the coalition. Establishing context is the first step to selecting appropriate partners.

² 12 National Academies of Sciences, Engineering, and Medicine, *NCHRP-917: Right-Sizing Transportation Investments - A Guidebook for Planning and Programming* (Washington, DC: 2019), <https://doi.org/10.17226/25680>.

Corridor context refers to characteristics of the transportation network and its interrelationships with community local governments; local, state, and regional economic systems; and elements related to quality of life including health, natural environment, and the equitable well-being of community members. Key aspects of context to consider in building coalitions include:

- **Community Context-** refers to the nature of a community's-built environment, its social and cultural characteristics, its schools, its housing stock, and its disadvantaged populations. Consideration should also be given to whether it is urban, suburban, ex-urban, or rural, whether the land-uses are industrial, commercial, residential, or combinations of the above; when understanding context, it is important for agencies to think broadly and inclusively.
- **Economic Context-** refers to the corridor's relationship and contribution to the local, regional, state, and interstate economy.
- **Health Context-** can be included with other contextual topics like community or kept separate. Keeping the issue separate can help highlight the topic if it's important to communities. Issues to consider could include whether an area is designated as a nonattainment area, non-auto access to lifeline services, whether development and infrastructure patterns accommodate or encourage walking and cycling, etc.
- **Natural Context-** is meant to explore natural features that contribute to the character and aesthetics of the community- parks, trails, open space, etc.
- **Transportation Context-** includes features like facility type, functional classification, freeway, and arterial spacing, operational characteristics, state of the asset, accessibility characteristics, corridor purpose (home to work, goods movement, etc.), what modes are present, etc.

Programmatic Steps for Building Coalitions: Key programmatic steps in forming or updating a corridor management strategy require the practitioner to address five essential questions regarding any given corridor management process. These include:

- What is the realistic scale, geography, and complexity of the intended corridor impact?
- What are the roles of key entities in the corridor management process?
- How are impacts to be understood over time, and at what junctures?
- What are the data and technical resources needed or available to assess impact?
- How, when, and to who are corridor impacts to be communicated?

Implementing Accountability Structures: In addition to conveying a common understanding of the roles, extend, and mechanics of the effort, a durable coalition entails a process for partners to commit through a formal accountability structure. Sources of authority binding coalition partners together have ranged from general agency powers to specific agency powers, specific enabling legislation for a corridor coalition, specific agency policies and procedures recognizing a corridor, or unbinding voluntary cooperation among partners.

PLAY 4 | Building a Spatial Analysis Environment for Corridors

Because corridor management involves not only infrastructure, but its users and stakeholders – spatial analysis of the corridor market area is a vital feature of managing corridors for impact. By creating a practical and flexible spatial environment for mapping, displaying and evaluating relationships between activities, assets and costs in a corridor, managers can both diagnose needs and illustrate the impact of the management effort. A spatial environment for successful corridor management entails (1) establishing the mapping and spatial resources for understanding the corridor environment, (2) identifying spatial data sources and capabilities within the coalition and (3) agreeing to the layouts by which the coalition will examine and communicate about how the corridor relates to outcomes in its spatial proximity.

Geospatial corridor analysis enables corridor managers to (1) Find candidate project locations based on visualizations, (2) Understand base-level, existing conditions of a corridor's performance and score potential projects across condition and performance outcomes for the same geographic area (3) plan and prioritize investments in capital projects (4) visualize or display before and after results to measure and evaluate the impacts of projects on corridor performance, (5) study future investment and travel demand option scenarios for visual demonstration and (6) Pinpoint problems to attack through potential projects by using existing mapped databases that identify locations with multiple deficiencies (e.g., pavement, bridge, congestion, safety) or opportunities (high freight value, developer interests).

Spatial analytical tools are relevant to transportation agencies when they:

- **Use data conflated to highway segments** - Geospatial tools should build spatial environments relying on data conflated to the highway network segments for a corridor to make use of federal mobility, safety, and other data that are measured for those segments.
- **Rely on using spatial resources to develop results** - Tools that help corridor management agencies build spatial environments, like TOSTADA, can layer datasets for measures such as congestion, safety, pavement condition, bridge condition, economic value, and freight value. These interrelated performance data are layered using spatial resources, which can range from ArcGIS to Tableau to SAS to Excel. This provides consistent information on topics of interest and presents them in one holistic picture of performance, instead of considering each performance area separately.
- **Present data visually in a comprehensive score for decision-makers** - By building a spatial environment for corridor analysis, performance calculations for various data layers can be turned into an index between zero and one and have a weighting applied to each segment. The outputs can then be visualized in color-coded data maps to show the combined performance for each segment of a corridor.

Too often, corridor management discussions are focused on engineering evaluations when important economic and quality-of-life concerns may be addressed by the projects, programs, and policies being considered. Because spatial environments integrate maps and other visuals, they provide a more comprehensive and consistent set of information that can improve project comparison and selection, public engagement, and awareness of the relationship between mobility, safety, freight, economic value, and asset conditions.

PLAY 5 | Selecting Strategies with Supporting Data and Tools

Flexible Solution Sets: With a coalition (or internal management team) in place – a cohesive vision for the corridors’ role and actions for achieving the vision are essential. Because corridor conditions are always changing, a vision is expected to be dynamic. A dynamic vision requires a flexible “solution set” instead of a singular preferred alternative. Clear roles and objectives for each potential solution are integral to success. Such a vision may involve an interstate, regional, or local facility, or a nesting of all three facility types. Because stakeholder inclusion is a key to developing a durable, implementable corridor “solution set” corridor managers are advised to ensure that the parties needed to develop and implement such a “set” are on board. If not, it is advisable to revisit the process of coalition-building, with its framework for engaging stakeholders (both internal and external) and for developing a shared vision of a corridor; one that has been vetted with the leadership of partner agencies, community, and business groups. While no stakeholder engagement process can guarantee a durable outcome, developing a shared vision and agreed-upon goals, objectives, and performance measures/evaluation criteria will certainly improve the odds of successful outcomes.

Summary and Concept Agreements: While formal corridor management agreements are important for accountability, it is also important to have high level “concept” documents articulating the general roles of partners and their intended impact. Corridor agreements define the ongoing stakeholder interests and the roles and responsibilities of each party in carrying out the shared vision as embodied in the corridor solution set. For example, a corridor solution set could include local land-use strategies, so it’s important to get a commitment to make those changes. While the formal document of a corridor agreement may be cumbersome to revisit too often, a strategic summary of the agreement can be a valuable tool for partners to readily identify roles and opportunities to participate, and also review the overall strategic organization of the effort. Figure ES-5 offers a general format that a corridor coalition can use to create a “coalition at a glance” reference that can be readily checked and updated at coalition meetings and shared with agency leadership.

Figure ES - 5 Example of a Concept-Agreement Flexible Coalition Summary

Coalition Partner	Type of Solutions	Needed Payoffs
Municipal Government	Business Improvement Districts Beautification and Enhancements Police, fire, public health	Preserve Tax Base Attract Business Improve Quality of Life
Private Residential or Business Groups	Business operations (demand management) Private infrastructure and land Use of private land/facilities	Access to Markets Enhanced Property Value Business Amenities & Services
State DOT	Capital programming Use of right-of-way Provision of ITS or other technologies	Achievement of performance-based planning objectives
Transit Agency	Service and Route Operations Inter-Modal Connections Integration of Operations with TNC	Farebox Recovery Efficient Operations Enhanced Modal Capture
Port Authorities	Expanded capacity or amenities Adapted operations/time-of-day	Port Revenue Enhanced Port Access

Trigger Points: Corridor agreements can also be used to periodically reconvene the stakeholders to assess progress toward implementing a corridor solution set. Importantly, corridor agreements can also make it more difficult for new players to change course, whether at the local government or agency level. With that said, it's important to realize that things do change, and practitioners would do well to establish a process that accounts for changing conditions. This is where the concept of trigger points comes into play. Trigger points are times in the corridor development process where changing conditions may warrant a reassessment of the corridor vision, goals, objectives, performance measures/evaluation criteria, and the components of a solution set. The table below shows an example of a set of trigger points for a corridor coalition.

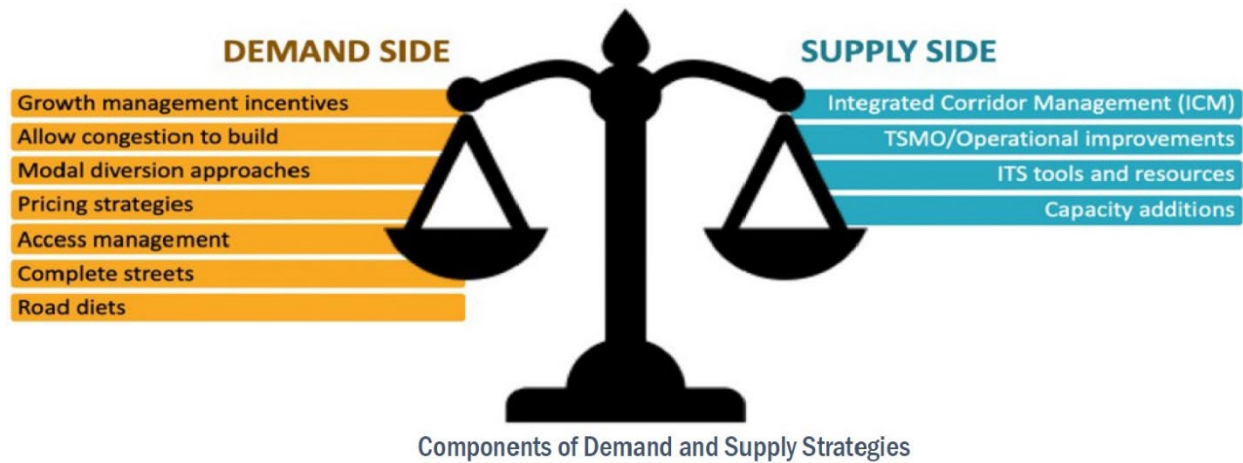
Figure ES - 6 Example Structure of “Trigger Points” For Updating a Corridor Solution Set

Performance Issue	Current Solution	Trigger Point	Alternative Solution
Inadequate Parking on Urban Blocks	Provide overflow shuttle at peak periods	Development Density Exceeds pre-determined threshold	Provide transit and park-and-ride service
Lack of Truck Capacity Accessing Industrial Park	Businesses stagger hours and shifts and use traffic control officers	Business park exceeds pre-determined threshold of employment	Reconstruct site access and intersection into park
Pavement Condition on Statewide Interstate System	Provide asset management/preservation on schedule A	AADT at state cordon points indicates growth exceeds X%	Switch to asset management/preservation schedule B

In each example of Table 6, the corridor benefits from not a singular solution but a “solution set” identified in the corridor planning process.

Balancing Capacity Supply with Travel Demand: Corridor management is not simply a process of enlisting coalition partners in a program of building infrastructure. In many cases, lower-cost solutions can occur simply through partners operating existing infrastructure or business processes strategically. In a solution set approach to improving corridor management, it may take both demand-side and supply-side approaches to address current and future growth. Figure ES-7 below offers examples of different types of approaches that managers consider as a starting point for a solution set balancing infrastructure supply and travel demand.

Figure ES - 7 Examples of Supply and Demand Tactics in a Corridor Management Strategy



Emerging Strategies for a New Generation of Corridors: As equity, demographic considerations, community quality of life, and rapidly changing technological and economic factors increasingly determine the objectives of corridor management, managers require an increasingly agile set of measures for pinpointing and evaluating supply and demand-side tactics. For this reason, effective strategies will aim at a wider range of performance targets than simply reducing delay, reducing crashes, and increasing throughput. The menu of targets for a corridor management effort can include equity, sustainability, quality of life, and economic outcomes supported by known practices in corridor

PLAY 6 | Balancing Competing Corridor Uses and Sources of Value

A critical success factor for any corridor management effort entails enhancing each source of value on a corridor without undermining other sources of value. This is especially true when considering business and residential or community interests in a corridor. One of the challenges in measuring corridor management impacts is the great diversity in what is viewed as a corridor. Highly urbanized corridors carry mostly person trips that are typically the focus of congestion, incident management, and transit or active alternatives. And, in urban corridors where freight trips are numerically high, they usually represent just a small percentage of the overall traffic volume, yet a limited number of freight carrying vehicles, rail cars, or vessels often represent significant economic value and infrastructure consumption. This complex relationship again points to the need for robust stakeholder engagement, the development of a shared understanding of corridor context, and a shared vision for the corridor.

Applying a Corridor Balance Sheet: When seeking to balance the uses of a corridor, the balance-sheet technique may be enhanced by considering comparative qualitative types of value a corridor can have. A very simple organization of a corridor balance sheet can consider (1) local community value, (2) local business value, or (3) regional/national industry value can enable corridor managers to understand and profile how their strategies seek not only to enhance corridor value but also balance these general principles. Figure ES-8 provides an example of how a corridor balance sheet

can be organized as a tool for assessing different sources of value, and how the balance sheet may change over time or with different alternatives or changes that occur in the life of a corridor.

Figure ES - 8 Examples of A Corridor Balance Sheet Assessing Different Sources of Corridor Value

Types of Indicators	Assets <i>Sources of Benefit in a Corridor System</i> (Reported as Annual or Current Year Value)	Liabilities <i>Sources of Avoidable Cost</i> (Reported as Discounted Value over the Time Horizon of the Corridor)	Community Value	Local/Regional Business Value	Regional/National Industry Value	
Quantifiable Economic Indicators	Infrastructure with residual/replacement value.	Sources of transportation cost for users of the corridor (time, mileage, reliability cost)	<i>1 = not relevant</i>	<i>2 = somewhat relevant</i>	<i>3 = relevant</i>	
	Facilities generating GDP and value-added activity within the corridor influence area.	Sources of transportation cost for non-users (emissions, crashes other wider costs)				
Key markets accessible to corridor. (Detail Given in Play 2)	(Detail Given in Play 2)	<i>4 = highly relevant</i>				
Intangible Indicators	Aesthetic, natural or other qualitative sources of value.	Noise, imposition of inequitable burdens on quality of life, other non-quantifiable considerations.				<i>5= essential for corridor success</i>

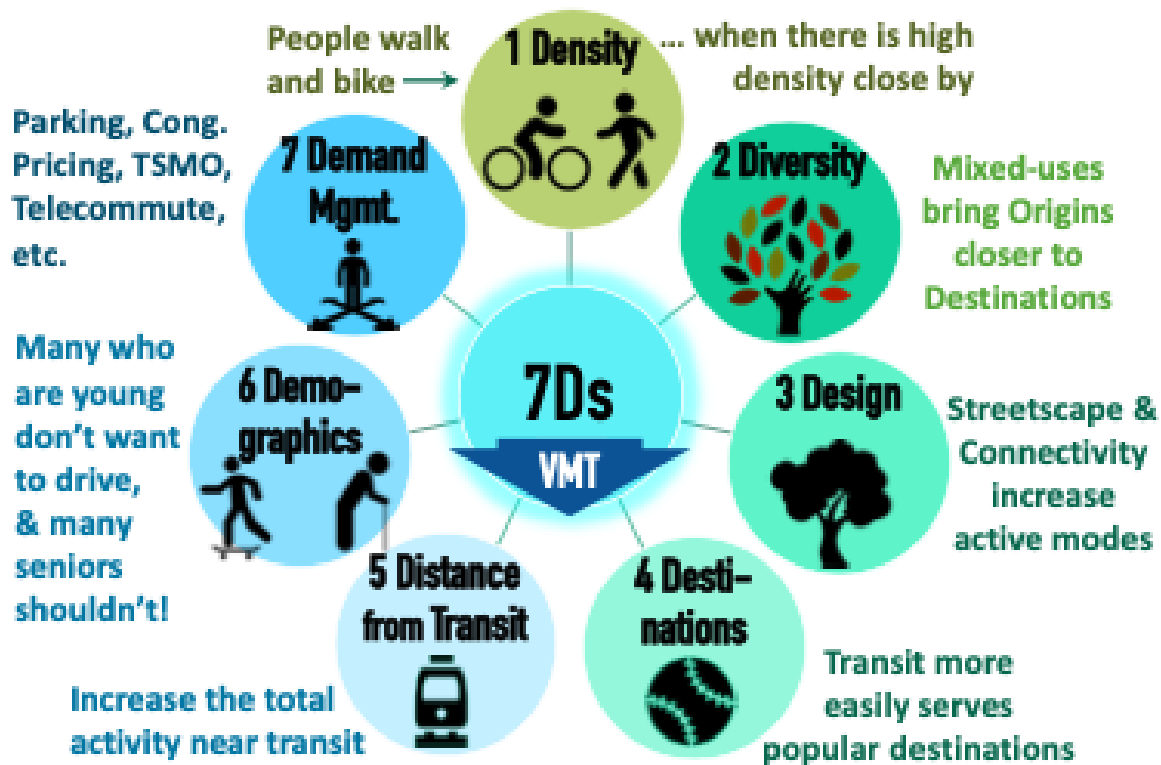
Corridor Decision Clinics: If a corridor balance sheet is constructed as shown above, managers can establish annual (or bi-annual) corridor *decision clinics* collaboratively address changes in a corridor’s value proposition. In a *decision clinic*, the coalition or corridor management would 1) assign a panel of 3-5 beneficiaries of each source of value given above (community value, regional/local business value, and regional/national industry value), 2) present the corridor balance sheet to each panel to evaluate the relevance/urgency of each balance sheet item in terms of their perceived value of the corridor, 3) use the 1-5 weighting of balance sheet items to evaluate and report on both, 1) the overall responsiveness of the management strategy to the corridor’s value potential but also, 2) identify any gaps, incongruity, or risks that corridor actions, by improving one area may jeopardize other areas. Recommended steps for corridor balancing decision clinics include:

- (1) Complete Corridor Balance Sheet
- (2) Designate beneficiary classes representing different types of value expected as shown in the table above
- (3) Appoint 3 stakeholder panels to serve as focus groups assessing the relevance of each balance sheet item with respect to each type of value
- (4) Facilitate half-day or full-day workshop in which each group separately reviews the balance sheet, assigns relevance/urgency values, and provides qualitative suggestions to the corridor management coalition or team for updates to the management strategy

Clinics of this type can be undertaken with minimal staff resources and can serve as an ongoing check to both ensure that the overall priorities governing the corridor management effort are current as well as draw a managing coalition's attention to changes or threats that may have been missed otherwise.

Consider Innovative Design Solutions: Another opportunity to reconcile competing sources of value in a corridor can be found in the innovative design and management of the corridor infrastructure. While there is an entire literature on context-sensitive solutions, access management, and value engineering, some new insight can be gained in their specific application for balancing personal and business uses. Often developing solution sets around the "D" Variables shown in the figure below can yield new approaches related to land use, access density and multi-modalism.

Figure ES - 9 Targets to Consider when Designing Innovative Corridor Solutions

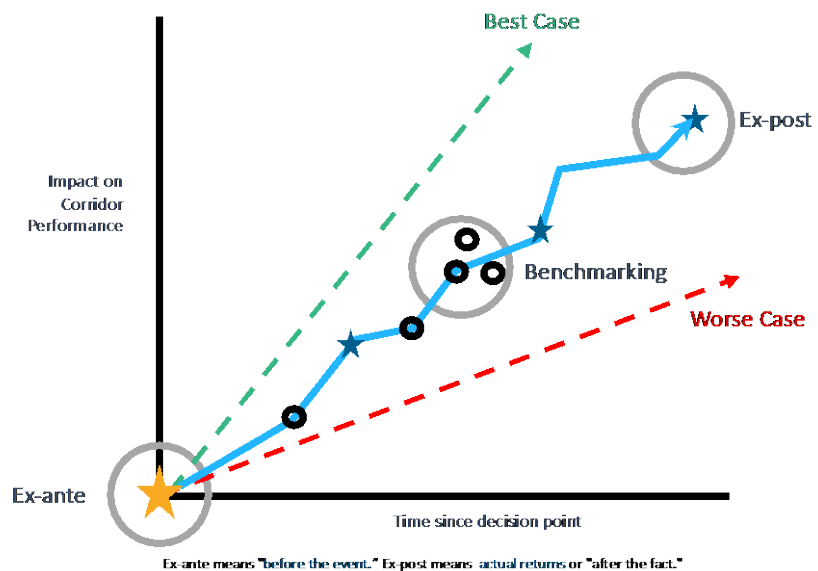


PLAY 7 | Evaluating Corridor Management Strategies

Regardless of how the corridor effort is defined or the solutions implemented ultimately corridor managers must quantify and relate how the strategies have been effective. To what degree have the actions of corridor management changed the intended performance outcomes? Which actions have resulted in intended changes, and which have not? How consistent are the outcomes of corridor management with the overall goals and objectives defined for the initiative? While corridor management regimes often utilize modeling to project scenarios and consider intended outcomes, very few corridor management regimes have consistently tracked performance over time or offered mechanisms for correcting course if impacts fail to align with intentions.

Ex-Post, Ex-Ante and Benchmarking Approaches: The Latin term “Ex Post” means “after the event” and “Ex Ante” means before the event. These terms are instructive for understanding different ways of quantifying expected or observed corridor performance. When quantifying the impacts of corridor management, it is helpful to consider (1) intended and likely impacts based on modeling different strategies when forming a strategy (ex-ante), (2) defining specific intervals at which to apply retrospective analysis on changes associated with management actions (ex-post) and to track overall conditions as they develop in the present time (benchmarking).³ Figure ES-10 demonstrates how these different types of measures can be used in corridor management strategies to assess a range of potential impacts when considering different elements (or scenarios) for managing corridors.

Figure ES - 10 Ex Post, Ex Ante and Benchmarking Evaluations At Different Junctures in Corridor Management



³ Steven A. Smith and Transcore, “NCHRP Report 435, Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making,” 1999, https://onlinepubs.trb.org/Onlinepubs/nchrp/nchrp_rpt_435.pdf; Marek Bauer and Andrzej Szarata, “The Methodology of Urban Transport Corridors Evaluation,” 2015 International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS), June 2015, <https://doi.org/10.1109/mtits.2015.7223285>; Abhishek Bhargava, Samuel Labi, and Kumares C. Sinha, “JOINT TRANSPORTATION RESEARCH PROGRAM Final Report, Development of a Framework for Ex Post Facto Evaluation of Highway Project Costs in Indiana,” March 2010, <https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2622&context=jtrp>; “Welcome to EconWorks,” EconWorks Improved Economic Insight, accessed October 26, 2021, <https://planningtools.transportation.org/13/econworks.html>; Organization for Economic Cooperation and Development, “Benchmarking Intermodal Freight Transport,” 2002, <https://doi.org/10.1787/9789264175129-en>

Figure ES-11 summarizes how these different measurement and benchmarking approaches can be applied within the context of corridor management, including when to apply them, how to implement them and the types of findings the corridor manager can expect from each type of evaluation.

Figure ES - 11 Summary of Ex Ante, Benchmarking and Ex Post Evaluation Measurement Approaches

Measurement Type	When to Apply	How to Apply	What to Expect
Ex Ante (Forecasting)	In initial development of corridor strategy, or when updating corridor strategy through scenario planning.	Use travel demand models, economic impact models, and predictive analytics to estimate marginal effects of corridor management actions.	Clear and quantitative expectation of intended management outcome, assuming all other factors in the corridor environment remain equal. Results will fall out of date as underlying basis of assumptions (population, technology, economy) change.
Benchmarking (Current Conditions)	Establish annual or semi-annual cycle for reporting key outcomes and drivers.	Track year over year factors and outcomes in relation to year over year management activities.	Results will not isolate outcomes specifically caused by corridor management actions. Results will show if and how the assumptions of original modeling (population, technology, economy) are changing to evaluate currency of strategy and overall changes in performance.
Ex-Post (Retrospective /Looking Back)	Establish annual or multi-year cycle for retrospective assessment linking improvement actions to outcomes	Create ratios of intended outcome metrics per improvement action. (Speed change per unit of capacity improvement) controlling for changes that are not sensitive to corridor management.	Available data and difficulty controlling for outside factors will pose challenges. Seek a small and easily measurable set of measures for indicators and improvement actions to evaluate.

Communicating About Corridor Performance: It is essential for corridor managers to consistently and transparently communicate with stakeholders about corridor performance. Heat maps, bar charts, trend lines, strategic location maps, and indexes of corridor performance provide corridor managers with a growing range of options for demonstrating the expected and actual results of how a corridor's impact relates to the surrounding context. Corridor management dashboards are an increasingly popular method for communicating corridor management impacts to a wide range of audiences.

Key communications tools for quantifying impacts include:

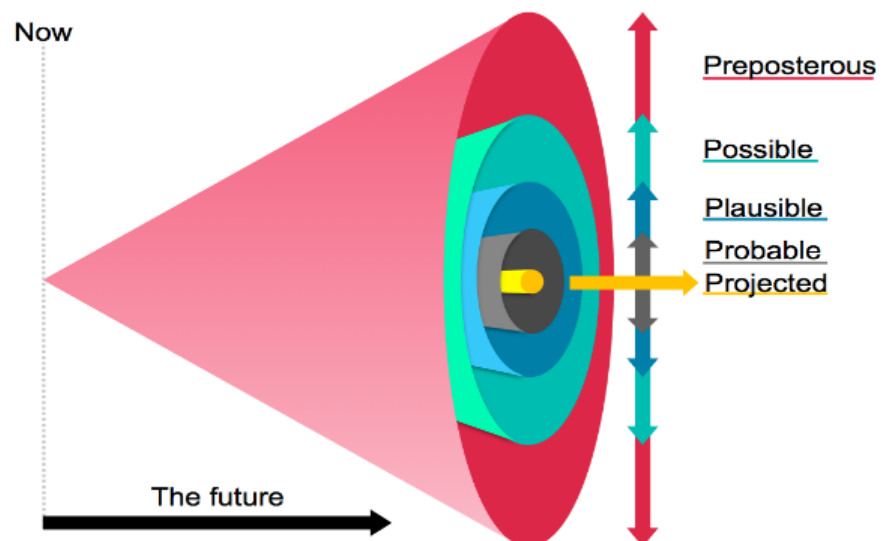
- **Using Maps to Communicate Impacts:** While maps used in corridor management have often been used to simply demonstrate bottlenecks, level of service (LOS), or safety hotspots, a new generation of corridor studies can take advantage of the land-use and municipal infrastructure knowledge of corridor management partners to show how a corridor relates to its wider context. Examples may include heat maps showing areas of walkability, unmet connectivity or access or lacking grid connections.
- **Summarizing Impacts Using Layouts:** When communicating corridor impacts, it is helpful to pinpoint and summarize key statistics not only about the infrastructure but its users. A layout including key vital statistics about corridor users, their needs, and status can often “show the work” behind a corridor impact evaluation. Creating a standard layout with a map, chart and table along with selected bullet points can offer both a visual representation of corridor management needs and impacts while also demonstrating the numbers behind the map, as well as trends and conclusions.
- **Interactive Dashboards for Different partners:** Ultimately demonstrating corridor performance on a dashboard can be extremely helpful for enabling a wide range of audiences to understand the impacts of corridor management. A key advantage of showing a range of supply and demandside corridor improvement strategies and outcomes is showing how and why partners with the authority, resources, and information to manage a corridor can and should continue participating in the effort.

PLAY 8 | Future Proofing a Corridor

Futureproofing a corridor involves attempting to address the uncertainty presented by unforeseeable forces beyond the control of corridor managers. Forces may include things like international trade policy and patterns, climate change, technology, fuel type and supply. Futureproofing involves identifying and

understanding the most significant forces that could affect a corridor and determining how best to position the corridor with projects or strategies that enable it to perform under the broadest range of potential futures. Figure ES-12 demonstrates how future proofing envisions a range of potential outcomes.

Figure ES - 12 Time Horizon for Future Outcomes



Key Elements of futureproofing for corridors include:

Scenario Planning: Applying the corridor management techniques presented in this report within the context of scenario planning can provide opportunities to future-proof corridors and their coalitions. The *NCHRP Report 750 Foresight Series: Strategic Issues Facing Transportation* examined global and domestic long-range, strategic issues and their implications for state departments of transportation (DOTs).⁴ Using this resource together with the current guide is recommended for managers seeking to address long-term uncertainty.

Determining and Monitoring External Drivers of Performance: Much of the future uncertainty that could influence the focus of any corridor effort is driven by external forces beyond the coalition's control. A source for identifying potential drivers is the Transportation Research Board's Executive Committee Reports on Critical Issues in Transportation.⁵ The report defines critical issues as long-term transportation problems or questions that are currently major policy issues or are expected to be major policy issues in the next 10 to 20 years. A coalition's engagement in a thoughtful, wide-ranging conversation about the forces that could shape the corridor's usage and effectiveness, augmented with expertise from different disciplines, can help inform projects and strategies that can maximize the value of the effort spent in re-shaping a corridor.

Conclusions

The practice of corridor management has developed significantly from an engineering practice initially focused on safety, technology and access management into a collaborative practice with the potential to enhance sources of value for stakeholders throughout a corridor environment. Defining the potential cope of a corridor's impact, assembling durable coalitions, selecting appropriate metrics and data and both tracking and communicating a corridor's changing value proposition offers a compelling opportunity to improve transportation and economic conditions in a rapidly changing physical human and economic environment. Figure ES-13 describes a series of new tools for quantifying the impacts of corridor management that accompany this report. This NCHRP guide and playbook on Quantifying the Impact of Corridor Management and its associated body of tools and case research offers a paradigm and a host of resources for realizing this opportunity.

Figure ES - 13 Tools to Quantify the Impacts

These tools quantify the impact of different strategies that inform decisions about how to manage the corridor.



⁴ "NCHRP Foresight Report 750 Series: NCHRP," Transportation Research Board (National Academies of Sciences, Engineering, and Medicine), accessed October 28, 2021, <https://www.trb.org/NCHRP/NCHRPForesightSeries.aspx?srcaud=NCHRP>

⁵ National Academies of Sciences, Engineering, and Medicine, "Critical Issues in Transportation 2019: Policy Snapshot," Transportation Research Board, accessed October 28, 2021, <https://onlinepubs.trb.org/onlinepubs/policystudies/criticalissuesbrochure.pdf>