Presented by:
Trevor McIntyre, Director, IBI Group
Bankim Kalra, Team Leader- Urban Planning and Design, IBI Group India
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– BD 2011 World Architecture 100, January 2011
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- Intelligent Transportation Systems; Smart
- Buildings; Communications Systems;
- Revenue Systems
Metrolinx Mobility Hub Guidelines, Greater Toronto & Hamilton Area Area
vivaNEXT Bus Rapid Transit  York Region, ON, Canada
WHAT IS TOD?
THE QUESTIONS

- WHAT IS TOD?
- WHAT ARE THE DESIGN PRINCIPLES OF TOD?
- WHAT TOD PRINCIPLES ARE APPLICABLE IN THE INDIAN CONTEXT?

“Sustainable Urbanism” -- an integrated approach to transportation and land use planning.
“Transit-Oriented Development is regional planning, city revitalization, suburban renewal, and walkable neighborhoods combined. It is a crosscutting approach to development that can do more than help diversify our transportation systems: it can offer a new range of development patterns for households, businesses, towns, and cities.”

— Peter Calthorpe, The New Transit Town
**TRANSIT ORIENTED DEVELOPMENT**

\[ T = \text{Transit frequency and usefulness} \]

\[ O = \text{Orienting infrastructure for making pedestrian connections between transit and development} \]

\[ D = \text{Development featuring a mix of uses and densities} \]

Source: Dena Belzer, Strategic Economics
TOD IS NOT ONLY ABOUT REDENSIFICATION AND REDEVELOPMENT...

... IT IS ALSO THE INTEGRATION OF THE VARIOUS COMPONENTS OF SUSTAINABLE COMMUNITY PLANNING INTO A HOLISTIC FRAMEWORK
Transit Oriented Development (TOD) refers to residential and Commercial Centers designed to maximize access by Transit and Non-motorized transportation, and with other features to Encourage Transit Ridership. **A typical TOD has a rail or bus station at its center, surrounded by relatively high-density development, with progressively lower-density spreading outwards one-quarter to one-half mile, which represents pedestrian scale distances.**

**Vibrant, compact, mixed use neighbourhoods containing a range of housing types, workplaces, shops, entertainment, schools, parks, and civic facilities essential to the daily lives of residents – all within a 5 to 10 minute walk from a transit station.**
“Now, I am able to combine and comprehend the meaning of "Bus do kadam", "75 m" and "400-600m" which collectively signifies that the Bus should be available within do kadam i.e. within a walking distance.”

Mr. L.K. Panigrahi, Chief Engineer (Projects)
Naya Raipur Development Authority
✓ Density, Design and Diversity

✓ Engineering, Education and Enforcement

✓ Safe and efficient Integration of all possible transport modes

✓ Social and cultural constraints for Vertical Mixed use development

✓ Physical Infrastructure Limitations for Higher densities

✓ Integrating informal sector

✓ Parking Policy /Standards

✓ Implementation Challenges and Political Constraints
Naya Raipur
Transit Oriented Development Study
TOD IN A GREENFIELD CONTEXT

DESIGNING A NEW CITY FOR SUSTAINABLE MOBILITY

- Comprehensively planned new cities offer an important solution to meet the nation’s urban crisis
  - Opportunity to create high-quality sustainable “places”
  - Reconnect people and planning proactively
  - Upfront infrastructure development
  - Strong leadership support and political will
  - Enable design of community driven processes and systems

Challenges/ Unknowns

- Population composition?
- Employment Generators?
- Local Real Estate Market capacity?
• Connecting the dots between multiple initiatives

• How do we integrate TOD principles within functional and in-progress projects?

• Do we need more density or redistribution of densities?

• How do we integrate planned transit with proposed land uses?

• Is the development code supportive of TOD principles?
UNFOLDING THE NAYA RAIPUR STORY

MASTER PLAN SALIENT FEATURES

- INSPIRED BY CORBUSIER’S CHANDIGARH & OTHER CAPITAL CITIES AROUND THE WORLD
- GARDEN CITY DENSITY - 560,000 PEOPLE IN 80 SQ.KMS.
- DIVERSE EMPLOYMENT BASE PROPOSED
- GREEN BELT AS AN URBAN GROWTH BOUNDARY
- MEGA BLOCK GRID SYSTEM - 800m X 800m SECTORS
- MONUMENTAL SCALE - 100m & 60m WIDE ROADWAYS
- AUTOMOBILE ORIENTED POLICIES - 2PPH ASSUMPTION
- SEGREGATED LAND USES
- EXTENSIVE OPEN SPACE NETWORK
UNFOLDING THE NAYA RAIPUR STORY

MASTER PLAN PHASE 1 IMPLEMENTATION

- PARALLEL PLANNING & CONSTRUCTION EFFORTS INITIATED - URBAN DESIGN STUDY/ CBD STUDY/ BRTS / NMT / TOD STUDY

- COMPREHENSIVE CITY WIDE MOBILITY PLAN - MISSING LINK

CONSTRAINTS

- ENVIRONMENTAL + NATURAL FEATURES CONSTRAINTS

- VILLAGE INTEGRATION & DEVELOPMENT POLICIES (120 sqm PER ADULT MEMBER)

- NET / GROSS LAND RATIOS NOT EFFICIENT

- MARKET ACCEPTANCE & DEVELOPER AWARENESS
The vision for the Naya Raipur TOD Study is to develop a transit supportive framework that supports a series of seamless self-sufficient neighbourhoods in Naya Raipur each with a distinct character- linked with sustainable mobility options.
**TOD PRINCIPLES FOR NAYA RAIPUR**

1. **MULTIMODAL TRANSIT STATION**
   Transit is at the heart of transit oriented development and transit facilities should be designed to connect with, not be isolated from, the surrounding neighborhood. People should have their choice of transportation modes including cars, bicycles, BRT, LRT, two wheelers, cycle rickshaws, and auto rickshaws.

2. **INTERCONNECTED STREET PATTERN**
   An interconnected street pattern is a traditional urban design technique that reduces congestion, encourages travel choice, and supports mixed use development. Block lengths should not exceed 400m.

3. **MIXED USE DEVELOPMENT**
   A mix of diverse and complimentary land uses in a compact pattern allows residents and workers to walk to work or to shop rather than driving for all daily needs.

4. **WALKABILITY**
   Pedestrian-friendly environments allow walking to be a pleasant, safe, and efficient alternative to (or extension of) the automobile. This includes design features such as safe crossing points near transit stations, shaded pedestrian routes, and continuous sidewalks and paths.

5. **COMPACT DEVELOPMENT**
   The scale of transit oriented development approximates the scale of the pedestrian. The extent of these neighborhoods is based on a comfortable walking distance from edge to centre (approximately 400 to 800 metres in radius).

6. **STREET FACING BUILDINGS**
   Buildings should be placed near streets, not behind parking areas, to better define the street. Streetfront retail should be provided to humanize the building wall and activate the sidewalk. Building entrances should be close to transit entrances.

7. **URBAN PLACEMAKING**
   Transit oriented development is defined as much by its public realm as its private development. Public and semi-public spaces enable the neighborhood infrastructure to build community bonds, social interaction, and community participation.
TOD PRINCIPLES FOR NAYA RAIPUR

8. STREETSCAPE DESIGN
A highly connected street pattern with design elements coordinated to provide visual interest, pedestrian amenity, and sense of place improve the desirability of walking and shortens perception of distance.

9. BICYCLE FRIENDLY STREETS/PARKING
Bicycles are efficient ways to expand the service area of the station without relying on automobiles or bus service. Bike lanes, bike routes, and secure parking make the bicycle an easy option.

10. URBAN PARKS & PLAZAS
A variety of public open spaces near transit stations contribute to a sense of place, foster healthy communities, and provides places for interaction.

11. ARCHITECTURAL VARIETY
Promoting an architectural style that is pedestrian friendly, contains visual variation and, with improved economics of higher density, higher quality building materials.

12. WELL-DESIGNED TRANSIT STATION FOR A HIGH QUALITY USER EXPERIENCE
The transit station will be a focal point and a gateway to the regional transit network. Its design will be paramount to ensure a that a seamless, accessible, and attractive customer environment and experience.

13. REDUCED PARKING STANDARDS
By reducing parking standards to reflect increased transit use and walking, the amount of site area that can be used for active uses or public amenities increases.

14. SAFETY & SECURITY/CPTED
Developing the pedestrian environment to maximize safety and security will enhance patron experience and transit ridership.

15. MARKET ACCEPTANCE & SUCCESSFUL IMPLEMENTATION
A TCD is successful when it attracts sufficient jobs and residents to create a vibrant, transit supportive place. In order to ensure success of a TCD, strategies should be flexible, designed to respond to the diverse nature of the station areas, their surrounding community contexts, and Naya Raipur’s development market.
<table>
<thead>
<tr>
<th>Key Ideas</th>
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<tbody>
<tr>
<td>1. Demarcation of TOD Influence Zone or “Station Area” – Station Area Planning vs Sector Based Planning</td>
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<td>2. Complete Streets Approach</td>
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<td>3. Best Practices Approach – Station Area Typologies as Building Blocks of TOD in Naya Raipur</td>
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<td>4. Station Area TOD Planning Toolkit</td>
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<td>5. Transit Supportive Development Code</td>
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GAP: SEGREGATED LAND USE + UNDERUTILIZED RIDERSHIP

RECOMMENDATION – REPLACE SECTOR BASED PLANNING WITH STATION AREA PLANNING
KEY IDEAS – STATION AREA TYPOLOGIES

Create seamless neighbourhoods - each with a distinct character - linked with diverse mobility options

- No “One-size Fits All” solution for TOD Station Area Development;

- Different TOD Stations Areas have different Land Uses / focus, cultural context, & character;
# KEY IDEAS – STATION AREA TYPOLOGIES

<table>
<thead>
<tr>
<th>Regional Intermodal Gateways</th>
<th>Urban Core (CBD)</th>
<th>Employment Centers</th>
<th>Destination Nodes</th>
<th>Transit Neighbourhoods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermodal Stations which are the first point of arrival to Naya Raipur such as intercity railway stations</td>
<td>Stations which serve the main business areas such as Central Business District</td>
<td>Stations which provide access to the main public / semi public amenities &amp; offices.</td>
<td>Stations which provide access to Naya Raipur’s unique destinations.</td>
<td>Stations which knit Naya Raipur’s main residential sectors with the rest of the City.</td>
</tr>
</tbody>
</table>
KEY IDEAS – COMPLETE STREETS APPROACH – 100M ROW WITHOUT BRT
KEY IDEAS – COMPLETE STREETS APPROACH – 100M ROW WITH BRT
15.6.3. DEVELOPMENT CONTROLS FOR PUBLIC REALM (ADDITIONAL SECTION UNDER 15.6)

It is important that individual buildings collectively promote a well-defined sense of place and provide comfortable, safe, and attractive streets and public spaces. Whether in a mixed use commercial or residential area, a safe, interesting, and engaging public realm encourages walking or cycling and makes the transit system more attractive to potential users. Providing visual interest at the pedestrian scale through thoughtful landscaping, lighting and building design will encourage people to use the public realm and help contribute to an active urban life.

- The development in Naya Rasapur should:
  a) Create a vibrant public realm that is universally accessible, safe, and comfortable for users of all ages, genders, and socioeconomic backgrounds;
  b) Promote mix of uses, active building frontages, and informal street uses to create round-the-clock activity;
  c) Use passive climate control strategies to make the public realm comfortable all day and all through the year;
  d) Maximize pedestrian linkages in the public realm to encourage pedestrian activity;
  e) Create approachable, active, porous, and aesthetically pleasing building frontages, well designed lighting and amenities to make the public realm safer and more attractive;
  f) Plan for informal users, viz. hawkers in the public realm, such that they encourage activity but do not prohibit pedestrian and NMV movement.
GAP: DENSITY ALLOCATION IN RELATION TO TRANSIT CORRIDORS

RECOMMENDATION: REDISTRIBUTION OF DENSITIES BASED ON PROXIMITY TO TRANSIT SERVICE
DEMONSTRATION STATION AREA BASED ON TRANSIT ORIENTED DEVELOPMENT STRATEGY

VEDANTA STATION AREA
Typical Transit Neighbourhood Sectors Grid
Phase 1 BRT Alignment
Station Area - 400m / 5 min walk & 800m / 10 min walk
Existing Conditions Review
Preserve Existing Natural Features
Integrate Existing Village; Village Road & Connections to Sector 36 - Vedanta Hospital
Proposed Green Spaces as per NRDA Plan 2031 Provide East-West Green Connections to link existing natural features
VEDANTA STATION AREA AS PER NRDP 2031

Streets & Blocks Pattern
Proposed Land Use as per NRDA Plan 2031
Highest Densities are proposed closest to BRT ROW & Station
Medium Density along Principal Roads within Sector
Public / Semi-Public Amenities as per Proposed Land Uses, NRDA Plan 2031
Medium / Low Density Residential Development as per densities outlined in NRDA Plan 2031
VEDANTA STATION AREA AS PER TOD STRATEGY

Transit Plaza & Urban Placemaking
Develop a high-quality transit plaza integrated within an urban park system including a full range of park types, open spaces, greenways, private, semi-public and public areas, identify and enhance existing places and landmarks and develop new landmarks.

Proposed Land Use as per TOD principles:
- Commercial-Retail Use: right next to the Station Area and away from the bus and street junctions with easy accessibility from inside the sectors.
- Mixed Use Type 2 (Commercial-Retail, Offices & Business facilities), nearest to the Station Area along the Major Access Roads and most conveniently located between 400m influence area of both the Stations.
- Mixed Use Type 1 (Commercial-Retail, Public-Semi Public & High Density Residential & Affordable Housing), within 400m radius walking distance of the Station Area around the Commercial-Retail & Mixed Use Type 2 for better accessibility to the Station & Major Access Roads.
- Public-Semi Public Facilities (Educational, Health, Religious, etc.) Most conveniently located along the Major roads with good accessibility from inside the sectors.
- Medium Density Blended Residences near the station area and the Sector Edges, Low Density Blended & Potted Residences in the middle of the sectors outside 400m boundary but within 600m boundary.
The Toolkit is a guide which will assist NRDA in the process of developing Station Area Plans.

Toolkit will be applicable to all Stations including 14 Existing & Future Stations

The Toolkit is Comprised of Four Frameworks

- FRAMEWORK 1 – IDENTIFY CHARACTER OF STATION AREA
- FRAMEWORK 2 – REFINE BOUNDARY OF STATION AREA
- FRAMEWORK 3 – DEVELOP STATION AREA PLAN
- FRAMEWORK 4 – IMPLEMENTATION MECHANISMS
IMPLEMENTATION FRAMEWORK

1. Legal Framework - Planning and Regulatory Changes
2. Administration and Enforcement
3. Financing Mechanisms
4. Creating a Market for TOD - Catalyst Projects; Incentives and Subsidies
5. Monitoring and Evaluation
6. Phasing Strategies
7. Capacity Building
"A developed country is not a place where the poor have cars. It's where the rich use public transportation."

Mayor of Bogota