Planning as Bargaining:

The causal impacts of plans in Seattle and San Francisco

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Abstract

Problem, Research Strategy, and Findings: Why would plans have an impact on the built environment, when their provisions can be revisited in the context of individual development decisions? I examine the causal impacts of transit-oriented development (TOD) plans in San Francisco and Seattle using a mixed methods approach, combining qualitative interviews and a quantitative regression discontinuity design. I find that the Market and Octavia Plan in San Francisco had a substantial impact on development outcomes, increasing densities and reducing parking ratios not just within the plan boundaries but also in adjacent neighborhoods. In Seattle, while parking ratios declined and densities rose over time, it is harder to attribute these trends to the TOD plans studied here, which constituted a small part of the city's overall planning program. Beyond zoning changes, I identify two mechanisms through which plans exert an impact. First, in a city where development approvals are not by-right, plans can act as an anchor point for bargaining between developers, city staff, and community members. Second, plans can serve as laboratories of innovation, enabling experimentation with new policies that can later be extended to adjacent communities. These findings, however, may not extend to places where zoning provides by-right development permission, or where community members are implacably opposed to new development.

Takeaway for Practice: Planners should consider the mechanisms through which plans exert causal impacts. In particular, they should strive for plans that provide a lasting compromise, and leave limited incentives for stakeholders to reopen controversial debates in the context of individual project approvals. Planners can also use TOD and similar plans as sites of experimentation and innovation.

Keywords: transit-oriented development; zoning; parking; mixed methods; plan implementation

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Introduction

Implicit in the idea of urban planning is that by drawing up and implementing a plan, a community can influence its destiny. Planners, elected officials, community members, and other stakeholders spend countless hours developing and scrutinizing plans. Presumably, these individuals assume that their efforts will be consequential, and that plans and planning processes have the ability to shape the urban environment.

There is surprisingly little evidence, however, that plans have any impact.[1] Rather, research has often emphasized the plan and the planning process as the objects of study (e.g. Flyvbjerg, 2002). Other scholars have asked whether plans are implemented (Talen, 1996a), whether development conforms to a plan (Chapin et al., 2008), or whether plans perform, i.e. are useful (Mastop & Faludi, 1997). Implementation, conformance or performance, however, do not equate to a causal impact, as plans may simply implement a vision that would have been realized in any event. For example, a plan that calls for food co-ops and farmers markets in Portland, live music venues in Austin, or high-rise development in midtown Manhattan may simply document preferences that would have been realized regardless of the plan.

In this paper, I use contrasting case studies—a set of eight station area plans in Seattle and the Market and Octavia Plan in San Francisco—to examine whether and how planning for transit-oriented development (TOD) has a causal impact on the amount and character of new development. The goal is not to characterize planning in the two cities in general—the plans studied here are not representative of each city's wider planning efforts—or even TOD planning in aggregate, but to use TOD plans as case studies to investigate the linkages between plans and development outcomes. For example, does a TOD plan lead to more housing being built close to transit? Does the plan promote development that capitalizes on the transit resource, for example through reduced parking ratios? By what mechanisms do any effects occur?

Several characteristics of TOD plans make them a useful case with which to investigate the broader phenomenon of planning impacts. First, TOD plans address physical changes to the built environment such as densities, heights, and parking ratios, which can be readily quantified. Second, as discussed below, the semi-arbitrary boundaries of some plan areas make it feasible to rigorously identify the impacts of the plans using a Regression Discontinuity Design. Third, there are direct policy implications. Public agencies in places such as Denver, Charlotte, and Dallas are funding or developing TOD plans as a means to enhance ridership, reduce greenhouse gas emissions, and provide housing opportunities. While much research has analyzed transit-oriented *development* in terms of barriers, success factors, and impacts on land values, ridership, and housing affordability (e.g. Boarnet & Compin, 1999; Cervero et al., 2004; Atkinson-Palombo & Kuby, 2011; Ratner & Goetz, 2013; Ibraeva et al., 2020), there has been no systematic study to date that attempts to identify the causal impacts of TOD *plans*.

[1] I refer to the impact of plans as shorthand for the impact of either the adopted plan or the planning process. Where relevant, I specifically distinguish between the two.

This paper begins with a brief discussion that conceptualizes the causal impacts of plans and reviews the associated literature.[2] It then discusses the case study contexts and the mixed-method research design. The subsequent section draws on both quantitative and qualitative evidence to show that plans have an impact on parking and densities in San Francisco, but not in Seattle. Drawing primarily on the qualitative data. I then identify three specific mechanisms: rezoning, the bargaining process through which plans serve as anchors for negotiation, and how plans influence surrounding neighborhoods through serving as laboratories of innovation. A key implication for practice is that planners should consider how plans can provide a lasting compromise, leaving limited incentives for stakeholders to reopen controversial debates, and provide a testbed for learning and experimentation.

Conceptualizing a plan's causal impacts

Imagine Farmville—a city where the Comprehensive Plan aims to retain a rural identity. All parcels in Farmville are zoned for agricultural use, but other uses are allowable via a conditional-use permit. Developers may propose non-agricultural uses, which are allowable subject to a finding of compatibility and public interest by the City Council.

Now imagine Towerville—a city identical to Farmville in its urban form, political dynamics, and all other characteristics, but where an adopted plan calls for high-rise, mixed-use development. The zoning code is permissive, with almost all land uses and heights allowable subject to a design review process and an environmental impact report.

What would be the fate of a similar development proposal—say, for a 10-story apartment building—in the two cities? A literal interpretation of the plans and zoning would suggest that the project would be turned down in Farmville but approved in Towerville. But in both cases, local public officials would have the discretion to accept or deny the project, and the leverage to work with the developer to achieve local goals. Whether they have a strong desire for the project to be approved or denied, they could construct a reasonable pretext, with the help of skillful attorneys, in support of either decision. In short, "decisions" made by the plan can often be revisited in the context of proposals for specific projects.

Of course, there are likely to be state-specific legal constraints that restrict "spot zoning" and dictate how a City Council decision could withstand scrutiny in court. At root, however, a discretionary approval process means that the underlying zoning and the city's plan may have an indirect relationship with any approval decision. From a political economy perspective that emphasizes the role of political interests and institutions, the fates of the proposed apartment buildings would depend on the composition of the respective City Councils and their appointed commissions and boards, rather than the text of the plans or zoning regulations.

[2] I focus on the literature on the impacts of plans, and do not attempt to cover the extensive literature on transit-oriented development. For a useful, international review of TOD, see Ibraeva et al. (2020).

Discretionary vs by-right approvals

The hypothetical cases of Farmville and Towerville illustrate the importance of discretion in development approvals. Even if zoning technically confers by-right permission to develop, the combination of intricate regulations and physical site constraints in existing urban centers mean that few major projects can proceed without some relief from design requirements or the rules that govern setbacks, open space, and parking. For example, an irregularly shaped or sloped site might make it infeasible to comply with the letter of the zoning code. Indeed, some cities and community activists seek to retain or even expand their discretion in order to improve their bargaining positions and exact infrastructure improvements and public amenities in exchange for development approval (Manville & Osman, 2017; Metcalf, 2018). On greenfield sites, meanwhile, subdivision approvals often require some form of regulatory relief, or a process of negotiation between developers and local governments (Ben-Joseph, 2003). In the case of planned developments, negotiation is quite intentionally at the heart of the process (David, 2015).

Thus, discretion in land-use approvals is pervasive in many parts of the United States (Camacho, 2005), as well as in places such as England where development rights are fundamentally discretionary (Hirt, 2012). Selmi (2011) calls the move from traditional regulations to negotiated agreements the "contract transformation in land-use regulation." In urban areas, a discretionary review by a Planning Commission, design board, or similar body is the norm for anything other than the most straightforward of projects.

Indeed, urban economists have often viewed zoning as endogenous (Pogodzinski & Sass, 1994). That is, rather than exerting an independent influence on urban development, zoning regulations are seen as a reflection of the same underlying factors that shape development outcomes. Pre-existing market forces, the desires of existing residents to limit future development, rent-seeking by landowners, and other political and economic constraints affect decisions on zoning, but they also affect development approvals directly. For example, upzoning efforts in Los Angeles have occurred where the development gains are largest (e.g. on industrial and other sites with low-intensity uses), and where there is least political opposition from homeowners (Gabbe, 2018). At the extreme, zoning could reflect what would have happened regardless on a case-by-case basis, and similar outcomes might be obtained in a city with no zoning but a discretionary land-use approval process.[3]

Causal impacts of plans

The preceding discussion focused on zoning and similar land-use regulations. What of the impact of broader urban planning efforts, which may or may not be legally binding or tied to zoning changes? Ex-post studies of plan implementation are often categorized as "conformance" (did the outcome match the plan?) or "performance" (was the plan useful?)

[3] Such a view that zoning reflects, rather than shapes, other determinants of land-use is not incompatible with research that finds that zoning controls and other land-use regulations substantially limit the supply of housing (Glaeser & Ward, 2009; Jackson, 2016; Quigley & Raphael, 2005). Rather, zoning could serve as one mechanism for local political actors to realize their policy preferences. Even without zoning, these actors could find other ways, such as impact fees or design review processes, to achieve their goals (Monkkonen et al., 2020).

(Hopkins, 2012; Mastop & Faludi, 1997; Oliveira & Pinho, 2010; Talen, 1996a). However, this typology is incomplete: a plan might score highly on conformance or be implemented, but simply codify what would have happened anyway. And a plan might be useful in supporting a decision, but fail to change the behavior of a Planning Commission or City Council. Thus, neither conformance nor performance necessarily mean that the plan had a causal role in the adoption of specific projects or policies (Millard-Ball, 2013).

Even though plan evaluation can help ensure the legitimacy of planning, improve decision-making and foster continuous learning (Guyadeen & Seasons, 2016), ex-post evaluations are rare in the planning literature (Talen, 1996b; Sciara, 2020). In particular, there is an "attributability gap" in linking planning actions to planning outcomes in a causal chain (Carmona & Sieh, 2008; see also Guyadeen & Seasons, 2018). Causal inference methods such as natural experiments, randomized controlled trials, and regression discontinuity designs, prevalent in other social science disciplines (e.g. Winship & Morgan, 1999), have seen more limited use in planning and design (Deng & Freeman, 2011; Honey-Rosés & Stevens, 2017).

Do plans have a causal impact? In other words, do they lead to different policy or development outcomes compared to a counterfactual "no plan" scenario? The little research that exists on causal impacts (as opposed to plan performance or conformance studies) suggests that, as with zoning, plans often reflect existing policies and development strategies, rather than shaping them. In Sacramento, for example, the voluntary regional Blueprint plan had little impact in guiding growth in more transit-oriented directions. Local jurisdictions followed the regional plan only to the extent that it matched their own preferences, and one jurisdiction even tried to change the regional Blueprint to match its own preferred growth trajectory (Allred & Chakraborty, 2015). In California, local climate action plans appear largely to catalog the policies that a city would have undertaken anyway (Millard-Ball, 2012, 2013). Sustainability plans may motivate action when newly created, but their effect fades over time (Liao et al., 2020). In Florida, local comprehensive plans have reinforced existing development patterns, rather than helping to limit development inside hurricane hazard areas (Deyle et al., 2008). In Youngstown, Ohio, the "smart shrinkage" policies of the Comprehensive Plan went largely unimplemented because landowners and other stakeholders saw little benefit to them (Ryan & Gao, 2019).

Despite the lack of empirical evidence, there are a range of pathways through which plans and planning *could* change outcomes (Millard-Ball, 2013), assuming that the policy or development project is financially feasible. Plans might be used to coordinate interdependent decisions, such as the locations of housing and infrastructure (Hopkins, 2001; Knaap et al., 1998). Planning could affect outcomes through knowledge gathering and technical analysis, whether through a technocratic or collaborative planning process. Planning may shape people's preferences or change the way in which those preferences are considered and aggregated by decision makers. Or there may be reputational costs from deviating from a plan.

Case Study Contexts

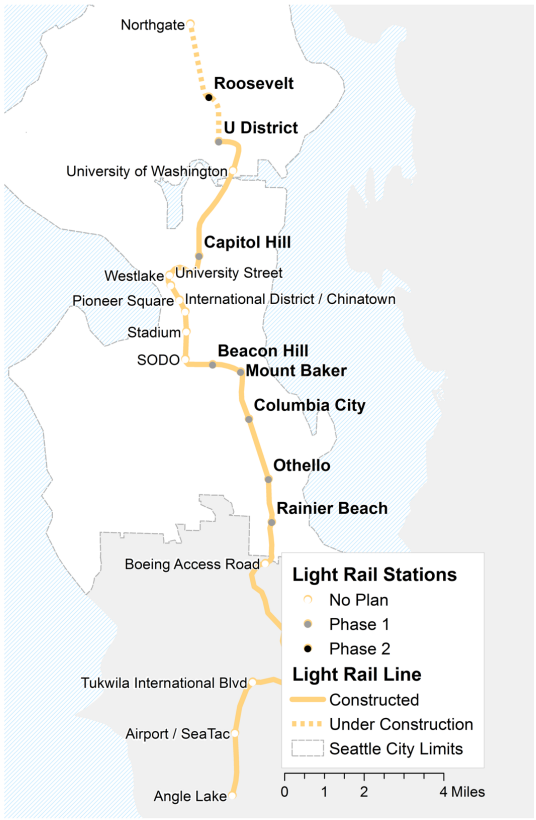
I used three criteria for case selection. First, a TOD or similar plan must have changed the quantity and/or character of allowable development. Second, there must exist a semi-arbitrary plan boundary that creates a natural experiment via the regression discontinuity discussed below. Third, there must be sufficient time post-adoption for any impacts to become evident. After identifying potential cases that match these criteria, I chose plans in Seattle and San Francisco because the depth of their planning efforts mean that it was reasonable to expect a measurable impact, and because they differed in key respects such as state-level planning law, geographic extent, and timing. These criteria correspond to "most likely" and "diverse" case selection criteria (Gerring, 2007 Ch. 5). The case studies are not intended to be directly comparable, but rather to explore contrasting settings where plans may have had a causal impact on development outcomes.

Seattle's station area planning program encompassed multiple stations more than a decade in advance of rail transit, and was explicitly a transit-oriented development planning effort. Station area plans were ultimately completed and zoning changes enacted for eight stations by the City Council in 2001 (Figure 1). Of particular note, a station area overlay zone relaxed (and later eliminated) minimum parking requirements, removed density limits, and prohibited certain auto-oriented land uses such as drive-through restaurants or coffee shops (Table 1).

San Francisco's Market and Octavia Plan, adopted in 2008, took place in the context of a mature light rail system, and was primarily a neighborhood plan that responded to the opportunities from freeway removal as well as transit availability (Figure 2). The zoning changes in San Francisco were also more extensive than in Seattle, and included removal of density caps; replacement of minimum parking requirements with parking maximums of as little as 0.25 spaces per unit; and increased height limits (Table 1).

While both cities have extensive planning efforts, the plans considered here are their only ones that match the case selection criteria, specifically the semi-arbitrary plan boundary. The Technical Appendix provides more detailed descriptions of case selection and of each city's planning efforts.

Figure 1 **Station area plans in Seattle**



Station area plans were developed for eight stations (labeled in bold). Seven stations were in the first phase, with Roosevelt in the second phase.
Map drawn by Brandon Nyo.

Figure 2 **The Market and Octavia Plan area in San Francisco**

The boundary of the draft Market and Octavia Plan was based on a quarter-mile radius from the Church and Van Ness light rail stations, and Octavia Boulevard which followed part of the alignment of the demolished Central Freeway. The adopted plan boundaries were adjusted to exclude certain peripheral blocks (dotted line).
Map drawn by Brandon Nyo.

Table 1 Summary of Key Regulatory Changes

	San Francisco		Seattle	
	Before	**After**	**Before**	**After**
Required parking	Minimums, normally one space per unit	Minimums abolished Maximums, 0.25-1 space per unit	Minimums, normally one space per unit	2001: Off-site parking permitted to satisfy minimum requirements 2006-2009: Minimums eliminated in station area overlays
Parking design	Generally, none	Setback and design requirements to screen parking from the street	Generally, none	Setback and design requirements to screen parking from the street
Heights	Varied	Major increases in some parts of the plan area, decreases on residential streets 5' increase to enable higher ground-floor ceilings	Varied	No major changes
Density	Normally restricted	Limited only by height and bulk restrictions	Normally restricted	Limited only by height and bulk restrictions
Zoning	Varied	Almost every parcel rezoned into one of three new zoning categories	Varied	Overlay zoning plus rezonings of selected parcels
Restrictions on auto-oriented uses	Varied	Drive-throughs and auto-oriented uses prohibited Curb cuts prohibited on transit priority streets	Varied	Drive-throughs and auto-oriented uses prohibited
Other key changes	Design guidelines Program-level environmental impact report			

Data and Methods

I adopt a mixed-method approach that combines quantitative and qualitative analysis. The quantitative analysis is best suited to identify the extent of any impact of urban plans. The qualitative analysis, in turn, helps to validate the quantitative findings and illuminate causal mechanisms (Millard-Ball & Kim, 2020; Tashakkori & Teddlie, 1998).

Quantitative Analysis

I used a regression discontinuity design (RDD) to compare the quantity and character of development on parcels immediately inside and immediately outside the plan area. The plan boundaries are semi-arbitrary, being based on a quarter-mile radius from rail stations (and, in San Francisco, from the alignment of the demolished freeway), without regard to physical or socio-economic boundaries. While transportation planners often use a quarter- or half-mile radius as a rule-of-thumb to define the catchment area from which people will walk to transit, there is nothing magical about these precise thresholds (Guerra et al., 2012). Rather, transit mode share declines continuously with distance from transit.

Therefore, any differences between parcels on either side of the plan boundary can be attributed to the planning process or to the adoption of the plan. Figure 3 shows that the urban fabric is indistinguishable on either side of the plan boundary—there is no natural divide. Thus, RDD can overcome the biases typically encountered in statistical analysis, where the presence of a plan is correlated with unobserved variables such as planned growth, or cultural, political or socio-economic factors. The RDD approach is well established in the causal inference literature (Imbens & Lemieux, 2008), including cases where the discontinuity follows a geographic boundary (Dell, 2010). RDD has also been used in recent planning research (Deng & Freeman, 2011; Millard-Ball et al., 2013).

Figure 3 Urban fabric at the plan boundaries

The plan boundary runs through the middle of these photos in San Francisco (*left*) and Seattle (*right*). In the left photo, the buildings in the foreground are in the plan area; those in the background (the green building and beyond) are outside, but the light industrial character is the same. In the right photo, the house on the left is in the overlay zone, but the house on the right is not. *Photos by author.*

Three independent variables measure aspects of new development that might be influenced by the plan: (i) the probability of a redevelopment or similar planning application being submitted; (ii) the proposed density; and (iii) the proposed parking ratio. These three

variables were chosen because they are measurable and focus on key outcomes that the plans promoted, but they do not capture the full range of TOD planning goals, including housing affordability and urban design.

The primary sources of data for each city are (i) the property tax database; (ii) land-use planning permit applications; and (iii) GIS layers for parcel boundaries and current and historical zoning. The final dataset consists of 607 land-use planning permit cases on 10,573 parcels in San Francisco, and 948 cases on 7,998 parcels in Seattle. The Technical Appendix provides further details of the statistical design and data sources.

Qualitative Analysis

The qualitative analysis probed the motivations and experiences of planners, developers and neighborhood activists, and sought to identify mechanisms behind the quantitative results. In-depth, confidential interviews with key informants are the primary source of qualitative data, coupled with analysis of news reports and webcast Planning Commission hearings. The informants were recruited through a snowball approach, beginning with my own professional contacts in each city. Of the 20 interviews, eleven were in San Francisco and nine in Seattle. Ten were with planners, six with neighborhood activists, and four with developers or architects. The semi-structured interviews were conducted in person and typically lasted about an hour; the Technical Appendix provides the interview protocol. The interviews were recorded, transcribed, and coded using TAMS Analyzer software. In San Francisco, participant observation also yielded insights: I worked as a consultant on the early stages of the Market and Octavia planning process, and spoke at plan adoption hearings as a Board member of the Hayes Valley Neighborhood Association in 2007-08.

The following sections integrate the qualitative and quantitative analyses. First, I discuss the empirical evidence of *whether* planning had an impact. The subsequent section examines *how* planning achieved its impacts.

Did Planning Have an Impact?

San Francisco

Parking ratios fell considerably in the Market and Octavia Plan area to an average of 0.16 spaces per unit in post-adoption developments (Figure 4, *left panel*). For comparison, the ratio for nearby projects outside the plan area was 0.37. Development densities also rose. These findings are supported by the regression discontinuity analysis: the plan is estimated to have reduced parking by –0.39 spaces per unit, and increased densities by 96% (Technical Appendix).

The results are also supported by the qualitative data. Four of the interviewees (#2, #3, #7, #8) pointed to specific instances where zoning changes—particularly, increases to heights and allowable densities, which cannot legally be waived through a variance—enabled projects to be built in a way that would not have been possible prior to the plan. Thus, the plan was a necessary albeit not sufficient cause of increased density.

There is less evidence in Figure 4 (*right panel*) of an impact of the plan on the *quantity* of development, i.e. the fraction of lots that were redeveloped. With the city experiencing some of the highest housing prices in the country, development is likely to have been economically feasible even without the additional densities, environmental review streamlining, and other incentives that the plan allows. Indeed, interviewees suggested that while the Market and Octavia Plan has helped to shape development, most of the vacant or under-used parcels would have been built on regardless.

Figure 4, however, suggests two complications to the story. First, the trends towards reduced parking were already established before adoption of the plan, suggesting that the planning *process* had a role in changing prevailing norms about development. Second, the trends are evident outside the plan area, where parking ratios fell and densities rose at a similar rate, although they remained respectively higher and lower than within the plan boundary. Almost all interviewees considered that the Market and Octavia Plan had led to broader changes outside its formal boundaries, for reasons discussed in the "Laboratories of Planning" section.

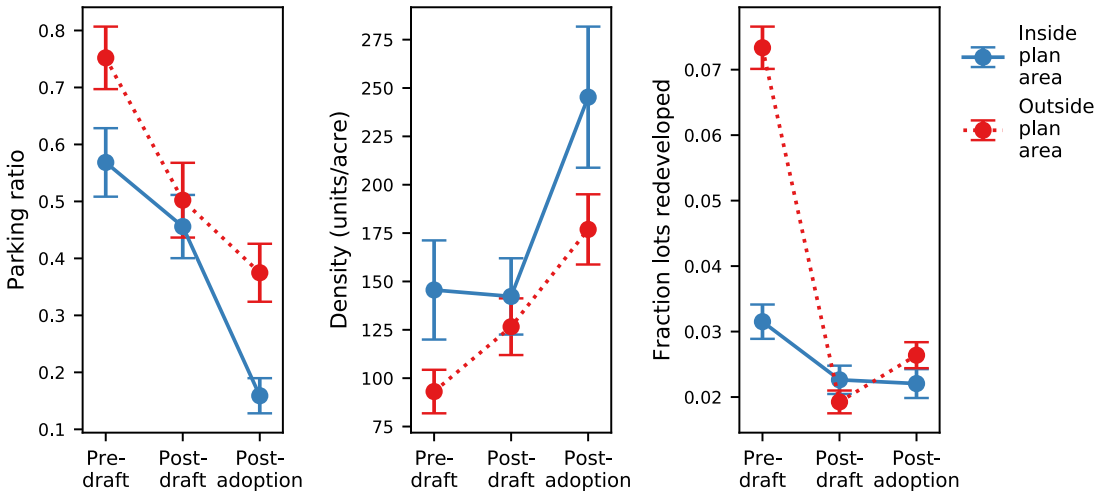
Seattle

The analysis for Seattle reveals quite different patterns to those in San Francisco. Figure 5 indicates that parcels within the station area overlay zone have less parking than other parcels close to the station. However, this difference only holds for three of the eight stations, and the regression discontinuity model (Technical Appendix) indicates no statistically significant relationship. There is even less evidence of an impact on residential densities or the probability of redevelopment in the plan areas as a whole. Station-by-station statistical estimates suggest one exception: at Othello, the station area plan did appear to increase the probability of a lot being redeveloped.

Compared to San Francisco, interviewees in Seattle had more difficulty in pointing to any fingerprint of station area plans on parking and development trends. Planners and community members alike saw them as a minor contribution in the constellation of neighborhood planning and the construction of light rail. Station area plans were just one of a series of planning efforts—the 1994 Comprehensive Plan, neighborhood plans in the late 1990s, and decisions on light rail alignments—in the city over a 10-year period. Moreover, interviewees considered that the plans were completed too far in advance of light rail construction and other drivers of market feasibility for them to directly shape development decisions. "I think the biggest takeaway is that our goals were too lofty for what we could accomplish that far in advance of when the [rail] system actually opened," said one planner (Interview #12). "It was way too early…Can we point to a whole lot of direct results in terms of development? I don't think so," said another (Interview #13).

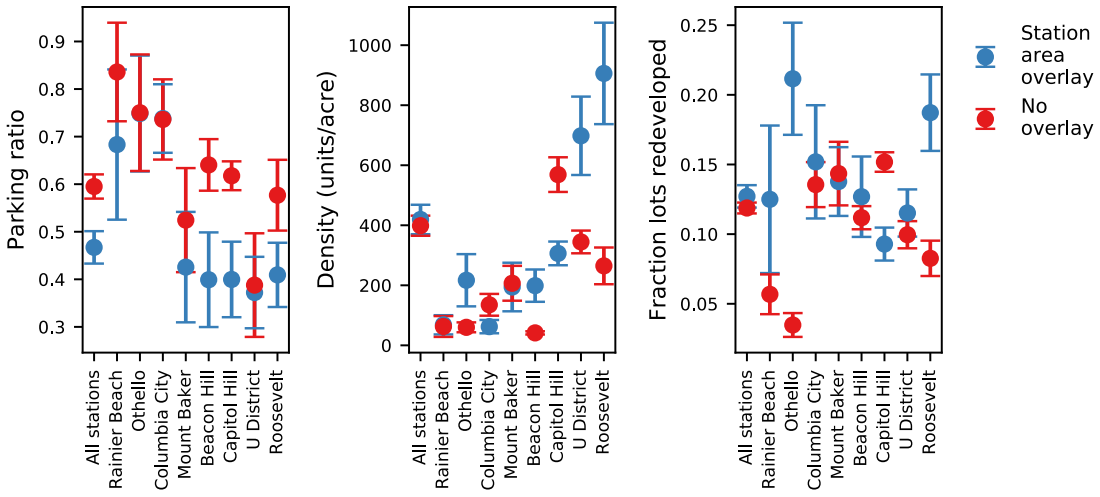
As in San Francisco, the time trends are notable both within and outside of the plan area. Outside the overlay zoning, the average parking ratio has declined from 0.85 spaces per unit in 2006 to 0.51 in 2016. Within the overlay, the decline was even steeper, from 0.92 to 0.30 spaces per unit over the same period. Density has also increased over time. Given that the regression discontinuity analysis indicates "no impact," this implies that changes in parking ratios and densities are not attributable to the plans, but rather to other citywide factors.

Figure 4 **Trends in parking, density, and development: San Francisco**



Error bars indicate one standard error.
Pre-draft: 01-01-1999 to 11-30-2002. Post-draft: 12-01-2002 to 05-29-2008.
Post-adoption: 05-30-2008 to 09-07-2016.
Note that dates refer to when the planning application was filed with city officials, and do not indicate construction or completion dates.

Figure 5 **Parking and density patterns: Seattle**



Error bars indicate one standard error. Excludes single-family zoned parcels.

How Planning Has an Impact

Rezoning

The most obvious way in which the TOD plans impact land-use decisions is through zoning changes that were implemented in conjunction with plan adoption. Zoning provisions such as height limits, lot coverage standards, allowable uses, and parking requirements or restrictions constrain what developers can build on a parcel. Indeed, developers, architects, and planners in both cities talked about how zoning changes allowed them to increase unit counts and provide less parking, and how the removal of parking minimums made projects financially viable. In both cities, planners also pointed to the impacts of the new zoning prohibitions on automobile-oriented uses, drive throughs and curb cuts. For example:

> That's the one thing that station area planning did do. It established a new zoning overlay…early enough to forestall a lot of what would have been more auto-oriented development. That was a success. [Planner, Seattle, Interview #13]

> We stopped Starbucks from doing a drive through [which was precluded by the zoning overlay] at the McLellan [Mount Baker] station.…They came in 3 times and said, "we want this, we're Starbucks"…It was an old donut shop. They said, "the donut shop had it." We said, "you're establishing a new use, no drive through. No drive through, no drive through." [Planner, Seattle, Interview #15]

The same interviewee also highlighted a 340-unit project at Othello (as noted above, the only station in Seattle where the plan had a quantifiable impact):

> That happened as part of the [zoning] overlay, because they had [more allowable] density, they could do more units there. They didn't have lot coverage requirements…Of course, they built more [parking] than they needed to." [Planner, Seattle, Interview #15]

What if the plans and associated zoning changes had not been adopted? Developers could certainly have sought a rezoning of individual parcels to allow for increased heights or densities, but according to interviewees, the costs and delays mean this path would rarely have been financially worthwhile. Some zoning provisions—particularly parking, rear yard and similar requirements—could be waived through a simpler process such as a variance or conditional use permit, without the need for a rezoning. But even these procedures introduce delay and uncertainty into the approval process, and open up a project to additional scrutiny by elected officials and neighborhood activists. "We're used to playing the [zoning] cards we're dealt," said a Seattle affordable housing developer (Interview #16), noting that applying for waivers on required parking would cause delays that might jeopardize tax credit financing. A San Francisco neighborhood activist noted that projects that do not request variances offer "very little leverage" to the community to negotiate with the developer (Interview #11).

The more that a project complies with the zoning, the greater the certainty for developers. In San Francisco, planners and developers discussed the plan's impacts on streamlining approvals, particularly through making processes less discretionary (Interviews #2, #3, #4 #8). One planner added:

> Basically, every project before the plans was a battle. What the plans did was to eliminate a lot of those basic discretionary approvals over the fundamental nature of the size and land use, and made the review process a more administrative, design review process. [Planner, San Francisco, Interview #2]

A mixed-use project that lies just outside the plan area illustrates the power of zoning (Figure 6). Even though the developer, planning staff, and neighborhood groups all wanted to apply at least some aspects of the adjacent Market and Octavia zoning in order to enable higher ground-floor ceilings and additional units, this would not have possible without incurring substantial delays. Thus, the project went ahead under the old zoning.

Figure 6 Impact of zoning controls. 2299 Market St (*left*), approved in 2010, is just outside of the Market and Octavia Plan area due to the arbitrary plan boundary. It includes 18 units, 18 parking spaces, and ground-floor commercial, at a height of 50' and a density of 108 units/acre. 2175 Market St (*right*), approved in 2012, is one block away but within the plan area. It includes 88 dwelling units, 44 parking spaces, and ground-floor commercial, at a height of 65' and a density of 207 units/acre. The surrounding neighborhood fabric and the pre-plan height limits, parking requirements and other zoning controls are identical, and so the height, density, and parking differences can largely be attributed to the plan and associated rezoning. *Photos by author.*

Plans as anchors for negotiation

Rezoning has clearly affected development outcomes, but is unsatisfactory as a complete explanation. Developers can seek relief from most zoning rules. Moreover, variances, conditional use permits, and other discretionary decisions were still required for many projects even after the plan. The interviews suggest that the plans and associated zoning, particularly in San Francisco, have functioned not just as a legal mandate, but also as an anchor in an ongoing bargaining process between developers, planning staff, and neighborhood activists, serving as a baseline for what is fair and reasonable in subsequent negotiations.

Developers have a strong interest in predictability and quick approvals; prolonged negotiations threaten the feasibility of a project. But perhaps less obviously, city staff and community activists also benefit from a streamlined process that means less time spent negotiating with developers, attending public hearings, and (in the case of activists) lobbying

Planning Commissioners. Interviewees in both cities (#9, #11, #18) talked of "bandwidth" limitations and the risk of volunteer fatigue. The Market and Octavia Plan "was an effort to fight some of those battles once so that we didn't have to fight them every time," said one activist (Interview #11). Other activists (#9, #10) spoke explicitly about how they expect projects to comply with the standards set out in the plan, and how they emphasize plan conformance in letters of support to decision makers. Planning staff, meanwhile, expressed their "wariness" of reopening "carefully crafted policy compromises" (Interview #2), and also highlighted the plan-level environmental analysis which reduced the environmental review burden for subsequent projects (Interviews #1, #3). The plan was also emphasized in staff recommendations on project approvals, and in developer mailings providing notice of permit applications. "We believe that our proposal will do much to further the goals of the Market Octavia Plan," read one mailing to nearby residents from a developer proposing a 96-unit residential building.

Community groups still aim to shape development projects, but target their wish list narrowly. One spoke of their group's two main demands beyond the requirements of the plan. First, they ask for required affordable housing units to be provided on-site (rather than through an in-lieu fee), and for developers to provide more affordable units than the plan requires. When one developer initially refused to adhere to their housing demands, activists mobilized sympathetic organizations to lobby en masse against the project—setting a line in the sand as a warning to other developers (Interview #11).

Second, neighborhood groups ask for as little parking as possible. Indeed, parking ratios provide an instructive example of the evolving anchor inspired by the Market and Octavia Plan, which caps parking ratios in Neighborhood Commercial Transit zoning districts at two levels: 0.5 spaces per unit by right, and 0.75 spaces per unit as a conditional use. One of the first projects to be approved under the new plan gained the conditional use, but the concerted opposition by activists to the additional parking laid down a marker for future projects. "Early on we made a point, and the Planning Department has backed us up on that since then," explained one activist (Interview #10). "It became politically unsavory to try and get more than 0.5 parking [spaces per unit] on these sites," added a developer (Interview #8). Since then, very few projects have even tried to obtain approval for the higher parking ratios. Thus, the power of the plan has materialized through setting an anchor or reference point around which different neighborhood groups and staff can rally.

To the extent that the causal impacts of a plan arise through providing an anchor, however, a bargaining process must occur. The case of Seattle illustrates a counterexample: where negotiations between developers and community groups are less central to development decisions, the plan may play a more limited role. In Seattle, the main forum for community input is Design Review, which provides little leverage given that issues such as parking and heights are legally "off the table." One activist noted that "we don't have much teeth…design review panels can soften the corners or ask them [the developers] to come back for another design cycle, but they can't stop the project per se" (Interview #19). Another activist commented similarly, noting that design review "doesn't feel a terribly potent process for neighbors to impact" (Interview #20). "There's no leverage" for community members who want to influence parking ratios, agreed a developer (#17), adding: "They can go to the planner, and the planner says, well, that's the zoning. Sorry."

Moreover, while Seattle developers can request a parcel-specific rezoning to change allowable uses, heights, parking, or other zoning provisions, such a "contract rezone" is considered a quasi-judicial City Council action. As such, lobbying and any other communications with council members are prohibited, and bargaining is not legally possible.[4] It's a "closed-book, closed-room process," said one activist (Interview #19).[5]

Laboratories of Planning

Rezoning and bargaining help to explain impacts within the plan boundaries. But what of the finding in both Seattle and San Francisco, that parking ratios have declined and densities increased in adjacent neighborhoods as well? In both contexts, part of the explanation is likely to lie in the similar economic and development trends that affected the entire city over the study period. But in San Francisco, the Market and Octavia Plan provided a laboratory to test new ideas, while in Seattle, station area plans provided a vessel to implement citywide innovations.

In San Francisco, the Market and Octavia Plan served as a political strategy to pilot progressive innovations where there were strong champions among neighborhood activists. "A tremendous amount of learning and experimenting was done on the back of this plan," wrote the policy director for SPUR, a regional urban policy nonprofit (Karlinsky, 2008). Policies such as parking maximums, curb cut restrictions, and removal of density controls would have not been politically feasible at the citywide level, at least initially. But through a spatially defined plan, planning staff could target geographic pockets of support.

According to one planner, opponents outside the plan area "don't feel like they have political license to critique [a policy such as parking maximums] because it doesn't apply to their neighborhoods" (Interview #2). But once implemented, local advocates have an evidence base to persuade elected officials to export the policies to other parts of the city. Particularly for policies that might meet resistance if initially proposed at a citywide level, a neighborhood-by-neighborhood approach provides the chance to build acceptance and familiarity. As one planner said:

> It's kind of like gay marriage [laughs]. One state, then another state, then a couple more, and then eventually all the dominos fall. You get a critical mass, and then everyone just becomes accustomed to it, and it just becomes the status quo. [Planner, San Francisco, Interview #2]

In Seattle, by contrast, planners saw station area plans as a mechanism to gradually ratchet up the strength of new planning policies. According to one, the goal was to enact incremental changes that were feasible at the time, but also to "draw the overlay and get it

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[4] See, for example, City of Seattle guidance at http://www.seattle.gov/dpd/publications/cam/cam228.pdf, and an informative analysis here: https://seattleslandusecode.wordpress.com/2011/06/18/just-not-my-type-type-iv-and-v-rezones/

[5] Bargaining certainly occurs in other land-use planning contexts in Seattle, suggesting that the capacity of community groups is not the constraint. One developer (Interview #17) highlighted the work of The Champion, a group formed to advocate for the implementation of community TOD goals at the Capitol Hill station site, and to champion the implementation of the Urban Design Framework plan. However, this advocacy focused on the redevelopment of land owned by Sound Transit, a public agency, rather than privately owned parcels covered by the more extensive and earlier station area plan.

mapped, and then we can always go back and add more tools to the overlay" (Interview #12). Minimum parking requirements provide a good illustration: they were phased out in station area overlay districts starting in 2006—five years after the overlay zones were adopted.

Station area plans thus helped implement citywide policy decisions, but had a limited causal role in spearheading the changes. If the overlay zones created by the station area plans had not existed, policymakers would likely have found other vessels for the parking policy changes. Indeed, minimum parking requirements were phased out in designated Urban Villages at the same time as in station area plans.

Conclusions

There is surprisingly little evidence about whether urban plans causally shape policy and development outcomes, and about the mechanisms through which any impacts come about. While a plan may be implemented, those outcomes might have happened regardless of the plan as a part of a case-by-case approval process. Indeed, some cities have sought to institutionalize such a case-by-case approach as a means to improve their ability to exact community benefits from developers, rather than rely on clear by-right development permissions (Manville & Osman, 2017; Metcalf, 2018).

This paper finds that transit-oriented development plans have had an impact in San Francisco, but only partly through the technical, legal process of rezoning. Rather, the Market and Octavia Plan has affected development outcomes through providing an anchor point for negotiations around individual projects. Moreover, the plan's impacts have been felt beyond its boundaries through providing a laboratory to showcase the success of novel zoning provisions such as parking maximums. This reflects a conscious strategy by staff and activists to target initial pockets of support for innovative policies, mirroring how green energy advocates in California have pioneered policies in progressive cities rather than aiming for a statewide rollout (Armstrong, 2019).

In Seattle, in contrast, station area planning has had more limited impacts. The land-use permit approval process in Seattle is more streamlined than that of San Francisco, and offers fewer entry points for community negotiation and bargaining, partly through restricting public input to the realm of design. Thus, of the three mechanisms identified in this paper, rezoning is of primary importance in Seattle, and much of this rezoning happened through earlier neighborhood plans rather than station area plans. Thus, the limited contribution of station area plans may speak more to the success of the city's other planning programs than any inadequacy of station area plans. In their study of New Orleans, Kaza and Hopkins (2009) emphasize the need to consider the complexities of interacting and partially overlapping plans. But the case of Seattle also shows that the implicit assumption that plans, especially if implemented, have causal impacts on the built environment warrants critical scrutiny.

Plans are certainly not the only factors that affect the parking, density, and development feasibility outcomes studied here. While beyond the scope of this paper, economic conditions, lender attitudes, transportation infrastructure, and building codes almost certainly affect the quantity and nature of development. Moreover, the mechanisms I identify are not

exhaustive; in other cities, there may be further ways through which plans exert causal impacts. For example, coordination of interdependent decisions may be an important mechanism in greenfield planning contexts, where sewer and other infrastructure expansion needs to match development locations (Hopkins, 2001). Generating knowledge, changing political preferences, or changing the way in which decision makers aggregate those preferences are other possible avenues (Millard-Ball, 2013). However, the interviews provide little evidence that these mechanisms are at play in the case studies considered here. Plans in both San Francisco and Seattle had considerable resources devoted to their development, both in terms of community participation and detailed technical analysis. But while this mass of background studies and outreach may have supported the legitimacy of the plans, it did not lead directly to impacts on the built environment. While some neighborhood activists did change their views, it was through seeing policies such as parking maximums work in practice, rather than debates within the planning process.

San Francisco and Seattle are atypical of US cities. Community members are well-organized and often well-versed in arcane provisions of the zoning code and review procedures. Established neighborhood groups have sometimes pressed for less parking and more affordable housing, in contrast to the more common scenario where local residents want more parking than the developer proposes. Coupled with the inherent limitations of case studies in providing findings that are generalizable to other contexts and that capture the full range of causal mechanisms, the results here should therefore be treated with caution.

In particular, the bargaining argument presented here presupposes that neighborhood activists embrace new development, or at least are not implacably opposed. If the main aim of local NIMBYs is to block a project, then it is hard to see how a plan can help. Possibly, planning processes may change attitudes and soften opposition, but that was not evident in the case studies here. In any city where development approvals are not by-right, opponents who prefer the status quo are unlikely to be swayed by the existence of a plan.

But in other cities, viewing planning as bargaining may help resolve the central puzzle addressed in this paper: why would developers and community members feel bound by the provisions in a plan when they can be revisited in the context of specific projects? In both case studies presented here, the high cost of revisiting zoning changes provides a partial answer. But in San Francisco, the plan has also provided an anchor that reduces the costs—monetary, time, and emotional—of relitigating controversies over parking and design. A plan represents a bundle of attributes such as allowable uses, heights, and parking. While individual neighborhood groups or developers might prefer a different outcome on certain attributes, a painful reopening of the entire process might generate a net loss. In this way, a plan can be a commitment mechanism, enforced by the costs of reopening up a carefully negotiated compromise. Since bargaining is normally a repeated process amid a stream of development proposals, staff, activists, and developers all benefit from avoiding time-consuming and expensive negotiations—battles, even—on each individual proposal.

A bargaining framework may seem more prosaic than grander aspirations for the power of planning. But it is not inconsistent with the idea that the process is as critical as the adopted text. A planning process that is short and costless to stakeholders can scarcely be expected to provide a solid anchor point, as there would then be little downside to reopening the underlying debates. Thus, one can speculate that a vague or aspirational plan that simply

consists of broad policy statements might be expected to have little impact on behavior. Similarly, if a stakeholder was not involved in shaping the plan, they have no vested interests in upholding the anchor point or compromise. But where the planning process provides a forum to generate an agreement that delivers benefits to developers and community members alike, its provisions may hold relatively firm. The more controversial, painful, and time-consuming the plan, the more limited will be the appetite of participants to reopen a carefully crafted compromise.

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Planning as Bargaining:
The causal impacts of plans in Seattle and San Francisco

Technical Appendix

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Case Selection

Potential case studies were identified using three screening criteria:

(i) The existence of a Transit-Oriented Development (TOD), station area, or similar plan that changed the quantity and/or character of allowable development

(ii) The existence of an arbitrary plan boundary that created a natural experiment and enabled the regression discontinuity analysis that is used in this study

(iii) A sufficient length of time post-adoption for any impacts of the plan to become evident (at least five years from data collection in 2016)

To the author's knowledge, no comprehensive list or database of TOD planning efforts exist. Therefore, potential plans were identified through a review of best practice guides for TOD planning, and web searches using keywords such as "TOD plan," "transit-oriented development plan," and "station area plan." The aim was not to enumerate the universe of all potential plans, but rather to identify several potential candidates for further consideration.

Most potential plans were screened out through criterion (ii), as plans (quite reasonably) tend to follow natural boundaries such as the edge of business districts, freeways, or well-defined neighborhoods. Where an arbitrary boundary exists, it is often applied through a citywide ordinance rather than a station-level planning effort, meaning that criterion (i) is not fulfilled (i.e., no plan exists). For example, Chicago's 2013 (and later updated) TOD ordinance reduced parking requirements and allowed increased building heights within a certain distance (600 feet to 0.5 miles) of rail stations, but in a blanket, citywide manner.

The following plans or sets of plans were identified as potential case studies (date of adoption in parentheses, and chosen case studies in bold):

- Portland, Oregon: Station Area Planning program (1980s and 1990s)
- **Seattle, Washington: Station Area Planning program (2001)**
- **San Francisco, California: Market and Octavia Plan (2008)**
- St Paul, Minnesota: Central Corridor Development Strategy and Zoning Study (2011)
- Denver, Colorado: Station Area Master Plans (2004–present)

The Seattle and San Francisco plans were chosen on several criteria. First, both planning efforts were in-depth with substantial technical analysis and community involvement, meaning that plans were likely to have an impact. Such "most likely" cases (Gerring, 2007) can help to falsify a theory, but also allow for an exploration of causal mechanisms, given that it is difficult to examine mechanisms when no effect exists. Second, the plans differ in many important ways: whether the rail stations were existing or planned, centrality in the urban region, and whether the plan was stand-alone or part of a wider program. Such a "diverse" case selection approach may be able to exemplify different types of causal mechanisms (Gerring, 2007). Third, the Portland and Denver programs span multiple cities and plans for different stations were adopted at different times, complicating the process of data collection and inference. While a case study could have consisted of a subset of the plans within a single city (e.g. the City of Denver), this would have resulted in a smaller sample in terms of the number of parcels, compared to San Francisco or Seattle. Fourth, the St Paul plans were adopted later than in the other potential case studies, leaving less time for an impact to occur.

Note that much of the case selection literature (e.g. Geddes, 1990; Gerring, 2007; Seawright & Gerring, 2008) assumes that the outcome is known at the outset and can inform decisions on which cases to choose. In this study, however, the outcomes emerged through the case study process, and limited information was available ex ante. Selecting diverse cases, therefore, was also a pragmatic strategy designed to increase the chances that at least one of the cases would have a positive outcome where planning did have a causal impact. While the diversity of the cases makes between-case comparisons more challenging, the benefit comes through additional opportunities for within-case analysis, which is the primary focus here. A second case study increases the likelihood that at least one will demonstrate a causal impact, and that the qualitative analysis will reveal a broader range of causal mechanisms.

Case Study Contexts

Seattle's Station Area Planning Program

Seattle's station area planning program began in 1998, in anticipation of the city's first light rail line, and followed on from extensive neighborhood planning efforts in the mid-1990s (see Sirianni, 2007 for an extensive discussion of that program). The light rail alignment runs from south of the airport through downtown to the University of Washington, and ultimately to points further north, and the first segment opened in 2009. Station area plans were completed and zoning changes enacted for eight stations by the City Council in 2001. The downtown stations were excluded from the rezoning effort, but otherwise the plans cover a wide variety of urban contexts, from the dense, mixed-use and vibrant Capitol Hill to the lower-density and lower-income Rainier Valley.[1]

The zoning changes enacted as part of the station area planning program took a variety of forms. Some parcels were rezoned entirely, for example from low-rise residential to neighborhood commercial, or height limits were increased. In other cases, the underlying zoning remained the same, but an overlay zone was added. This overlay relaxed and later eliminated minimum parking requirements, removed density limits, and prohibited certain auto-oriented land uses such as drive-through restaurants or coffee shops. For an extensive analysis of the impacts of reforming parking requirements in Seattle, see Gabbe et al. (2020).

Overall, the overlay zone and other rezonings involved relatively modest changes, particular compared with the San Francisco case study. For example, a common change was to introduce more stringent design standards through rezoning a Commercial parcel to Neighborhood Commercial. With a few exceptions, single-family zoning was untouched. The limited scope of station area plans was partly because extensive changes had already been introduced in the 1990s via the 1994 Comprehensive Plan, which designated urban villages where growth would be concentrated, and 38 subsequent neighborhood plans.

San Francisco's Market and Octavia Plan

The Market and Octavia Plan in San Francisco centers on two existing light rail stations (Church and Van Ness) and the parcels vacated by the demolition of the Central Freeway in 2003. Work on the plan commenced in 2000, a draft was published for public review in December 2002, and final adoption occurred in May 2008, following delays caused by funding shortages and environmental review (Karlinsky, 2008).[2] Hayes Valley and Duboce Triangle are the most prominent

[1] All plan materials are archived at http://www.seattle.gov/transportation/ppmp_sap_home2001.htm.

[2] All plan materials are archived at http://www.sf-planning.org/index.aspx?page=1713.

neighborhoods in the plan area, which consists of medium-density residential and mixed-use development, and is adjacent to the City's cultural and government institutions around City Hall. For context on the political struggles around gentrification, housing and mobility in the neighborhoods, see Cervero et al. (2009), Henderson (2014) and Foletta and Henderson (2016, Ch. 4).

One of the main goals of the Market and Octavia Plan was to enable a diversity of housing production while avoiding adding vehicle traffic to the neighborhood's already congested streets. To this end, some of the most significant zoning changes were (i) removal of density caps, meaning that the number of units would no longer be restricted as long as the project remained within height and bulk limits; (ii) replacement of minimum parking requirements with parking maximums of as little as 0.25 spaces per unit; (iii) substantially increased height limits in the southeast of the plan area, where there was less existing residential development, and smaller reductions in height limits on some residential streets and alleys; and (iv) urban design guidelines to maintain the character and walkability of the neighborhood. The plan also proposed a wide variety of transportation and public space improvements, partly supported by an impact fee on new development; and conducted a program-level environmental analysis intended to speed subsequent approvals of individual projects.

The Market and Octavia Plan was the first major rezoning in the neighborhood since the adoption of Neighborhood Commercial zoning in the 1980s. It introduced three new zoning classifications—Residential Transit-Oriented, Neighborhood Commercial Transit, and Downtown Residential. Particularly when compared to the incremental changes in the Seattle station areas, the Market and Octavia rezonings were more substantial and affected almost every parcel in the plan area.

Comparing Seattle and San Francisco

A summary of major changes in both case study areas is shown in Table 1 of the main text. Note that this table does not do justice to the complexity of the changes, which vary considerably between different zoning districts even within the same station or plan area. If the plans have an impact, these regulatory changes should be reflected in the outcome variables: the parking ratio (affected by the abolition of minimums and the introduction of maximums), density (which is affected through zoning provisions on parking, heights, and density), and the probability of redevelopment (which may be affected if increased densities make redevelopment more profitable). Not all regulatory changes, particularly design requirements, however, could be assessed in the quantitative analysis.

While the Seattle study area comprises the neighborhoods around eight geographically separated stations, and the underlying zoning was different in each, the overlay zoning regulations were identical, and were developed through a single planning effort. Other zoning changes were enacted as part of the same package. For this reason, Seattle station area planning is treated in this analysis as a single case study.

In San Francisco, by contrast, the Market and Octavia Plan was a discrete plan. While in the early stages of planning, Market and Octavia was part of a coordinated series of three plans under the city's "Better Neighborhoods" initiative, the other two plans are not directly comparable. The Balboa Park Station Area Plan was adopted a year after Market and Octavia, and focuses on a narrow strip along the Ocean Avenue commercial corridor along with publicly owned lands: rail yards, a reservoir, and a community college. The Central Waterfront planning effort, meanwhile, was folded into the larger Eastern Neighborhoods plan. Moreover, only Market and Octavia used the arbitrary quarter-mile radius from light rail stations as the basis for the plan area boundary, and is thus the only plan in San Francisco that satisfies case selection criterion (ii) as discussed above.

Quantitative Data Sources and Descriptive Statistics

I created two datasets for each city (San Francisco and Seattle). The **parcels** dataset consists of one observation for each tax assessment parcel. The **cases** dataset consists of one observation for each submitted land-use planning application. Note that not all of the submitted applications were approved, or were subsequently built even if approved. Also, some aspects of the development proposal may have changed post-submittal. The cases dataset illustrates developer intentions at the time of the application, rather than actual changes to the built environment.

San Francisco

Cases: The cases dataset was downloaded from data.sf.gov (September 8, 2016). The dataset is complete since 1999, but cases older than 1999 are not consistently recorded. It consists of cases that require Planning Department action, and excludes cases that require only a building permit (typically small additions or renovations).

The original dataset consists of 168,631 cases, which I restrict to the 17,412 cases on blocks within 0.5 miles of Octavia Boulevard or the Van Ness or Church light rail stations. I exclude cases involving minor land-use changes (e.g. a new deck, rear stair, wireless communication utility, advertising sign, legalization of an existing unit, or changes from one commercial use to another). Multiple records were merged (for example, many projects consist of a separate case for the project description, variance application, and environmental review), yielding a final total of 607 cases. A subset of 468 cases, which excludes projects with a large non-residential component, is used for the analysis of residential density.

The original cases dataset contains some information on unit counts, square footage and parking. However, these data are often inaccurate and inconsistently available. Therefore, a manual search of Planning Department records was conducted for each case, and where available, information from the environmental review or Planning Commission staff report was used in preference to the original cases dataset.

Geospatial data on zoning were downloaded from data.sf.gov. Locations of rail stations, Octavia Boulevard and the Market/Octavia Plan boundary were digitized manually, and zoning data and distances to light rail and the plan boundary were calculated in ArcGIS.

Parcels: The parcels dataset is based on year-2000 lot boundaries, downloaded from data.sf.gov (last accessed October 30, 2015), and restricted to lots on blocks within 0.5 miles of Octavia Boulevard or the Van Ness or Church light rail stations. Parcels that are zoned "P" are excluded, as they comprise parks, schools, and other public facilities. Historical tax assessment data for each parcel was purchased from the Office of the Assessor-Recorder. The existence of a planning application (i.e. a case) on each parcel and distances to light rail and the Market/Octavia Plan boundary were calculated through spatial joins in ArcGIS.

Seattle

Cases: The cases dataset was downloaded from data.seattle.gov (October 9, 2016). The original dataset consists of 11,763 land-use planning cases, which is reduced to 6,833 cases after dropping those involving minor land-use changes (e.g. wireless communication utilities, sidewalk cafe seating, or parcel boundary adjustments). Land-use permits related to the same case were merged, and the

sample restricted to parcels within a zoning polygon within 0.5 miles of a station in the Station Area Planning program, yielding a final total of 948 cases. The original cases dataset contains some information on unit counts, square footage and parking, which were supplemented through scraping the City's permit data website and through a manual search of Planning Department records (mainly, the Design Review proposals and staff reports).

GIS data on zoning information were downloaded from data.seattle.gov. The locations of light rail stations were digitized manually. Zoning for each case and parcel, and distances to light rail and the plan boundary were calculated in the Python GeoPandas library.

Parcels: The parcels dataset is based on the 2003 lot boundaries, purchased from King County, and restricted to lots within zoning polygons within 0.5 miles of a station in the Station Area Planning program. Historical tax assessment data were also obtained from King County. The existence of a planning application (i.e. a case) on each parcel and distances to light rail were calculated through spatial joins in GeoPandas.

The main analyses for both cases and parcels exclude single-family zoned parcels, given that they were generally excluded from the overlay zoning and more general rezoning efforts.

Regression Discontinuity Design

In both cities, the quarter-mile radius provides the basis for the plan boundaries. However, the radius was interpreted differently by planners in each city, for example to ensure uniform zoning within a block, and therefore the zoning changes do not precisely correspond to the quarter-mile limit.

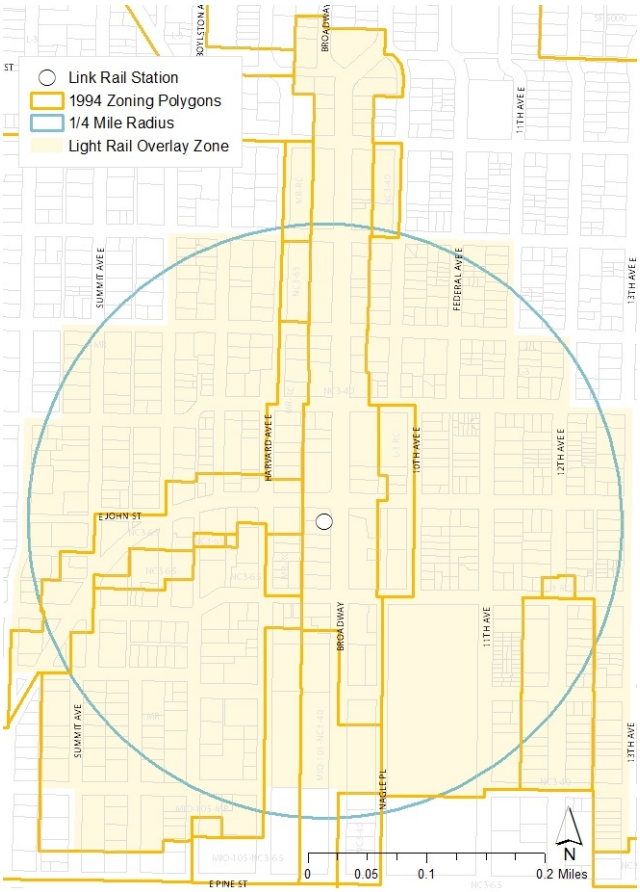
Specifically, in San Francisco, a *parcel* generally lies within the plan area if any part of the *block* is less than 0.25 miles from Octavia Boulevard, or from the Church or Van Ness light rail stations. However, the northern boundary does not follow the quarter-mile radius precisely, and the plan boundary was also modified slightly before adoption (the difference between the "draft" and "adopted" plan boundaries in Figure 2 in the main text).

In Seattle, a *parcel* could be rezoned if any part of the original zoning *polygon* was within a quarter mile of the then-proposed station entrance. For example, a parcel 0.3 miles from the station could be rezoned if it was part of a larger zoning polygon that extended closer to the station. Figure A-1 shows an example at the Capitol Hill station. Moreover, in Seattle, most single-family residential and other lower-density parcels were excluded from rezoning, even if they were within the one-quarter mile, as part of a political compromise. Note that I use the term "rezoning" to refer to the addition of an overlay zone or a substantial change in parking requirements, heights or similar code provisions, even if the zoning category (e.g. Neighborhood Commercial) for that parcel remains the same.

To take account of the imperfect match between the plan boundaries and zoning changes, I use a fuzzy Regression Discontinuity Design (RDD) in both cities. A fuzzy RDD takes advantage of the fact that the *probability* of "treatment" (i.e., rezoning) changes at the discontinuity, even if the relationship is not deterministic (Imbens & Lemieux, 2008). I use distance from the nearest light rail station (and, in San Francisco, Octavia Boulevard) as an instrument for the treatment, i.e. being in the plan area.

The RDD implicitly controls for important factors such as demand for development and quality of transit service, as well as other observed and/or unobserved variables. The statistical analysis does not compare Seattle to San Francisco, but rather a parcel just inside the arbitrary plan boundary to one just outside. That means that market demand, transit, etc. are effectively the same, with the differences in distance to transit controlled for by a quadratic distance term. Other covariates are added, but with the purpose of improving the precision of estimates—they are not necessary to avoid bias, subject to the RDD assumptions.

Figure A-1 Boundaries of Light Rail Overlay Zone, Capitol Hill



Boundaries of the light rail overlay zones are based on the 1994 zoning polygons. In general, a polygon is included in the overlay if any part of it falls within a quarter-mile radius from the station entrance. This example shows Capitol Hill station.
Map drawn by Brandon Nyo.

Results: San Francisco

The regression discontinuity results for San Francisco are presented in Table A-1. Separate models are estimated for three different time periods: prior to the publication of the draft plan, between publication of the draft plan and adoption of the final plan, and post-adoption. This approach allows the impacts of the planning process to be captured, and also provides a check on the results given that no impact should be evident in the pre-draft period.

The first stages are all strong and statistically significant, indicating that the distance from light rail or Octavia Boulevard is an excellent predictor of being in the plan area. The second stage indicates the impact of being in the plan area on the three dependent variables: probability of redevelopment (using a probit model), and parking ratios and residential density (using linear models). The first model includes no covariates, while the second model controls for the quadratic distance to the closest light rail station, as well as the other variables listed in the notes to Table A-1.

Both sets of estimates—with and without covariates—support the impact of plan adoption on parking ratios and development densities. Being in the plan area post adoption reduces parking by 0.39 spaces per unit, and increases density by exp(0.6748) – 1 * 100) = 96%. There is also some support for an impact on the probability of development, although the statistical significance is less strong and there is no effect in the model without covariates. There is no statistically significant impact in the two pre-adoption time periods on any of the three dependent variables, which supports the hypothesis that the plan itself, rather than unmeasured characteristics of the neighborhood, causes change in the built environment.

The relationship between the dependent variables and the instrument (distance of the block from the light rail station or Octavia Boulevard) is plotted in Figure A-2. The distance is expressed as whether the block is inside (negative distance) or outside the quarter-mile buffer that was the basis for determining the plan boundaries. The lower-right panel indicates the strength of the instrument; the probability of being in the plan area is high within the quarter-mile buffer, but drops as the distance increases. The remaining panels are harder to interpret, because the RDD is not "sharp." However, the trends over time in parking ratios and densities are evident in the shifts between the red (pre-draft), blue (draft plan), and green (adopted plan) lines. The impact of the plan is indicated by the difference between the solid and dotted green lines.

Table A-1 Regression discontinuity estimates: San Francisco

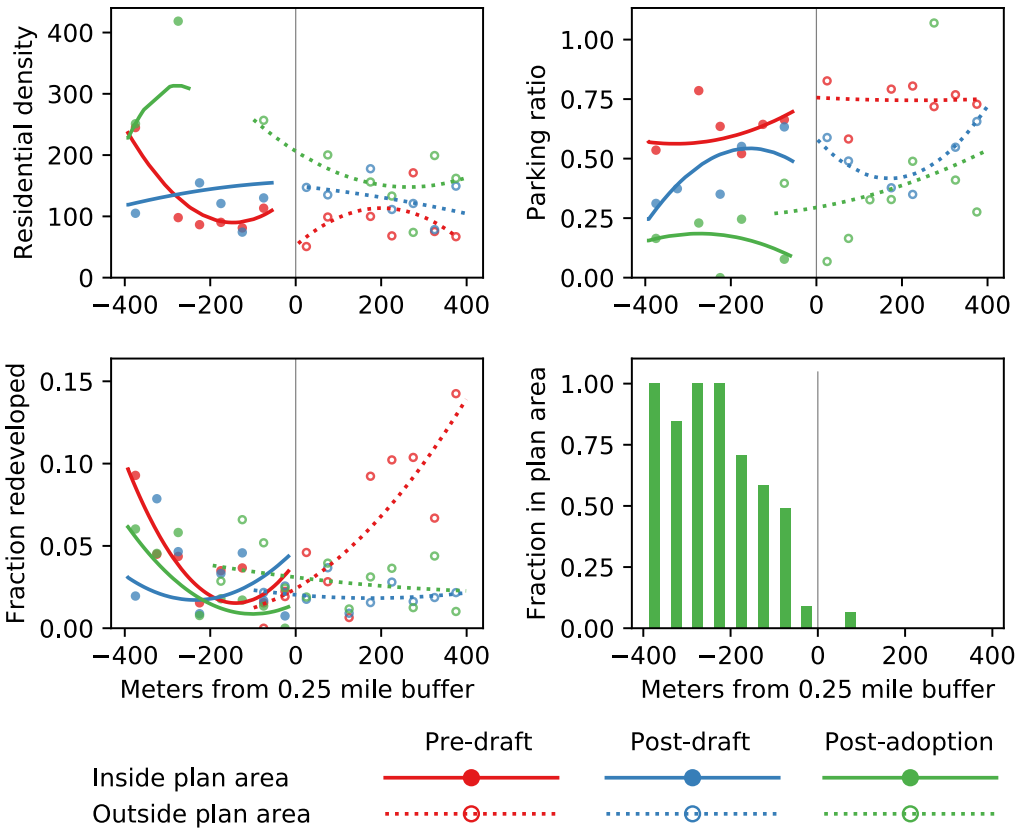
Dependent Variable	Time period	(1) No covariates		(2) With covariates		N
		First stage	Second stage	First stage	Second stage	
Development	Before draft plan	-0.0018*** (0.0001)	-0.5181** (0.2483)	-0.0016*** (0.0001)	-0.4372 (0.2849)	10,573
	After draft plan	-0.0019*** (0.0001)	0.0529 (0.1630)	-0.0017*** (0.0001)	-0.0153 (0.1438)	10,573
	After plan adoption	-0.0019*** (0.0001)	-0.0633 (0.1822)	-0.0017*** (0.0001)	0.3124** (0.1151)	10,573
Parking ratio	Before draft plan	-0.0016*** (0.0001)	-0.1732 (.0953)	-0.0014*** (0.0001)	-0.0160 (0.1547)	147
	After draft plan	-0.0018*** (0.0001)	-0.1003 (0.0976)	-0.0015*** (0.0002)	-0.1745 (0.1363)	93
	After plan adoption	-0.0016*** (0.0001)	-0.2790** (0.0859)	-0.0016*** (0.0001)	-0.3944*** (0.1076)	160
Log density	Before draft plan	-0.0016*** (0.0001)	0.4287 (0.1698)	-0.0014*** (0.0001)	0.4753 (0.1811)	187
	After draft plan	-0.0018*** (0.0001)	0.2140 (0.1955)	-0.0016*** (0.0001)	0.3384 (0.1602)	104
	After plan adoption	-0.0016*** (0.0001)	0.7562** (0.2261)	-0.0015*** (0.0001)	0.6748*** (0.1785)	109

* p<0.05 **p<0.01 ***p<0.001

Covariates for all dependent variables: distance to closest light rail station (linear and squared terms); zoning in the year 2000; parcel size. Additional covariates for the "development" models: ratio of land value to improvement value. Additional covariates for the "parking ratio" and "density" models: binary variables that indicate whether a project consists of senior or affordable housing and is primarily residential; binary variables for each year.

Coefficients indicates the impact of being in the plan area, instrumented using the distance from the block to Octavia Blvd or the Church or Van Ness light rail stations. Standard errors are robust, and for the probit model are clustered at the block level.

Figure A-2 Regression discontinuity estimates: San Francisco



Markers indicate the mean of each variable within a 50m distance band between the block and Octavia Blvd or the Church or Van Ness light rail stations. Lines indicate the quadratic fit, estimated separately inside and outside the plan area. Only distance bands with a minimum sample of size of 5 cases or 50 parcels are shown.

Results: Seattle

The regression discontinuity results for Seattle are presented in Table A-2. In contrast to the San Francisco estimates, only a single time period is used due to the unavailability of data prior to adoption of the zoning changes.

The first stages are strong and statistically significant in all but one case, indicating that the distance of the zoning polygon from light rail is an excellent predictor of being in the overlay zone. The second stage indicates the impact of being in the overlay zone on the three dependent variables: probability of redevelopment (using a probit model), and parking ratios and residential density (using linear models). The first model includes no covariates, the second model controls for the quadratic distance to the closest light rail station, and the third controls for quadratic distance as well as the other variables listed in the notes to Table A-2.

The relationship between the dependent variables and distance from the light rail station is plotted in Figure A-3 in a similar manner to Figure A-2. The distance is expressed as whether the closest point in the zoning polygon is inside (negative distance) or outside the quarter-mile buffer that was the basis for determining the overlay zone boundaries. The lower-right panel indicates the strength of the instrument; the probability of being in the overlay zone is high within the quarter-mile buffer, but drops as the distance increases. Any impact of the zoning overlay is indicated by the difference between the solid red and dotted blue lines.

Neither the table of statistical estimates nor the figure provide support for the hypothesis that the overlay zone has affected parking, density, or development decisions in Seattle. The second stage estimates are either statistically insignificant or (in the case of Model 2 and log density) have an opposite sign to what would be expected. The plots in Figure A-3 show considerable overlap between outcomes on parcels at the same distance to light rail, with and without the overlay zoning.

To explore potential heterogeneity in the impacts of the plans between the eight different stations, the estimates in Table A-2 were recalculated on a station-by-station basis. To avoid collinearity problems at some stations where the sample is small, the Model 2 specification was used, which controls only for the quadratic distance to the rail station. Four of the 24 estimates showed a significant ($p<0.05$) impact—for the impact of the plan on the parking ratio at Capitol Hill, and on the probability of development at Capitol Hill, Othello, and Roosevelt. However, these estimates are inconsistent—at Othello, the plan has a positive impact on development, while at the other two stations the impact is negative. Moreover, neither result at Capitol Hill (for parking nor for development) survives the addition of the controls per the specification in Model 3. Thus, even for individual stations, there is little robust evidence of an impact of the station area plans, with the exception of development at Othello. And even at Othello, the statistical significance is weakened due to multiple comparisons.

Table A-2 Regression discontinuity estimates: Seattle

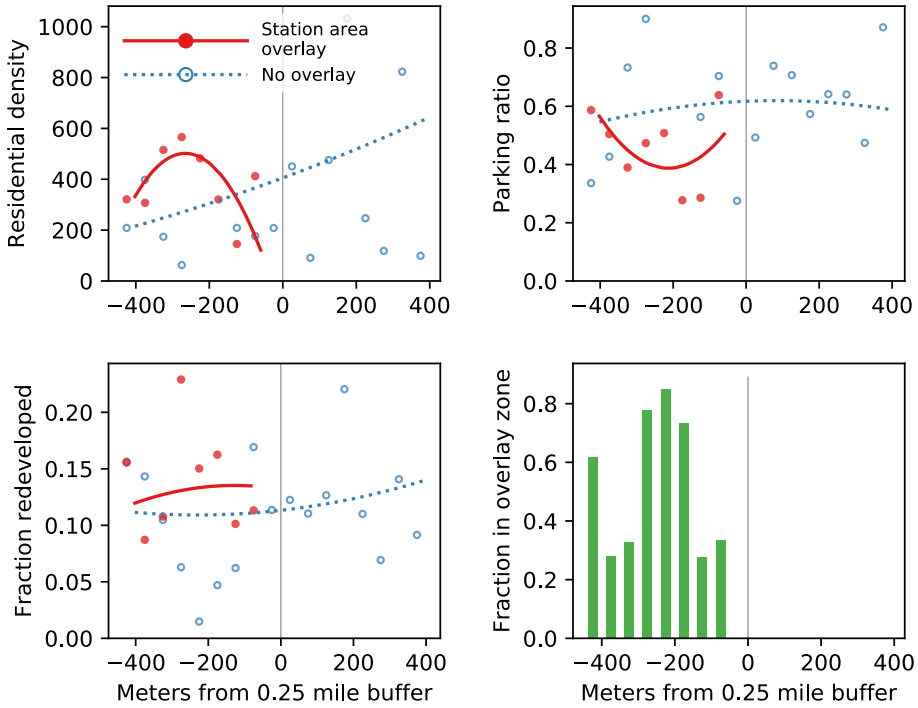
Dependent Variable	(1) No covariates		(2) Distance to rail only		(3) All covariates		N
	First stage	Second stage	First stage	Second stage	First stage	Second stage	
Development	-0.0007*** (0.0001)	-0.1623 (0.2036)	-0.0003*** (0.0001)	-0.7799 (0.5514)	-0.0002** (0.0001)	-0.2953 (0.6553)	7998
Parking ratio	-0.0007*** (0.0001)	-0.1871 (0.1070)	-0.0004*** (0.0000)	-0.0464 (0.22976)	-0.0002*** (0.0000)	-0.9494 (0.6700)	521
Log density	-0.0008*** (0.0001)	-0.4692 (0.3226)	-0.0002*** (0.0000)	-4.1922*** (1.1351)	-0.00004 (0.00005)	3.0735 (6.9120)	434

* p<0.05 **p<0.01 ***p<0.001

Covariates for all dependent variables: distance to closest light rail station (linear and squared terms); zoning in the year 1994; parcel size; and binary variables for each station. Additional covariates for the "development" models: ratio of land value to improvement value. Additional covariates for the "parking ratio" and "density" models: binary variables that indicate whether a project consists of congregate housing; linear time trend.

Coefficients indicates the impact of being in the plan area, instrumented using the distance from the zoning polygon to the nearest light rail station. Standard errors are robust, and for the probit model are clustered at the block level.

Figure A-3 Regression discontinuity estimates: Seattle



Markers indicate the mean of each variable within a 50m distance band between the zoning polygon and light rail station entrances. Lines indicate the quadratic fit, estimated separately inside and outside the station area overlay zone. Only distance bands with a minimum sample of size of 5 cases or 50 parcels are shown.

Interview Protocol

The semi-structured interview protocols consisted of open-ended questions that were intended as prompts to start a conversation and explore specific themes. The number of questions varied by interviewee, partly because the interview protocol was adapted for each interviewee, partly for reasons of time, and partly because follow-up probes were added based on the initial responses. Questions were generally drawn from the following list.

Introduction

Introduce aim of research project

Walk through human subjects agreement, and request permission to record

Explain that interview will be confidential, and no identifying information will be published

How would you describe your role?

For how long have you worked with/been involved with these planning issues?

Planning and rezoning

What was your involvement in the planning process? Over what period?

What were your overall goals and priorities for the process?

Talk me through the process and your involvement

For you, what are the most important elements of the plan and rezoning? Probes: Heights, uses, parking requirements, urban design, density, others

How has the plan been working out to date? Have you been pleased/disappointed with some of the specific development proposals that have come forward? In what way?

Project Review/Approval

What are some of the major projects that have come forward recently in the neighborhood or that you've been involved with?

[Using specific examples] Talk me through the process. What happened?

What are your priorities during the project review process? What are you looking to achieve?

Do projects like this typically conform with the plan and zoning? If not, where do you see the departures? Uses? Heights? Parking? Others?

On which issues do you spend the most time? Uses? Heights? Parking? Design? Others?

How does being close to rail transit affect your process/decision? To what extent do you handle these projects differently? Would your process/goals for a project be different if it were further away from the station?

What worked well with this project? What would you have liked to see come out differently?

To what extent are you focused on maintaining conformance with the plan and zoning? Or is your main goal to get the best project possible? Is there any difference between the two?

Zoning has to have boundaries. To what extent do you pay attention to the boundaries? E.g. if a project is right on the boundary, does this make any difference? Are there examples?

Has the plan made the development review process easier for you? More difficult? In what way?

Other issues

What are the lessons learned? What would you like to see done differently?

What is the most important benefit of the plan? Any downsides?

Anything else that you'd like to add?

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