

AGGREGATE SUPPLY TRENDS AND RECLAMATION OPPORTUNITIES

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ABSTRACT

The majority of the Greater Toronto Area aggregate production comes from the Niagara Escarpment Plan Area or the Oak Ridges Moraine. Both of these areas are highly regarded for their environmental and recreational values. Planning for the continuing supply of essential non-renewable aggregate resources must be sensitive to the environmental and recreational attributes of these close to market supply areas. Ecologically orientated rehabilitation plans are an important component of this planning exercise. Well planned extraction in conjunction with good progressive rehabilitation can provide opportunities for ecological enhancement and community benefits.

The paper will outline some of the general trends affecting aggregate resource planning and highlight recent projects which emphasize ecological restoration and community benefits.

The author is a consulting resource planner with 15 years of experience in the field. This includes both broad policy issues and detailed site specific approvals and design. The author is also a member of the Canadian Land Reclamation Association and Past President of the Ontario Chapter.

THE IMPORTANCE OF CLOSE TO MARKET SUPPLY AREAS

Provincial policy and sound planning principles dictate that aggregate be supplied from close to market locations. Mineral aggregates are characterized by their high bulk and low unit value. The economic value of a deposit is a function of its proximity to the consumer as well as its quality and size. The importance of being "proximate" is directly related to the impacts of truck haulage which is estimated to account for 60% of the cost. In addition to economic advantages, use of close to market resources brings with it significant social and environmental benefits associated with reduced truck haulage. This explains the "close to market" component of Provincial Policy.



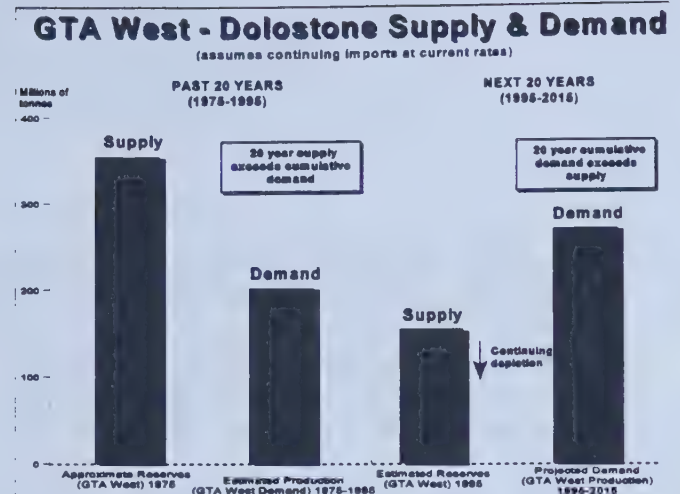
Ontario will need an estimated 3.5 billion tonnes of aggregate over the next twenty years. That is about 100 million truck loads. The distance travelled should be minimized to the greatest extent possible if environmental impacts are also to be minimized. The consequences of increased haul distance simply reflects the reality that trucks haul the aggregate from the deposit to the consumer and the further trucks have to travel the greater the impact on people along haul routes and on the environment in terms of fossil fuel consumption and emissions.

*"As much of the mineral aggregate resources as is realistically possible will be made available to supply mineral resource needs, as close to markets as possible."*¹

*"As far as it is reasonably possible to do so, each municipality should try to satisfy its need for aggregate from within its own boundaries. That is not only fair, it is government policy, and, in the public interest because the shorter the distance to transport the gravel, the lesser the costs to the consumer."*²

In Ontario, the most significant market area requiring delivery of close to market aggregate is the Greater Toronto Area (GTA). It is estimated that the GTA consumes 40-65 million tonnes per annum or about one third of the total provincial production.

Over the past 25 years, aggregate supplies in the GTA have been consumed at rates which greatly exceed the replacement of licensed reserves through the issuance of new licenses. Provincial studies have concluded that there is a critical need for new licensing.



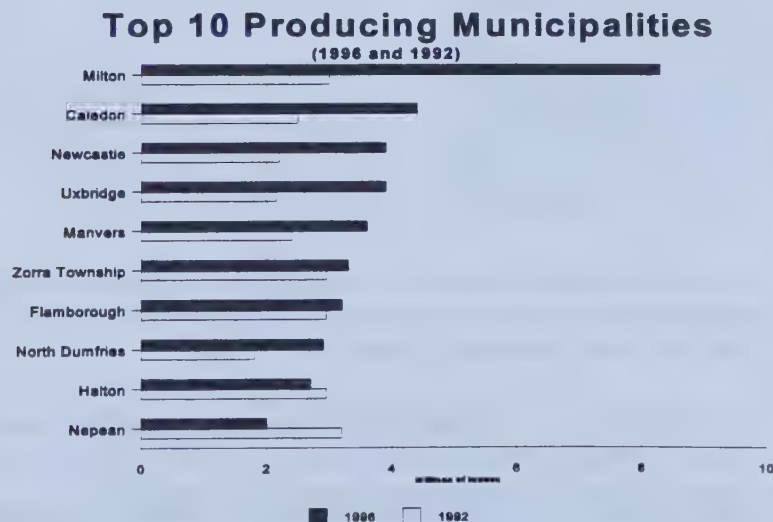
Source: MHBC Planning Limited/Clayton Research, 1998

GTA Close to Market Supply Comes From The Oak Ridges Moraine and Niagara Escarpment Plan Area

Aggregates are fixed location, non renewable resources. They can only be extracted in those areas where they occur. The key close to market areas for the Greater Toronto Area are:

1. The Niagara Escarpment Plan Area which includes both important sand and gravel deposits and provincially significant Amabel/Lockport Dolostone (which forms the caprock of the escarpment).
2. The Oak Ridges Moraine which contains large, good quality, sand and gravel deposits.

The GTA (and provincial) dependence on these supply areas is reflected in municipal production statistics. The top five producers (Milton, Caledon, Newcastle, Uxbridge, Manvers) all rely on aggregate deposits in the Oak Ridges Moraine and Niagara Escarpment Plan Area. 75% of GTA aggregate production comes from these two areas.



Source: Mineral Aggregates in Ontario, Overview and Statistical Update, 1992 and 1996, MNR, 1994 and 1998 respectively

The Oak Ridges Moraine (ORM) and Niagara Escarpment Plan Area share a number of general attributes and characteristics that must be taken into account in planning for continued aggregate supplies. These attributes and characteristics can be summarized as three-fold:

- **Environmental attributes:** Both the Niagara Escarpment Plan Area and the Oak Ridges Moraine are provincially recognized environmental resources. This history and geographic conditions in these areas contribute to their environmental sensitivity. Both areas provide significant wildlife habitats, contain concentrations of threatened, rare and vulnerable species and fulfil important hydrogeological functions. Both areas also include less sensitive environmental lands that are within the planning jurisdictions due to their association or proximity to other features.
- **Recreational attributes:** The extensive greenspace and proximity to urban areas means that both the Niagara Escarpment Plan Area and the Oak Ridges Moraine are subject to significant recreational pressures. The provincial interest in these areas is, in part, based on their recreational/greenspace values.

Planning objectives for the Niagara Escarpment Plan and Oak Ridges Moraine both reflect these environmental and recreational attributes:

- The proximity of these resource areas to urban centres also brings with it the reality of **pressures for residential development**. People wish to enjoy the benefits of City life while living in the Country side. These landforms are generally outside the prime agricultural areas and their scenic qualities contribute to their desirability as a place to live.

Demographers are predicting a significant movement back to rural areas. It has been termed the “rural population turn around” or “counter urbanization”. The “Popcorn Report” calls it “eco-settling”. David Foot observes that as people get older they want out of the City. This trend will be heightened by the communication revolution and the home office phenomenon.

These attributes and characteristics are reflected in the Provincial Plans and Policies that apply to these areas:

Introduction - The Niagara Escarpment Plan

The particular combination of geological and ecological features along the Niagara Escarpment results in a landscape unequalled in Canada. It is also a source of some of southern Ontario's prime rivers and streams and one of the province's principal outdoor recreation areas.

OBJECTIVES

The objectives of the Plan are:

1. to protect unique ecologic and historic areas;
2. to maintain and enhance the quality and character of natural streams and water supplies;
3. to provide adequate opportunities for outdoor recreation;
4. to maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery;
5. to ensure that all new development is compatible with the purpose of the Plan;
6. to provide for adequate public access to the Niagara Escarpment; and
7. to support municipalities within the Niagara Escarpment Plan Area in their exercise of the planning functions conferred upon them by the Planning Act.

1.4 Significance and Sensitivity of the Oak Ridges Moraine

The Moraine provides a wide range of environmental functions critical to the maintenance of healthy water resources and natural heritage values in the Greater Toronto Area.

The Moraine is an important feature for the long term protection of many of the watercourses in the GTA. The north and south slopes of the Moraine are dotted with various springs and wet depressions that are the source areas that provide baseflow to many streams and rivers.

The Moraine, in general, serves as a large recharge area supplying water to a system of aquifers. Many communities and farm operations within the Oak Ridges Moraine depend on these aquifers for their water needs. As can be appreciated, the disruption of the quantity and/or quality of the groundwater resource could have major ramifications.

The Moraine also contains a large number of significant natural areas (e.g. wetlands, fish and wildlife habitat) and large healthy forested tracts. In addition, soil type and topography render many areas of the Moraine sensitive to the forces of wind or water erosion.

The significance and sensitivity of such areas must be taken into account in considering any land use change to ensure the environmental and social benefits of the Moraine are not destroyed or degraded. Therefore site specific and cumulative impacts of planning and development must address the sensitivity and significance of the Moraine.

Implementation Guidelines - Provincial Interest on the Oak Ridges Moraine
Area of the Greater Toronto Area, June 1991

In summary, there is a strong need for continuing and new/replacement supply from the close to market aggregate sources for the Greater Toronto Area. The challenge is to satisfy this requirement with proper regard to the characteristics and attributes of these supply areas. The remainder of this paper considers various approaches and strategies that are being implemented to address these challenges.

ENVIRONMENTAL RESPONSES

Avoidance Strategies

In terms of Environmental Protection, both the Niagara Escarpment Plan and guidelines for the Oak Ridges Moraine identify areas where aggregate extraction (and most other forms of development) are not permitted. This avoidance strategy protects the most sensitive and valuable environmental components of the planning areas.

Protection Strategies

Due to the nature of these resource areas, access to the aggregate resource often means extraction in proximity to significant environmental features. Provincial legislation and planning policy requires that the features be protected from undesirable impacts associated with aggregate extraction. This is achieved through detailed and comprehensive study and an understanding of the impacts of extraction in each specific setting. Mitigation is developed to protect adjacent features and functions.

Restoration and Enhancement Opportunities

Aggregate extraction is an interim land use and rehabilitation of extraction sites provides the opportunity to create afteruses that maximize biodiversity and increase ecological values.

Memories are short. Many who relocate to an area see the pits and quarries and hear how they have been active for many years. There is skepticism in terms of both quantity (rate of) and quality of past reclamation efforts.

Recent land use history on both the Niagara Escarpment and Oak Ridges Moraine provides us with undisputable proof that extraction sites are readily reintegrated with the natural environments which surround them. Aggregate extraction and other man induced disturbances are part of the history and heritage of these land forms.



The first mine in Canada at the Forks of the Credit 1886, limestone and sandstone were extracted.

*"A drive up the Niagara Escarpment to the Belfountain is a popular country outing. This charming landscape at the Forks-of-the-Credit is the product of industrial dereliction. Those scenic, jagged, rock piles were waste dumps from late nineteenth-century stone quarries. The birch trees are recent colonists on the steep slopes. The deep cutting through which the road climbs was formed from mining activity. The rustic dam in the Credit River once provided power for local industry. And that is just what you see from the car. If you know where to look vertical quarry faces, rusting wire rope, vestiges of roads and railways, and abandoned derricks. Belfountain was anything but a cherished landscape a century ago. Time and natural regeneration modified the wasteland into an appreciated resource of today."*³



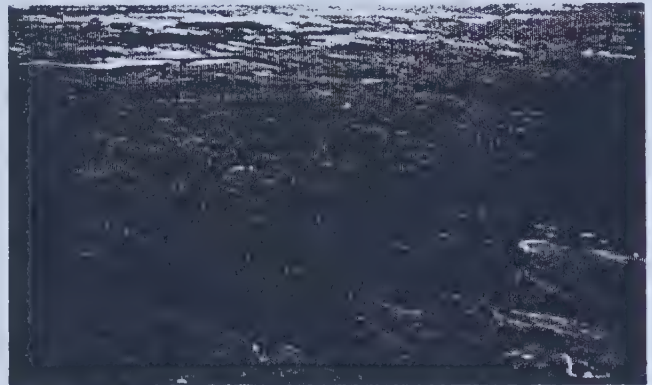
Credit Valley today, looking north to Cataract

The history of land use on the Oak Ridges Moraine is testimony to man's ability to work with nature to repair previous damage. Portions of the Moraine were once a veritable waste land as a result of uncontrolled forestry and agriculture in the 1800's. These same areas, reforested in the mid 1900's, are now part of the Gananaska Forest, a revered core area of the moraine.

The success of a 1950's reforestation program which turned a denuded landscape of blow sands into a core area forest should leave no doubt that today's aggregate industry with more sophisticated knowledge and stringent regulations can accomplish equal or better results.



Reforestation during the 1940's



Gananaska Forest today

The Ontario Ministry of Natural Resources has undertaken research which shows that even old extraction sites left to naturally regenerate have become diverse and highly valued ecological refuges. It is recognized that aggregate extraction has an important role in maintaining a mix of landscapes, habitats and species and providing conditions for unique plant and animal communities. Former extraction sites have redeveloped into Class 1 wetlands, valuable fisheries habitat and Areas of Natural and Scientific Interest.

Many of the presentations at this conference further attest to the environmental opportunities.⁴



Rehabilitation at Dufferin Aggregates Milton Quarry incorporates slope and habitat diversity



Progressive rehabilitation at the Halton Crushed Stone Quarry near Campbellville has provided an excellent variety of slopes and vegetation diversity.

Monitoring Opportunities

Monitoring opportunities are well exemplified in the functions of the UNESCO Biosphere Reserve. The Niagara Escarpment Plan Area is designated as a United Nations Biosphere Reserve. One of the main functions of the reserve is to provide sites for research, monitoring, education and training directed towards local or regional issues of conservation and resource use.⁵

Historical quarry sites provide opportunities to inventory and assess natural regeneration capabilities. Existing operating sites provide opportunities to observe the form and function of adjacent woodland and wetland communities. New extraction sites which have been the subject of detailed environmental studies provide baseline data and opportunities for continued monitoring over the development life of the site. The assembly of this type of information can only improve understanding of impacts and opportunities and improve decision making and mitigation design in the future.

RECREATION RESPONSES

One of the reasons for protection of green space associated with the Niagara Escarpment and Oak Ridges Moraine is to provide a setting for recreation and tourism. Indeed, public support for continued protection of these areas can only be strengthened if they are accessible and available for enjoyment, relaxation and education.

Attributes of extraction sites which make them ideal candidates for recreational redevelopment include:

- The sites are easily accessible. They are close to market/urban areas and have established transportation routes.
- Many extraction sites include water amenities as a result of below water extraction. These sites are very suitable for higher intensity recreational uses (swimming, beaches, water sports).
- It makes sense to use former extraction areas as public access points. Use of a former extraction site avoids the need to disturb “greenfield” sites to provide parking or day use facilities.
- Aggregate companies have shown a willingness to allow some public access to rehabilitated and unused portions of their properties for community recreational pursuits.



Boy Scouts participate in tree planting at Dufferin Aggregates Milton Quarry.



Hikers on Bruce Trail Bridge at Dufferin's Milton Quarry.

There is also a high interpretive/educational value associated with public access to these former extraction sites. They provide an ideal setting for geological study or interpretive centres as well as highlighting industrial and commercial heritage of local areas. For example, Dufferin Aggregates Milton Quarry includes an interpretative lookout on the Bruce Trail which overlooks the quarry and includes a display information regarding geology and history of the site. Dufferin Aggregates has also produced a brochure "Fossils at the Milton Quarry" which is available to visiting groups interested in geological research.



Royal Ontario Museum Family Affair Tour shows off their fossil discovery

COMMUNITY RESPONSES

Aggregate extraction is a rural activity that is dependant on the fixed location of the resource. The land use priority in rural areas is necessarily placed on resource based activities like agriculture, aggregate extraction and recreation (Ontario Provincial Policy Statement, Section 1.1.1 b)).

As planners, we tend to place the priority on rural areas as resource areas. Whether it is agricultural soils or aggregate deposits or environmental resources, they take priority over rural non-farm residential development. This is reflected in Provincial Policy and is the basis for many Ontario Municipal Board Decisions on rural resource uses.⁶

Planning strategies are designed to avoid conflict by restricting rural residential uses in areas where they may preclude or hinder existing or future aggregate extraction (Ontario Provincial Policy Statement Section 2.2.3.3).⁶

In situations where some degree of conflict cannot be avoided (due to existing residential uses), then the aggregate extraction operation is designed to ensure that impacts related to noise, dust, vibration and traffic are controlled so that provincially defined levels and limits are met and the two uses can co-exist.

In some cases, involvement of the community or local residents in the design and monitoring of the operation goes a long way to alleviating concern and developing compromise. The following case study is one such example. In other cases, resident liaison committees have proved useful and have lead to the development of mutually acceptable solutions.

One of the license conditions requires the establishment of a Citizens' Advisory Committee comprised of residents adjacent to the quarry and to the haul route for the purpose of reviewing operations at the site and screening complaints regarding site operation and haul route usage..... The Board, based upon the evidence it heard, finds that quarry operators today, are very concerned with the public that is affected by its operations and make every effort to develop and retain good public relations.⁷

CASE STUDY: INDUSTRY AND COMMUNITY CO-OPERATION LEADS TO ECONOMIC ENVIRONMENTAL, AND SOCIAL BENEFITS

There are many examples of projects that exemplify strong community involvement, environmentally beneficial reclamation and recreational opportunities. A recent example in the Town of Caledon combines many of these elements.

Caledon Sand & Gravel Inc. is located just south of Caledon Village on the edge of the Niagara Escarpment Plan Area within the west end of the Greater Toronto Area. The company is part of the James Dick Construction Group. The pit has operated on a 130 hectare site since 1956. Applications for an 80 hectare (200 acre), 35 million tonne, expansion were initiated in the late 1980's. The original application met with vehement opposition from local politicians and area residents.

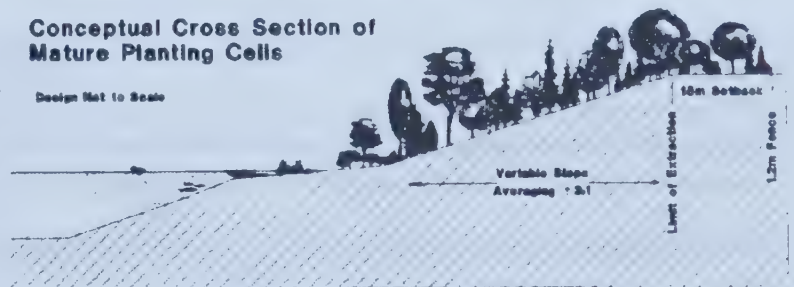
While the existing pit is outside the Niagara Escarpment Plan Area, the extension lands were located in the Plan Area. There is a provincially significant wetland to the north (partially within the existing licensed pit). The pit area is also a recharge zone for the regional aquifer which provides baseflow to springs and tributaries which contribute to significant fisheries resources.

As a result of several fortuitous circumstances including pre-hearing mandated negotiations, the applicant, review agencies and public were able to narrow and eventually resolve concerns regarding the proposed pit extension. The settlement, negotiated in 1996, was achieved by making significant alterations to the extraction and rehabilitation proposals.

The basis for the settlement was detailed, comprehensive environmental studies and investigations which provided a good understanding of surrounding environmental features and their relationship to important environmental functions. For example, the hydrogeological studies lead to recommendations for installation of a hydraulic buffer around the provincially significant wetland in order to reduce potential drawdown impacts associated with underwater extraction.

Another key was the development of an augmented rehabilitation plan incorporating ecological enhancement principles which was developed in order to improve connectivity of adjacent environmental areas. One of the objectives of the ecological enhancement rehabilitation plan is to establish and promote biologically diverse indigenous plant communities. Planting cells are designed to provide both age and species diversity which will provide multiple habitat opportunities for a wide range of wildlife species.

Conceptual Cross Section of Mature Planting Cells



Source: Ecological Services for Planning

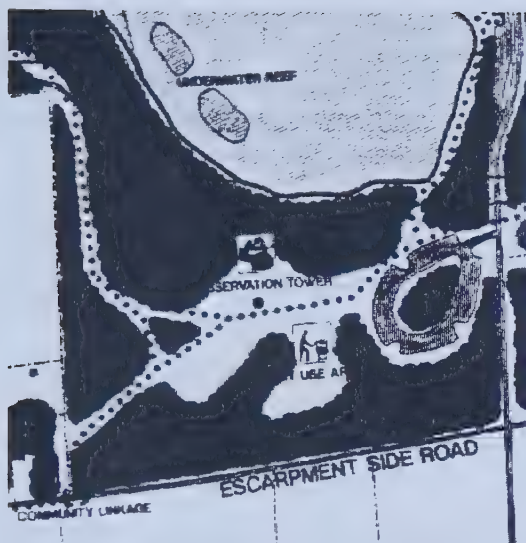
The overall net effect of the expansion proposal was maintenance and enhancement of ground and surface water resources. This includes a small increase to the baseflow of adjacent creeks which is viewed as beneficial both from a hydrogeological and ecological perspective. A detailed monitoring regime is in effect to track the accuracy of the predictions and contingency plans are included in the event that adjustments are required.

In addition to these environmental achievements, the community secured a number of operational and rehabilitation commitments that addressed their concerns.

- The operational phasing was revised in order to accelerate extraction and rehabilitation of areas closest to Caledon Village thereby making them available for alternative uses in a shorter timeframe.
- The applicant also agreed to construct a community beach at the north end of the operation as well as providing associated trail and future wetland areas.



Community Beach and Trails



Proposed Bruce Trail and Observation Tower

At the south end of the property, the applicant agreed to allow realignment of the Bruce Trail to allow hiking access to the southern buffer lands. This commitment includes an agreement to provide a location for access, parking spots, interpretive displays and observation points. Over time, it is expected that this access and co-operation will extend to other portions of the property.

As a result of the negotiated settlement, the applicant was able to secure access to additional resources which were critical to both the corporation and provincial consumers. The site had immediate access to provincial highway in close proximity to the growing urban areas in the Greater Toronto Area.

In addition to these tangible benefits, an additional achievement was the establishment of a good working relationship between the applicant, residents and the municipality.

CONCLUSION

Close to market aggregate supply areas for the Greater Toronto Area are the Niagara Escarpment Plan Area and Oak Ridges Moraine. Extraction in and adjacent to this area must be carefully planned to realize opportunities such as environmentally beneficial restoration, recreational focal points and community benefits.

ENDNOTES

- ¹ Ontario Provincial Policy Statement 2.2.3.1
- ² Floyd Preston Limited License Application (Town of East Gwillimbury), April 23, 1990, Board File Nos. O 870050 et al., A.J.L. Chapman, Vice-Chair and C.M. Millar (Re)
- ³ Andrae, Christopher. "Industry, Dereliction, and Landscapes in Ontario." *Ontario History* LXXXIX.. 2 (June 1997), 162-180
- ⁴ See for example, Abandoned Pits and Quarry Sites: Living Experiments (Mark Browning), Management of Abandoned Aggregate Properties Program, Chris McGuckin, Landscape Ecology Approaches to Sustainable Management of Mineral Aggregate (John Fraser), Rehabilitation of the Glenridge Quarry Landfill Site, (J. Fausto), Planning for the Future: Rehabilitation of Dufferin's Milton Quarry, (Ken Zimmerman), A Natural Heritage Approach to the Rehabilitation of Southern Ontario's Pits and Quarries (Ken Ursic)
- ⁵ Biosphere Reserve: What Does It Mean? George Francis, Member - Working Group on the Biosphere Reserves.
- ⁶ See for example, Rideau (Township) Official Plan Amendment (Dibblee Construction), August 25, 1983, Board File No. R 821749 et al., D. M. Rogers and J.E. Hendy (Re), Pages 2 and 4, Lafarge Canada Inc. Class A License (Township of Camden East), September 26, 1997, Board Files Nos. Z920054 et al., T. Yao (Re)
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Reclamation and Restoration of Settled Landscapes

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